Photo: iStock.com

4

Policies and measures

This chapter describes the Finnish climate policy framework, the policy-making process and domestic and regional legislative arrangements and procedures for climate policy implementation under the UNFCCC, the Kyoto Protocol and the Paris Agreement. These are followed by a description of the national climate and energy strategies and plans for meeting the related targets. The policies and measures planned, adopted and implemented to achieve the emission reduction commitments under international agreements and the ambitious national goal of carbon neutrality by 2035 are presented by sector. Also, taxation and subsidies, use of Kyoto mechanisms and the effect of policies and measures on long-term trends are discussed. The end of the chapter examines mitigation benefits other than greenhouse gas reduction and minimising adverse effects in other countries.

4 Policies and measures

4.1 Climate policy framework in Finland

Effective climate change policies require global collaboration and actions. Finland's climate policy is therefore based on international agreements: the UNFCCC; the Kyoto Protocol; and the Paris Agreement. This chapter describes the Finnish climate policy framework, the policy-making process and domestic and regional programmes, legislative arrangements and procedures for climate policy implementation under the UNFCCC, the Kyoto Protocol and the Paris Agreement. The common policies of the European Union, such as the EU 2030 Climate and Energy Package, play a key role in the implementation of the above international agreements. At national level, Finland's climate policy is defined in government policies and programmes, and since 2003, ministerial working groups have steered strategic work. In addition, national energy and climate strategies have been prepared since 2001 to implement international and EU commitments, as well as national targets, and to define sectoral policies and measures.

4.1.1 Climate Act

The new Climate Act (423/2022) entered into force on 1 July 2022. The previous Climate Change Act, the first in Finland, was adopted in 2015. The Act sets out several plans that aim to reduce greenhouse gas emissions and adapt to climate change in Finland. It also obliges the central government authorities to monitor the trends in emissions and achievement of climate targets and report on them to Parliament.

The 2035 carbon neutrality target, which was set in the Programme of Prime Minister Sanna Marin's Government in 2019, was included in the reform of the Act. In addition, new emissions reduction targets for 2030 and 2040 were included in the Act, and the previous emissions reduction target of 80 per cent by 2050 was updated. The new targets are 60 per cent by 2030, 80 per cent by 2040, and at least 90 per cent, aiming for 95 per cent, by 2050 compared to 1990 levels.

The scope of the Act was also extended to cover the land-use, land-use change, and forestry (LULUCF) sector, and a target for the strengthening of carbon sinks was added. The planning system for national climate policy under the Climate Act was also reformed by including a new climate programme for the land-use sector.

4.1.2 UNFCCC and Kyoto Protocol

Under the UNFCCC, the EU and its Member States committed to achieving a joint quantified economy-wide greenhouse gas emissions reduction target

of 20 per cent below the 1990 level by 2020 ("the Cancun pledge"). It is therefore a joint pledge with no separate targets for Member States under the Convention. The UK remained part of the joint EU 2020 target with the 27 EU Member States.

The EU has jointly committed to its UNFCCC target and implemented it internally through EU legislation in the 2020 EU Climate and Energy Package. In this package, the EU introduced a clear approach to achieving the 20 per cent reduction in total GHG emissions from 1990 levels by dividing the effort between the sectors covered by the EU Emissions Trading System (EU ETS) and the sectors under the Effort Sharing Decision (ESD)[1]. Binding national targets were set for Member States under the Effort Sharing Decision. The achievement of EU internal compliance under the 2020 Climate and Energy Package, including the national targets under the ESD, is not subject to the UNFCCC assessment of the EU's joint commitment under the Convention.

The EU and its Member States played their part in the joint commitment as follows. Emissions from categories covered by the EU Emissions Trading System (EU ETS) were to be reduced by 21 per cent by 2020 from their 2005 level, and emissions not covered by the EU ETS were to be cut by approximately 10 per cent from the 2005 level by 2020 within the EU as a whole. The EU ETS emissions reduction commitment was an EU-level commitment, and Member State specific caps were not defined for the EU ETS emissions reductions (for more information, see Section 4.1.3 below).

The EU substantially overachieved its reduction target under the Convention, which means that its Member States and the United Kingdom also fulfilled their emissions reduction obligations. As stated in the 2022 EU GHG inventory submission to the UNFCCC, the total GHG emissions, excluding LULUCF and including international aviation, decreased by 34 per cent in the EU-27 + UK compared to the 1990 base year, or 1.94 billion tonnes of CO_2 equivalent.

The EU's Effort Sharing Decision defined Finland's reduction obligation for the sources not covered by the EU ETS as 16 per cent of the 2005 emissions. This reduction obligation was determined in CO_2 equivalent (eq.) tonnes in the Commission Decision[2], and adjusted in the Commission Implementing Decision[3] to take changes in the coverage of the EU Emissions Trading System from 2013 onwards into account. For Finland, these annual adjustments increased the reduction commitment by 2020 by approximately five percentage units.

1 2009/406/EC
2 2013/163/EU
3 2013/634/EU

The Kyoto Protocol was amended with new quantified emission limitation and reduction commitments for the second commitment period, 2013 to 2020, which continue the commitments established for the first period. Finland's emissions reduction target for the second commitment period of the Kyoto Protocol was defined based on its emissions reduction obligation under the ESD described above. This target amounted to 240,544,599 tonnes of CO_2 eq. and covered only non-ETS emissions. In addition, Finland was responsible for the emissions and removals from the LULUCF activities as defined in Decision 2/CMP.7 during the second commitment period.

Based on the inventory data, the cumulative emissions of the Effort sharing sector during the entire commitment period were 238.2 Mt CO_2 eq. The additional burden from the emissions and removals from the LULUCF activities as defined in Decision 2/CMP.7 is 5.9 Mt CO_2 eq. Finland must therefore use additional emission units transferred from the previous Kyoto Protocol commitment period or acquired from the Clean Development Mechanism or Joint Implementation. Finland has enough such additional units at its disposal. The fulfilment of the commitment will be confirmed between 2022 and 2024 after international reviews and the True-Up Period. A description of the first commitment period of the Kyoto Protocol can be found in the 7th national communication.

Articles 3.3 and 3.4 of the Kyoto Protocol

Articles 3.3 and 3.4 of the Kyoto Protocol concern emissions and removals from land-use, land-use change and forestry (LULUCF) activities. Article 3.3 activities (afforestation, reforestation and deforestation) are based on land-use changes, and reporting these activities is mandatory for the Annex I Parties. Under Article 3.4, the selection of activities (forest management, cropland management, grazing land management and revegetation) was voluntary for Parties during the first commitment period. During the second commitment period, forest management (FM) became mandatory. Finland had already elected to apply FM in the first commitment period but did not select other voluntary activities for either commitment period. The accounting for the emissions and removals under Article 3, Paragraphs 3 and 4 was to be done at the end of the first commitment period and will also be done for the second commitment period.

Based on an initial study by the Natural Resources Institute (Luke), Article 3.3 activities were estimated to cause net emissions for the 2013 to 2020 period because of the conversion of forest land to other land uses, as well as low carbon sequestration rates in areas afforested or reforested since 1990. During the second commitment period of 2013 to 2020, the net emissions from the Article 3.3 activities, i.e. afforestation, reforestation and deforestation were an average of 3.2 million tonnes CO_2 eq. per year. Average net removals from afforestation and reforestation were 0.6 million tonnes CO_2 eq. per year, including carbon stock changes in harvested wood products from afforestation/reforestation

areas. Net emissions from deforestation were an average of 3.8 million tonnes CO_2 eq. per year. Land-use change from forest land to other land uses is difficult to avoid in a country where forests cover 72 per cent of the land area. Most of the change is driven by settlements and infrastructure (e.g. roads and transmission lines), as well as agriculture. The emissions under Article 3.3, in total 25.9 million tonnes for the whole commitment period, will be subtracted from Finland's assigned amount at the end of the commitment period.

The FM net sink, i.e. the sum of emissions and removals during the second commitment period, was 37.8 million tonnes CO_2 eq. per year. These net removals for FM include the net removals by harvested wood products, which were an average of 13.7 million tonnes per year. Net removals from forest management vary significantly from year to year based on the demand for forest industry products driven by the overall economic situation.

The net emissions from FM will be compared to the reference level established for Finland (−20.466 million tonnes CO_2 eq.) in decision 2/CMP.2, adjusted by the technical correction (−9.1980 million tonnes CO_2 eq. in Finland's latest inventory submission). A higher sink will result in RMU units that can be used to meet the reductions target; a lower sink will mean the subtraction of assigned amount units equal to the difference between FM and reference level removals. Additional RMU units can be received only up to a value of 3.5 per cent of the 1990 national total emissions without the LULUCF sector (FM cap). Finland's cap value for the FM sink is −19.978 million tonnes CO_2 eq. At the end of the second commitment period, the sum of net removals from forest management exceeding the FM reference level and its technical correction was 64.9 million tonnes CO_2 eq.[4], which was greater than the FM cap. In total, net emissions from the Article 3.3. exceeded the maximum that could be accounted for from the forest management of Article 3.4., i.e. the forest management cap, by 5.9 million tonnes CO_2 eq., which will be subtracted from Finland's assigned amount.

The KP LULUCF accounting will be confirmed after the review and the True-Up Period at the end of 2023 or in 2024. Detailed information on Kyoto Protocol activities under Articles 3.3 and 3.4 is presented in Finland's latest National Inventory Report under the UNFCCC and the Kyoto Protocol.

4.1.3 Legislation on the Kyoto Mechanisms

An administrative framework for participating in the Joint Implementation (JI) and Clean Development Mechanism (CDM) project activities and emissions trading under the Kyoto Protocol (Articles 6, 12 and 17) is provided by the Act on the Use of the Kyoto Mechanisms.[5] Decrees on JI[6] and the

4 Also taking the reduction for one year into account when net removals were smaller than the forest management reference level and its technical correction

5 109/2007

6 91372007

CDM[7] include guidance on the content of the applications for project approvals and on authorisation for entities to participate in the projects.

The Ministry of the Environment decides whether to authorise legal entities to prepare for and participate in a JI project, and it approves the JI projects. The Ministry of the Environment may also participate in international emissions trading on behalf of the State. The Ministry for Foreign Affairs authorises preparations for and participation in CDM projects and approves the projects.

The Ministry of the Environment is the holder of the national account for Kyoto units and makes decisions regarding the transfer of units to and from national account. The Energy Authority is the competent authority for emissions trading and the administrator of the national emissions trading registry (see the section on the national registry in Chapter 3).

4.1.4 The Paris Agreement

The Paris Agreement was adopted in December 2015 and entered into force in November 2016. The EU ratified the agreement in October. The Finnish national ratification was completed in November 2016.

The Paris Climate Change Agreement is an international, legally binding agreement on climate change. It aims to limit the rise in global average temperature to well below 2 °C relative to pre-industrial levels and to pursue efforts by which warming could be limited to below 1.5 °C.

The Paris Agreement does not include any quantitative emissions reduction obligations, but the Parties commit to the preparation, communication, maintenance, and achievement of their successive national goals concerning emissions. The Parties are obliged to prepare their national contributions every five years, and the most recent goal must always be more ambitious than the previous one. Progress in relation to the objectives is to be reviewed every five years. The first global review, or "stocktake", will take place in 2023.

The EU's joint nationally determined contribution under the Agreement is to reduce greenhouse gas emissions by at least 55 per cent by 2030 from the 1990 level. The details of the effort sharing between the Member States, including Finland, are currently being negotiated. More information on the negotiations and the associated policy framework beyond 2020 is presented in the next section.

4.1.5 Climate policy of the European Union

EU legislation and policy programmes have a major effect on Finland's greenhouse gas emissions.

7 915/2007

In 2007, the EU heads of state or government agreed on targets to combat climate change through a commitment to reduce greenhouse gas emissions by 20 per cent by 2020 from the emission level in 1990 (see also Section 4.1.2). In the long term, or by 2050, the guideline target involved a reduction of emissions by 80 to 95 per cent. The EU 2020 Climate and Energy Package constituted the framework for the EU's climate policy for the 2013 to 2020 period.

To achieve the 2020 emissions reduction target, the EU Member States adopted a binding renewable energy target prescribing that at least 20 per cent of the EU's gross final energy consumption and 10 per cent of the final energy consumed in the transport sector must come from renewable energy sources by 2020.

According to the EU 2020 Climate and Energy Package, emissions from sectors not included in the EU ETS – such as transport, housing, agriculture and waste – had to be cut by approximately 10 per cent from the 2005 level by 2020 within the EU as a whole. The Effort Sharing Decision (ESD)[8] established binding annual greenhouse gas emissions targets for Member States for the 2013 to 2020 period.

Finland's target under the ESD is presented in detail in Table 4.1. The table also includes the emissions from non-ETS sectors from 2013 to 2020.

Table 4.1
Finland's target path for non-ETS emissions in accordance with the EU Effort Sharing Decision and corresponding emissions for 2013 to 2020

	2013	2014	2015	2016	2017	2018	2019	2020	sum (2013–2020)
Finland's annual emission allocations	31.8	31.3	30.8	30.3	30.2	29.6	29.1	28.5	241.559
Non-ETS emissions[1]	31.6	30.1	29.9	31.4	30.1	29.9	29.6	28.1	240.727
Distance from the target[2]	–0.2	–1.1	–0.9	1.0	–0.1	0.3	0.6	–0.4	–0.832

1 Due to the annual implementation of the EU ESD, the emissions used for assessing compliance are not updated after the compliance assessment. The emissions may therefore differ from the most recent inventory data.

2 Distance from the target is expressed as a negative number when actual emissions are below annual emission allocations.

As Table 4.1 shows, Finland met its emissions reduction commitments under the EU Effort Sharing Decision concerning the entire period from 2013 to 2020.

The 2020 Climate and Energy Package also required Finland to increase its use of renewable energy sources to 38 per cent of final energy consumption by 2020 and the share of biofuels in gasoline and diesel to 10 per cent by 2020. Finland has already reached these targets as well.

8 2009/406/EC

The EU also has a regulation on F gases[9], covering key applications in which F gases are used. The current regulation applies from 1 January 2015. The regulation limits the total amount of the most important F gases that can be placed on the EU market from 2015 onwards and phases them down in steps to a fifth of 2014 sales in 2030. In addition, the regulation bans the use of F gases in many types of equipment where less harmful alternatives are widely available, such as supermarkets, air conditioning, foams and aerosols, and imposes measures for preventing emissions of F gases from existing equipment by requiring checks, proper servicing and recovery of the gases at the end of the equipment's life. With the current F gas Regulation, the EU's F gas emissions will be cut by two thirds by 2030 compared with 2014 levels. In 2022, a revision of the F gas regulation was initiated. It is expected that the steps and timetable of the phase-down of certain F gases will be significantly tightened, new bans will be introduced and the containment of F gas emissions will be improved. The proposed new measures are expected to equate to additional emissions savings of 40 million tonnes CO_2 eq. by 2030 and 310 million tonnes CO_2 eq. by 2050 at the European level.

The policy framework for the period beyond 2020 is partly prepared and partly still in preparation in the EU. According to the European Council conclusions in 2014, the EU is committed to reducing total greenhouse gas emissions by at least 40 per cent by 2030 compared to 1990. The reduction target from the 2005 levels in the emissions trading sector is 43 per cent, and in the non-emissions trading sector, it is 30 per cent. The share of renewable energy (of final energy consumption) in the EU was set to 32 per cent, and the target of energy efficiency was revised to 32.5 per cent in connection with the revision of Renewable Energy and Energy Efficiency Directives in 2018.

In addition to the reform of the EU's emissions trading system (ETS) and the Effort Sharing on non-ETS emissions, for the first time the land-use, land-use change and forestry sector is also included in the EU's climate policy package. In the Effort Sharing Regulation, Finland's target for emissions reductions in 2030 compared to the 2005 level is 39 per cent. The legislative package includes flexibility mechanisms that allow Member States to achieve their targets in cost-effectively.

To achieve and implement the EU's 2030 Climate and Energy Package, as well as the Energy Union targets, in November 2016, the Commission submitted the Clean Energy Package, which included eight legislative proposals, a new eco-design working plan, and several communications and reports, all related to the clean energy transition. The Energy Union policy programme aims to provide EU citizens with reasonably priced, secure and sustainable energy.

In 2019, the Commission submitted a communication describing the European Green Deal, which included a target of carbon neutrality by 2050.

9 2014/517/EU

The target itself is already in the EU's binding legislation, but more detailed laws are still in preparation.

In 2020, the Commission presented its proposal to tighten the 2030 emissions target so that the new reduction in the EU's total emissions would be at least 55 per cent by 2030 compared to the 1990 level. The rationale is that the previous target is inadequate for achieving the carbon neutrality target by 2050. The Commission therefore submitted the preliminary Fit for 55 legislative climate package, which lays out measures for how to achieve the stricter 55 per cent reduction. For example, the current ETS would be expanded to maritime transport, and a new emissions trading system would be established for ground transport and space heating. Emissions reduction targets for the ETS and effort sharing sectors would be stricter (61 and 40 per cent compared to 2005 respectively), as well as the previously mentioned targets of the share of renewables and energy efficiency (40 and 36 to 39 per cent respectively).

It is also noteworthy that the Commission has the power to initiate an infringement proceeding against a Member State that fails to fulfil its commitments and obligations under EU law.

4.2 Climate policymaking process in Finland

4.2.1 Government and the role of ministries

The Government and Parliament make the most important decisions concerning climate policy. Usually, the President of the Republic directs foreign policy in cooperation with the Government and thus approves Finland's international commitments and decides on their implementation according to the constitution. However, some major decisions also require approval from Parliament (also see Chapter 2). Parliament also actively participates in the debate on how EU decisions are implemented nationally. The Ministerial Committee on European Union Affairs discusses and decides on Finland's positions on EU and international climate policy issues. Finland participates in the international climate negotiations as part of the European Union and therefore follows the EU's common positions.

The Ministry of the Environment bears the responsibility for coordinating the preparatory work for the climate negotiations and is the national focal point for the UNFCCC. Preparatory work for the climate negotiations is carried out in several ministries.

Since 2003, every Finnish government has appointed ministerial working groups responsible for energy and climate policy, with representatives from all government parties. These ministerial working groups have been responsible for preparing and updating the national strategies on energy and climate policy. The ministerial working group has a network of

officials acting as its preparatory body, comprising representatives from the Ministry of Economic Affairs and Employment, the Ministry of Transport and Communications, the Ministry of Agriculture and Forestry, the Ministry of Education and Culture, the Ministry for Foreign Affairs, the Prime Minister's Office, the Ministry of Finance, and the Ministry of the Environment. The network of officials is led by the Ministry of Economic Affairs and Employment, which oversees the overall coordination of the strategy work. The current strategy on energy and climate policy, which was updated in 2022, is described in Section 4.3.1.

In Finland, climate policy is increasingly being integrated with the decision-making processes in energy production, transport, agriculture, forestry and land use and other planning. For example, both the transport sector and the land-use sectors have their own climate policy programmes.

The new Climate Change Act that entered into force on 1 July 2022 lays down provisions on climate change policy planning and the related monitoring and sets the national climate objectives. The act also imposes obligations on the authorities. According to the new Climate Change Act, the rights of the Sámi people must be taken into account, and negotiations with the Sámi Parliament must be conducted in the processes to prepare climate change policy plans. The act also includes provisions on the duties of a multidisciplinary expert body, Finland's Climate Change Panel, in support of the planning of climate policy.

Procedures included in the Climate Change Act enable annual assessment of the implementation of the Kyoto Protocol and of the progress in meeting the national emission reduction commitments. Also, the European Commission monitors annually that the EU Member States, including Finland, are in compliance with their emission reductions targets, in accordance with Decisions 406/2009/EU and 2018/842[10]. The legislation concerning the EU ETS, including compliance in the ETS sector, is harmonized across the EU. Finland has not established specific national rules for taking action against domestic non-compliance with emission reduction because such rules are established in the EU legislation (see the 4th Biennial Report of the European Union, Section 4.2.2 for the period of 2013–2020).

Finland was also one of the first countries to prepare a national climate adaptation strategy (NAS) in 2005. The strategy was evaluated in 2013 and superseded by the National Climate Change Adaptation Plan 2022 (NAP) in 2014. In 2022, a final evaluation of the NAP2022 was completed, and preparation of the new National Adaptation Plan 2030 was underway (more on national adaptation policy in Chapter 6).

Climate and energy policies and measures are also considered in the context of the promotion of the sustainable development. Society's Commitment to

10 https://eur-lex.europa.eu/legal-content/FI/TXT/PDF/?uri=CELEX:32018R0842&from=EN

Sustainability[11], was updated by the National Commission on Sustainable Development in 2016. With this commitment, the public sector and certain other actors pledge to promote sustainable development in all their work and operations. The commitment was later updated to respond to the new global agenda for sustainable development, the UN Agenda 2030. In 2020, the Government presented its latest report on the implementation of the UN Agenda 2030 for Sustainable Development to Parliament. The aim is a carbon neutral, resource-wise and competent Finland.

In reporting on policies and measures, including their implementation and effects on emissions, and projections to the European Commission and to the UNFCCC, the Ministry of Economic Affairs and Employment is responsible for the overall coordination and compilation of information from different sectors. The sectoral ministries are responsible for the projections and impact assessments concerning their own field. Several expert organisations assist in acquiring data and in the assessments of policies and measures and modelling sector-specific projections. The network of officials gives the final approval of the national communication.

The latest reporting requirements in the energy and climate sector were updated in connection with reforming the Climate Change Act in 2022. This act contains provisions on climate policy plans on which the Government will issue a report to Parliament. The Government's annual climate change report is coordinated by the Ministry of the Environment and all relevant ministries are involved in the work. The annual report informs Parliament on the achievement of climate targets and the impact of the measures taken. The first annual climate change report was issued in 2019. The Finnish Government's annual report to Parliament reports the progress of agreed measures in the energy sector.

The recent EU regulation on the Governance of the Energy Union and Climate Change Actions requires every EU Member State to regularly prepare an integrated national energy and climate plan (NECP) and a Long-Term Strategy (LTS) for low-carbon development. Finland submitted its first NECP to the EU in 2019 and its first LTS in 2020. The regulation also includes an obligation to biennially prepare the national energy and climate plan progress report (NECPR). The first report will be submitted in March 2023.

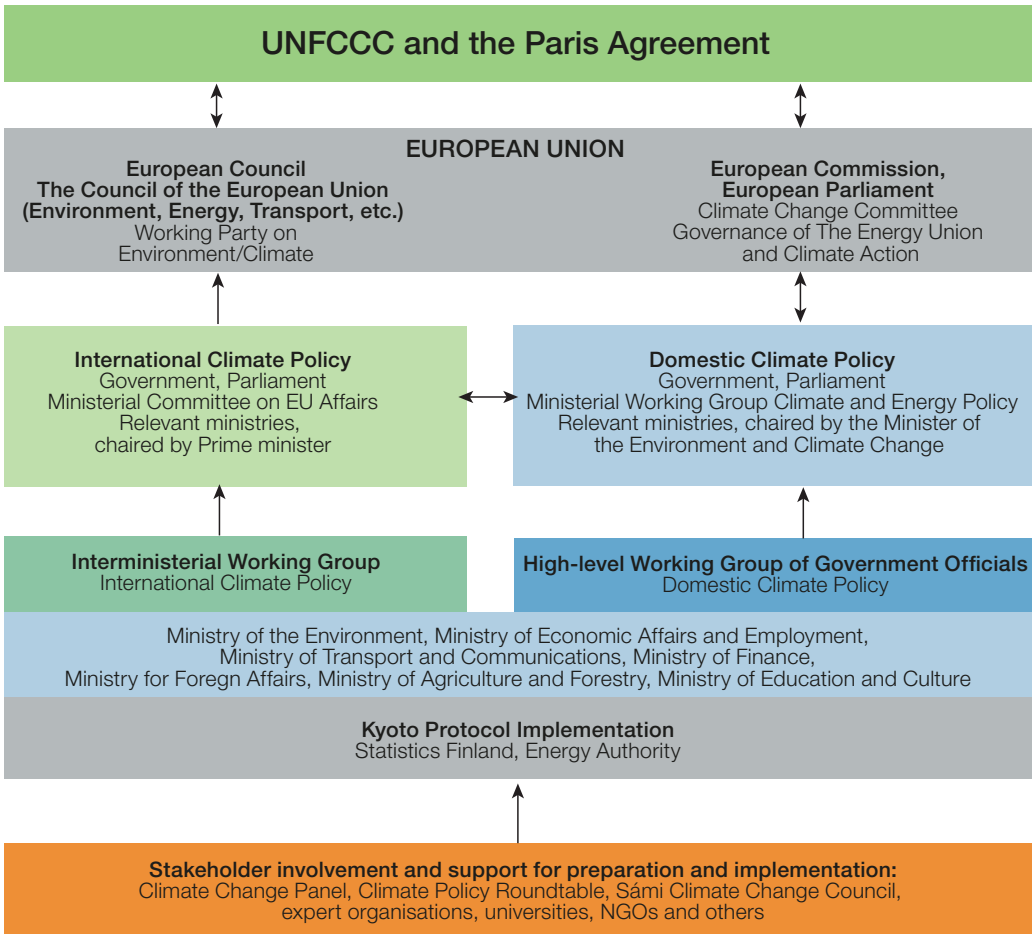
Statistics Finland is the national entity responsible for compiling the Finnish greenhouse gas inventory. Statistics Finland publishes the greenhouse gas inventory data three times every year. The publications include information on monitoring progress with Finland's commitments to reduce its greenhouse gas emissions under the EU and the Kyoto Protocol. The Finnish Environment Institute (SYKE), Natural Resources Institute Finland

11 http://www.ym.fi/en-US/The_environment/Sustainable_development

(Luke) and the VTT Technical Research Centre of Finland participate in the inventory preparation as part of the national system. The national system under Article 5, paragraph 1 of the Kyoto protocol and the inventory preparation process are described in Chapter 3.

The Energy Authority is the competent authority and the registry administrator for the national emissions trading registry under the Kyoto Protocol and the EU ETS (also see Chapter 3). The institutional arrangements related to climate policy and its implementation in Finland are described in Figure 4.1.

Figure 4.1
Institutional arrangements related to climate policy and its implementation in Finland



4.2.2 The Finnish Climate Change Panel

The Finnish Climate Change Panel[12] was nominated by the Ministry of the Environment for the first time in December 2011. The initially 12-member Panel was tasked to strengthen the interaction between research and policymaking. The Panel's members represent different branches of science from educational to atmospheric sciences. The Panel has published reports on

12 https://www.ilmastopaneeli.fi/en/

several topics relevant to climate policymaking, such as the Climate Change Act, a pathway for reducing net emission in Finland, climate education, adaptation to climate change, and the social acceptability of climate action.

The legal basis for the Finnish Climate Change Panel was established when the Climate Change Act came into force in the summer of 2015. The Panel is appointed as an independent body to support climate policy planning and decision making. The Government nominated the current 15-member Panel in December 2019 for a term of four years.

The Panel provides scientific advice for policymaking. The policy advisory role of the Panel has become stronger and more visible. The Panel gives its opinion on climate policy plans and produces reports to support the preparation and implementation of climate policy and legislation in Finland. Panellists have been invited to comment the National Climate and Energy strategy, the Medium-Term Climate Change Policy plan, and the Climate Plan for the Land-Use Sector.

4.2.3 Other stakeholders

The Climate Arena of the Ministry of the Environment is a network for other ministries and stakeholders (e.g. industrial and environmental non-governmental organisations (NGOs), research institutes, and labour unions), in which they can present their views concerning issues related to climate policy.

NGOs, including environmental, business, social, and research organisations, participate in various governmental working groups, seminars and official delegations. Industrial enterprises and the general public also play a major role in providing information and views for the decision-making process. The Ministry of the Environment also organises regular stakeholder meetings in advance of all major UNFCCC negotiations.

The Climate Policy Roundtable, established in 2020, brings all key stakeholders together to prepare Finland's national climate actions. It is a network for trade unions, municipalities, scientists, industrial sectors, interest groups, young people, and NGOs. The Climate Policy Roundtable does not make decisions; instead, it supports the national processes in preparing and implementing climate policy. The Roundtable meets five to seven times a year.

In April 2021, an online Citizens' Jury was convened to deliberate on climate actions planned by the Finnish government to reach its targets in reducing Finland's emissions. The jury was commissioned by the Climate Policy Roundtable with the Ministry of the Environment, and it was implemented by researchers from the University of Turku. This was the first nationwide deliberative mini-public event on climate issues in Finland. The results were

used for the preparation of the most recent Medium-Term Climate Change Policy Plan.

The Government Programme for 2019 to 2023 states that sectoral low-carbon roadmaps will be prepared to provide a more detailed picture of the scale and cost of the measures required for the transition to a low-carbon society. The work started in cooperation with major companies, advocacy organisations, and other organisations in 2019, coordinated by the Ministry of Economic Affairs and Employment. A total of 13 sectors prepared their own roadmap. The ministry published a report summarising the main results of the sectoral roadmaps in 2020. The report was published in English[13] in 2021. The report includes summaries of the published roadmaps, the project's key conclusions, a description of the work process and estimates of further work. It also explores how the roadmaps will be utilised in climate and energy work for a low-carbon Finland. The roadmaps will be updated where applicable in 2023 in accordance with the National Climate and Energy Strategy.

The Government Programme for 2019 to 2023 includes a climate programme for the LULUCF sector. The work of this programme is regularly reported to a steering body which is led by the Secretary General of the Ministry of Agriculture and Forestry and includes government officials and a broad base of stakeholders. This steering body has also steered the work of the Catch the Carbon programme (see Section 8.2.1 for Catch the Carbon programme).

The implementation of the National Adaptation Plan is supported by a broad-based Monitoring Group chaired by the Ministry of Agriculture and Forestry. It brings together representatives of several government ministries, sector agencies, research institutions, local and regional administrations, and other relevant actors (see also Chapter 6).

4.2.4 Public access to information

The right of access to information in official documents is a basic civil right protected by the Finnish constitution. Under the constitution, everyone has access to documents in the public domain. Documents in the possession of the authorities belong to the public domain unless access to them has been specifically restricted by an act.

The Act on the Openness of Government Activities[14] ensures everyone has the right to information on the activities of public officials. Access to documents is the main principle, and secrecy is an exception. Up-to-date legislation on climate and energy is publicly accessible through the Finlex online database of legislative and other judicial information of Finland. Finlex is owned by Finland's Ministry of Justice.

13 https://julkaisut.valtioneuvosto.fi/handle/10024/162851

14 621/1999

4.2.5 Regions and municipalities

Municipalities and regions play an important role, as Finland aims to be carbon neutral by 2035. Local and regional authorities can reduce their direct greenhouse gas emissions in many ways and minimise their carbon footprint. The local and regional authorities can also support and accelerate emissions reduction measures made by residents, companies, communities, and other regional and local stakeholders.

There is a wide range of informational, economic and voluntary or agreement-based instruments and tools local and regional authorities can utilise when pronouncing on and accelerating climate work in their own regions and municipalities across Finland. Climate budgeting is a valuable tool for municipalities aiming for carbon neutrality. Several municipalities in Finland have included climate investments in their budgeting. Tampere was the first Finnish city to introduce a climate budget in 2019. About 230 million euros was budgeted for climate investments in the city's economic plan for the years 2021–2024.

The new Climate Act (423/2022) entered into force on 1 July 2022. The Ministry of the Environment has prepared a proposal supplementing the Climate Act. In future, the Act will oblige municipalities to draw up climate plans. Municipalities should prepare a climate plan that will set out an objective to reduce greenhouse gas emissions in the municipality and measures to reduce greenhouse gas emissions. Government grants will be awarded to municipalities for the preparation of the climate plans. The Government has decided to allocate EUR 2,631 million per year for the preparation of climate plans in municipalities.

Municipalities have several means of expediting and promoting the climate work of their stakeholders, such as norms, obligations, financial means or communications, service design, cooperation, and partnerships. Within their own municipality, local governments are responsible for zoning, land use, transport planning, ownership steering of their own energy companies, choices between alternative heating systems for buildings and public procurement within their own territories.

The Finnish municipalities are active in a diverse set of networks that constitute an important part of local climate action, providing crucial peer support and knowledge sharing. There are several different types of regional, national and international networks that have varied cooperation and ways of working. Regional networks are based on the coordination of climate work at different governance levels or on the pooling of resources for smaller municipalities. The agreements concerning land use, housing, and transport are concluded by the State of Finland with the largest urban regions. The purpose of the agreements is to facilitate and support the cooperation between municipalities in urban regions and between municipalities and the State in

guidance related to the urban structure and coordination of land use, housing and transport. Although these agreements were originally made to solve other societal issues, they are also an essential tool covering the climate impacts of urban regional development.

Of the national networks, Hinku (Towards Carbon Neutral Municipalities) and Energy Efficiency Agreements represent older and larger networks, while the Climate Leadership Coalition (CLC) is a more recent and business-orientated network. The Hinku network brings together municipalities, businesses, and experts to create and carry out solutions to reduce greenhouse gas emissions. The Hinku criteria refer to the measures and policies municipalities have adopted to combat climate change. The municipalities in the network are committed to an 80 per cent reduction in greenhouse gas emissions from 2007 levels by 2030. There are 86 municipality members in the network, with a total of 2,265,000 inhabitants (42 per cent of the Finnish population).

Finland is committed to strict targets to improve energy efficiency. Energy Efficiency Agreements, chosen in cooperation by the Government and industrial/municipal associations, are a tool for fulfilling the EU energy efficiency obligations set for Finland, without resorting to legislation or other coercive measures. More than 120 municipalities and joint municipal authorities are committed to the energy efficiency targets set in the agreements. The parties to the agreements report annually on the energy efficiency measures they have taken and other activities aimed at improving energy efficiency.

The Climate Leadership Coalition is the largest non-profit climate business network in Europe. Six cities and several municipality-owned companies have joined the network.

Local Governments for Sustainability, the Covenant of Mayors, and Eurocities are international networks in which there are several municipality members from Finland. The larger cities are also active in other international urban climate networks, based on their own international strategies.

Finnish Sustainable Communities (FISU) aims for carbon neutrality, zero waste, and globally sustainable consumption. Integrating climate and other relevant goals at the municipal level brings synergies to local actors and businesses. The development of new types of cooperation is central in FISU actions.

At the regional level, the most important organisations for promoting climate work are the 18 Regional Councils (RCs) and 15 Centres for Economic Development, Transport, and the Environment (ELY Centres). The Regional Councils are responsible for compiling a Regional Land-Use Plan, which defines the principles of urban structure and the use of areas needed for specific purposes. All Regional Councils have included climate and energy issues in their strategies – either as separate climate strategy documents (climate roadmaps) or as a theme in comprehensive regional strategies.

The ELY Centres are responsible for the regional implementation and development tasks of national climate policy, for example, the four climate change policy plans. In recent years, ELY Centres have put more emphasis on climate change and circular economy issues. The first version of a roadmap to reduce ELY Centres' carbon footprint and to maximise their carbon handprint, i.e. their positive impact on regional stakeholders' mitigation measures for climate change, was published in 2021.

4.3 Strategies and plans

4.3.1 National energy and climate strategies

The Government Programme of Prime Minister Marin sets ambitious energy and climate targets, of which the most ambitious is Finland's national objective to be a carbon neutral society by 2035. National and EU-level legislation sets other energy and climate targets and commitments for 2030 and 2050 as well. In addition to the EU, certain international goals come from the UNFCCC, Paris Agreement and Kyoto Protocol , for example. The Government regularly prepares strategies and plans for achieving these energy and climate targets.

In 2020, Finland submitted its Long-Term Strategy to the EU and UN in accordance with the Implementing Regulation Act 2018/1999. The strategy includes Finland's latest national target, which is to achieve carbon neutrality by 2035. It is discussed further in Section 4.3.2.

Finland has prepared six national strategies on energy and climate policy, which were completed and submitted to Parliament as a Government Reports in 2001, 2005, 2008, 2013, 2016 and 2022, respectively. The focus of the 2008 and 2013 strategies was on policy measures for achieving the 2020 energy and climate targets. The 2016 strategy – National Energy and Climate Strategy for 2030 – outlined the actions enabling Finland to attain the targets specified in the Government Programme of former Prime Minister Sipilä (May 2015) and in the EU for 2030, and to systematically set the course for achieving an 80 to 95 per cent reduction in greenhouse gas emissions by 2050.

The latest strategy, called "Carbon Neutral Finland 2035 – National Climate and Energy Strategy", sets out the key starting points and objectives of the Government Programme goals, including the EU 2030 targets and national carbon neutrality target by 2035. It then assesses the adequacy of current measures for meeting the targets (the base scenario) and additional measures by which its targets can be attained (the policy scenario). The strategy also refers to the latest Medium-Term Climate Change Policy Plan, which specifies the key measures for achieving the binding emissions reduction targets in the effort sharing sector by 2030, and to the Climate Change Plan for the Land-Use Sector.

With minor exceptions, Finland is phasing out the use of coal in the energy sector. The share of transport biofuels will be increased to 34 per cent (of the fuel energy content), and an obligation to blend light fuel oil used in machinery and heating with 30 per cent of bioliquids will be introduced. Finland will continue to subsidise electric and gas vehicles and promote the use of biogas in transport. The minimum aim in the strategy was to have 750,000 electric and 130,000 gas-powered vehicles on the roads in 2030. The electricity market will be developed at the regional and European levels. The flexibility of electricity demand and supply and in general, system-level energy efficiency, will be improved. A continuously strong focus will be kept on the national Energy aid scheme, which funds energy projects based on new energy technologies.

With the additional measures outlined in the strategy, the share of renewable energy in primary consumption is expected to increase to approximately 50 per cent, and the self-sufficiency in energy to more than 50 per cent by 2030. Most of this is attributed to biomass and wind power, including offshore wind. The national carbon neutrality target by 2035 appears possible to achieve, but much depends on individual companies' timing in investing in reducing process-related emissions, as well as the kind of carbon sink levels the LULUCF sector will be able to sustain. Due to the high carbon prices in the EU's ETS, the target of halving the use of energy peat set out in the Government Programme by 2030 will be achieved well in advance. The greatest non-ETS sector reductions in emissions will be achieved in the transport sector, which is also the foundation of the latest Medium-Term Climate Change Policy Plan prepared in 2022.

The relevant ministries are responsible for implementing the measures set out in the National Climate and Energy Strategy and for their monitoring and evaluation. In some cases, this responsibility has been delegated to specialised government entities such as Motiva Oy, an entirely state-owned sustainable development company in Finland that promotes the efficient and sustainable use of energy and materials.

An example of sectoral climate policy progress reports are the summaries on the impact of energy efficiency agreements published on the internet[15] by Motiva Oy.

As a member of the European Union, Finland has reporting obligations to the EU concerning policies and measures and projections. The requirements are set by the EU Monitoring Mechanism Regulation[16]. The biennial report on policies and measures and projections has been compiled in cooperation with the Ministry of Economic Affairs and Employment (responsible for the overall

15 https://energiatehokkuussopimukset2017-2025.fi/tulokset/sopimusten-tulokset-yhteensa/ (Energy Efficiency Agreements 2017 to 2025, Results; platform only in Finnish)

16 2013/525/EU

coordination), the Ministry of the Environment, the Ministry of Transport and Communications, the Ministry of Agriculture and Forestry, the Ministry of Finance, Statistics Finland, the Finnish Environment Institute (SYKE), state owned sustainable development company Motiva Oy, and Natural Resources Institute Finland (Luke).

In the Government's annual report to Parliament, mitigation measures and emissions development are evaluated at a general level. Other energy and climate reporting activities include an annual report to Parliament on the implementation of the Medium-Term Climate Policy Plan and reporting once per government term on the national adaptation plan constructed based on the Finnish Climate Change Act.[17]

4.3.2 Long-Term Strategy (LTS)

In 2020, Finland submitted its Long-Term Strategy (LTS) to the UN and EU. It replaces the former Energy and Climate Roadmap 2050, published in 2014. The preparation of an LTS is stipulated in Article 4, Paragraph 19 of the Paris Agreement under the UNFCCC and in Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, also known as the "Governance Regulation". It was the first strategy to take Finland's carbon neutrality target into account before the latest National Climate and Energy Strategy in 2022.

Finland's Long-Term Strategy lays out scenarios and impact assessments concerning the national carbon neutrality target set for 2035 and developments in greenhouse gas emissions and removals by 2050. The strategy explores the following three scenarios. Alongside the reference scenario depicting the development achievable with current policy measures at that time, known as the "With Existing Measures" (WEM) scenario, the strategy presents two alternative low-emission scenarios, known as the "Continuous Growth" and "Savings" scenarios. The Continuous Growth and Savings scenarios describe alternative pathways for achieving the emissions reduction target at that time set by Finland (or by the European Union, if stricter) for 2050. The Long-Term Strategy does not consider the transition to a low-emission society from the perspective of regional or social justice; instead, its underlying calculations are based on the premise that emissions reduction costs will be minimised across the country. Nor does the Long-Term Strategy identify the sectors to which emissions reductions should be allocated; nor do the impact assessments derived from the scenarios include any quantitative analysis of the concrete measures or political decisions that would be required to achieve the carbon neutrality target or the 2050 targets considered here.

17 609/2015

With existing measures (WEM), carbon neutrality will not be achieved until 2050 – and even then, only with land-use net sinks at about 30 Mt CO_2 eq. per year. Conversely, the Continuous Growth and Savings scenarios will achieve carbon neutrality in 2035, but this will require substantial emissions reductions over the 2030 to 2035 period, while also keeping the size of forest carbon sinks at a reasonable level. The measures decided by the Government and their impact on emissions are described in the latest National Climate and Energy Strategy, prepared in 2022.

Going forward, Finland will prepare a new complementary national Long-Term Strategy in accordance with the requirements set out in the Climate Change Act. The new strategy will be submitted to Parliament by the end of 2025 at the latest.

4.3.3 Medium-Term Climate Change Policy Plan

The Climate Change Act contains a provision on a climate change policy planning system that includes a Medium-Term Climate Change Policy Plan adopted by the Government once every government term. The Medium-Term Climate Change Policy Plan will include an action plan that contains measures for the reduction of anthropogenic greenhouse gas emissions and the mitigation of climate change in the effort sharing sector (sectors outside emissions trading) and projections of greenhouse gas emissions and the effects of policy measures on the emissions. The preparation of the Plan is coordinated by the Ministry of the Environment, and all the relevant ministries are involved in the work. The Annual Climate report, which is submitted to Parliament every year, contains information on the implementation of the policy measures contained in the Medium-Term Climate Change Policy Plan.

The second Medium-Term Climate Change Policy Plan was finalised during 2022. Alongside the National Climate and Energy Strategy and the Climate Plan for the Land-Use Sector, this plan implements the climate policy objectives of the Government Programme. It specifies and complements the emissions reduction measures outlined in the National Climate and Energy Strategy and the Climate Plan for the Land-Use Sector. It also examines links between different sectors and crosscutting themes such as the role of consumption and regional climate action. The plan takes the energy policy measures included in the strategy and the measures included in the Climate Plan for the Land-Use Sector into account, because they will have an impact on the development of the total emissions.

The Medium-Term Climate Policy plan was updated to meet the increasingly stringent EU obligations for 2030 and the Government's target to achieve carbon neutrality by 2035. The plan sets a target for reducing greenhouse gas (GHG) emissions 50 per cent in the effort sharing sector by 2030 compared to the 2005 level. It also determines the measures for achieving the target. The target is based on the European Union's (EU) 2030 target of reducing

emissions by at least 55 per cent compared with 1990 levels and is in line with Finland's long-term climate goal. As the existing measures are insufficient to achieve the 2030 EU target and the national target to be climate neutral by 2035, the plan identifies a range of additional measures. The greatest emissions reduction potential is identified in the transport sector. The plan also includes measures to reduce emissions in the agriculture, waste, and machinery sectors, as well as emissions from building-specific heating and F gas emissions.

A wide range of citizens and stakeholder groups was heard during the preparation of the Medium-Term Climate Change Policy Plan. The plan is based on the principle that carbon neutrality should be achieved as cost-effectively and fairly as possible.

4.3.4 Climate Plan for the Land Use Sector

The Climate Plan for the Land Use Sector (LULUCF) was prepared from 2021 to 2022 for the first time, and it will be one of the key elements of the planning system under the revised Climate Change Act. In line with the UN Framework Convention on Climate Change and the Paris Climate Change Agreement, the land use sector comprises land use, land-use change, and forestry (LULUCF).

The preparation of the Plan was coordinated by a working group, which included members from the Ministry of Agriculture and Forestry and other relevant ministries, as well as two experts from the Finnish Climate Change Panel. The key principle in the preparation was to reach the climate targets as cost-effectively, fairly and justly as possible. The Plan was preceded by an analysis of the most effective climate measures in the LULUCF sector and complemented by an environmental impact assessment, as well as an analysis of the cost-effectiveness of the proposed measures. The Plan was prepared in a participatory manner.

The purpose of the Plan is to promote the reduction of emissions from land use, forestry, and agriculture, the strengthening of carbon sequestration and carbon storage, and adaptation to climate change in accordance with the Sustainable Development Goals. The annual net impact, i.e. decrease in the emissions and increase in the removals, for which the additional climate measures in the land-use sector aim is at least three million tonnes of carbon dioxide equivalent by 2035.

Some measures were implemented already during the preparation of the Plan. Such measures include new ownership policy guidelines for the State Forest Enterprise Metsähallitus for 2020 to 2024, the act on fixed-term support for afforestation, and the act on fixed-term support for fertilisation of forests with wood ash. The Plan also includes measures targeting land-use changes, carbon dioxide emissions from agricultural land, the management of peatland forests, the promotion of carbon markets, as well as long-lived wood products and

construction, and several crosscutting measures. The annual climate change report will contain information on the implementation of the policy measures included in the Climate Plan for the Land Use Sector. Links to the Medium-Term Climate Change Policy Plan and Climate and Energy Strategy were considered in the preparation process.

4.3.5 National forest legislation and programmes

The sustainable management of forests in Finland is based on legislation, high-level scientific knowledge, and good practices. Maintaining the forest carbon sink is part of sustainable forest management, and it has also been required as a means of conforming to the forest management reference level (–19.300 million tonnes CO_2[18]) set for Finland for the second commitment period of the Kyoto Protocol (2013 to 2020).

The means for steering the use of forests include legislation, Finland's National Forest Strategy 2025, financing, and public forestry extension organisations.

Forest legislation is the most important forest policy means for ensuring sustainable forestry. The key acts include the Forest Act[19] and the Act on the Financing of Sustainable Forestry.[20] There is also legislation dealing with the prevention of forest damage and the trade in forest reproductive material, timber measurement, jointly owned forests, and organisations in the forestry sector. Forest legislation ensured that the implementation of the KP LULUCF activities, i.e. Activities under 3.3 and 3.4 of the Kyoto Protocol were carried out taking into account sustainable use of natural resources and conservation of biodiversity.

The Forest Act sets requirements for the regeneration and conservation of certain key habitats. For example, a new seedling stand must be established within three years of the end of felling. The Forest Act is complemented by guidelines for good forest management and silviculture, which have been compiled and promoted by public forestry extension organisations. The current law allows for more diversified management methods such as uneven aged forest management. The amendments to the Forest Act increase the freedom of choice of forest owners in managing their own forest property, improve the profitability of forestry and operating conditions of the wood-producing industry, and enhance the biodiversity of forests. Best Practices for Sustainable Forest Management in Finland are continuously updated to reflect the most recent scientific knowledge and societal values among the key stakeholders, as well as the main targets set by the Finnish national forest policy. The development work related to the Best Practices is financed by the Ministry of Agriculture and Forestry.

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18 Assuming instantaneous oxidation for harvest wood products (HWP), (–20.466 million tonnes CO_2 eq. with HWP)

19 1093/1996 (amendment 1085/2013)

20 1093/1996

The Government Report on Forest Policy 2050 was adopted in 2014. The report, conducted in a participatory process, outlines a long-term vision and strategic objectives for the management of forests and the main measures to be taken. The vision of the Forest Policy Report, sustainable forest management is a source of growing welfare, stresses the diverse welfare derived from forests and the fact that the utilisation of forests offers solutions to the needs of people and society. Based on the Forest Policy 2050, Finland's National Forest Strategy (NFS)[21], adopted by the Government in February 2015, specifies the main objectives for forest-based business and activities until 2025. The strategy was updated in 2019. The NFS describes the priorities and measures for the development of forest-based business and activities, on which the Government will focus as part of the sector's joint development. The strategy is implemented by key projects.

According to the current NFS, climate change mitigation and adaptation in forests are supported by diversifying forest management. Forests' viability, i.e. growth and health, will be maintained and enhanced through active forest management. Over the long term, forest management techniques must be adapted to new and changing climate conditions. Timely and careful forest management can improve both the growth and the resistance of growing stock to damage, while safeguarding the ecosystem services of forests and producing wood biomass sustainably. Forests as a carbon sink have been a significant means of mitigating climate change in Finland.

The NFS is implemented and monitored in broad cooperation between the public and private sectors. The Ministry of Agriculture and Forestry, supported by the Forest Council, has the overall responsibility for the programme. The Forest Council includes representatives from different administrative sectors, industries, NGOs and specialist organisations. For more information on the national measures of the NFP, see Section 4.5.6. A new NFS until 2035 is currently being prepared (2022).

The NFS is also implemented through Regional Forest Programmes, in which the special regional characteristics are duly considered. Regarding the contribution to the conservation of biodiversity and the sustainable use of natural resources, the most important instruments are section 10 of the Forest Act (on preserving diversity and habitats of special importance) and the policies and measures outlined in the Forest Biodiversity Programme for Southern Finland 2014 to 2025 (the METSO programme), both of which are integral parts of the range of instruments in the NFS to protect biological diversity in the future.

The METSO programme is being implemented jointly by the Ministry of Agriculture and Forestry and the Ministry of the Environment. In southern Finland, 72 per cent of forests are owned by private persons. METSO therefore

21 https://mmm.fi/en/nfs

targets both private and state-owned land. It covers the protection and commercial use of forests. The aim is to halt the decline in forest habitats and species and to establish stable and favourable conditions for forest biodiversity in southern Finland. The programme is being implemented through ecologically efficient, voluntary, and cost-effective means. A Government decision-in-principle in 2014 sets goals for METSO up to 2025 that 96,000 ha of private and 13,000 ha of state-owned forests will be conserved on a permanent or temporary basis.

The new Helmi programme is a key tool for halting biodiversity loss in Finland. The programme (2021 to 2030) is a joint programme of the Ministry of the Environment and the Ministry of Agriculture and Forestry, implemented together by the administrative branches of both ministries and municipal authorities and organisations. Actions are carried out both within and outside protected areas. The participation of landowners is voluntary.

The main objective of the Helmi programme is to take a comprehensive view of habitats and the necessary restoration and management measures in collaboration between numerous stakeholders. Restoration and management actions are targeted to specific areas and sites to maximise their impact on biodiversity.

The SOTKA project of the Ministry of Agriculture and Forestry is part of the Helmi programme. In this project, wetlands and a network of resting areas for birds are built, mires and catchments are restored and small carnivores are captured.

Forestry is a significant income source for forest owners and provides benefits to society at large. Private and public organisations provide guidance and consultation services for forest owners. The provision of these services was liberalised by a new act on forest management associations.[22] A private forest owner may also receive assistance from the State for forest management and improvement work. State support encourages measures with long-term impacts. Managing the natural environment in commercial forests is promoted through environmental support and forest nature management projects. Public funding for forestry is based on the Act on the Financing of Sustainable Forestry, which is under preparation in 2022.

Environmental aid may be granted for additional costs and income losses due to preservation and management of habitats of special value. The State also finances forest nature management projects. The works to be designed and implemented in these projects are defined in further detail in the legislation. Most of the forest nature management projects have special regional importance. Apart from habitats of special value, the projects may concern landscape management, preventing damage to waters and the restoration of ditched areas.

22 534/1998 (amendment 1090/2013)

4.4 Sectoral policies and measures

Finnish regulations, policies, and measures are strongly affected by the increasing number of directives, policies, and measures of the EU. This chapter provides information on the most important policies and measures related to the reduction of greenhouse gas emissions. Both existing and planned measures are described. The mitigation actions, or policies and measures, and their effects are listed in tables and described by sector in the sections below.

Finland is continuously seeking to improve the information on the effects of the policies and measures. For some individual measures, Finland has been unable to provide quantified estimates on the impacts on national emissions. These are marked with the notation key NE (not estimated) in the tables. There are various reasons why it has not been possible to make the estimates, such as complexity and the overlaps with other measures (for example, the EU ETS), the measure is still in a phase in which the details of implementation are unknown (for example, recently decided agricultural measures such as new types of animal feed additives), the policy or measure targets heterogenous groups and/or many actors with different responses to the measure, or where the quantification of the effect is difficult (for example, measures providing customer advice and information).

For measures targeting F gas emissions and measures in the waste sector, only aggregate impact estimates of the policies and measures are provided to avoid double counting and improve the accuracy of the estimated effects. The impacts of the individual measures are marked with IE (included elsewhere) in the tables, and the aggregated estimates are provided for the group of measures. The notation Partly IE, partly included elsewhere, is used in the table for the emissions reduction impact of the investment aid for new energy technology demonstration projects. The emissions reduction has not been estimated separately for this measure because of the wide scope of possible projects being supported. The impact may partly be covered already by the emissions reduction figures for the measures promoting different renewable energy sources. In other words, the total emissions reduction figures for the renewable energy measures are presumably somewhat on the low side. The energy sector policies and measures are split under three headings. Section 4.4.1 presents all energy sector policies and measures except those targeted for the transport sector. Policies and measures in the transport sector are presented in Sections 4.4.2 and 4.4.3.

4.4.1 Energy

Policies and measures in the WM projection

The general objective of Finland's energy policy is to ensure energy security at competitive prices and with the lowest possible environmental impacts. Finland uses a diversity of energy sources, over about half of which are domestic (energy for transport not included) are domestic. The major trend is a steady

increase both absolutely and in relative terms in the use of renewable energy. Direct governmental intervention to guide the choice of energy sources is rare in Finland. However, economic instruments, i.e. taxation and subsidies, are used to improve energy efficiency and to promote the development of domestic energy sources such as biomass, hydro, wind and solar. For example, new wind power projects established between 2011 and 2017 were eligible for substantial subsidies in the form of a feed-in tariff scheme. The feed-in tariff was also granted to biomass power plants until the end of 2018. The energy market has since undergone and is still undergoing a significant turning point in the investment climate. It is illustrated by the ongoing boom in new wind power projects, which have become profitable without subsidies, for example. In addition to actual energy taxes, the EU ETS acts as sort of tax on carbon, which directs new investments from fossil fuels to renewables. In addition, the recent disruption to the global energy market because of Russia's attack on Ukraine has accelerated the structural changes even further by underlining the need to advance domestic renewables from the energy security angle.

Within the energy sector, the greenhouse gas emissions are in practice reduced in two ways: 1) the primary energy consumption is reduced by cutting the end use or increasing the conversion efficiency in power plants; 2) fuels and energy use are shifted to alternatives with less emissions.

The main policies and measures in the energy sector include the EU Emissions Trading System (ETS), energy taxation, an increase in renewable energy, and energy conservation measures.

The EU ETS is an EU-wide domestic measure, while renewable energy sources are supported by various national measures: investment grants, taxation, support for research, and feed-in tariffs.

Energy conservation measures concern all sectors of the economy. Energy efficiency agreements, i.e. a voluntary scheme for industry and municipalities, have proved to be efficient measures along with taxes and subsidies. For both new and existing buildings, building codes and regulations play an important role.

The policies and measures included in the WM projection for the energy sector are described in more detail in the following sections. A list summarising the policies and measures can be found in Table 4.2 at the end of this section. Energy taxation and tax-related subsidies are described in Section 4.6.

EU Emissions Trading System

The EU ETS continues to be the most important economic policy instrument for reducing emissions in the EU and its Member States. Under the system, emissions are limited under an EU-wide cap, which sets the maximum amount of emissions for all operators obliged to participate in the system. The system is divided into periods for which the emissions reduction target and the

representative cap are established. In addition, more significant rule changes usually take place as the period changes.

The EU ETS covers operators from power production, industrial processes and aviation limited to flights within the European Economic Area. The covered GHG gases are CO_2 and N_2O and PFC emissions from certain industries. EU-wide, some 11,000 installations are included in the EU ETS. There are around 600 installations in Finland. Greenhouse gas emissions in the emission trading sector and non-emissions trading sector from 2005 to 2020 are presented in Table 4.3. At the beginning of 2020, the EU ETS was linked with Switzerland's trading system, allowing more flexibility for the use of allowances for both entities.

Over the years, the EU ETS has undergone several reforms such as increasingly harmonised EU-wide rules, more ambitious emissions reduction targets, the introduction of auctioning as the primary allocation method and the establishment of the Market Stability Reserve (MSR), a mechanism that aims to decrease the allowance surplus in the market and improve its resilience to future recessions.

During Phase 4, that is, between 2021 and 2030, 57 per cent of allowances are allocated in auctions, and the rest is granted directly to installations as free allocation. Most Member States, including Finland, auction their allowance shares in joint auctions organised by the European Energy Exchange (EEX). During Phase 3, Finland's appointed auctioneer, the Energy Authority, accounted for a total EUR 1.10 billion of state revenues.

All sectors except electricity production and carbon capture, transport, and storage are entitled to apply for a free allocation. Sectors considered to have the highest risk of carbon leakage will continue to receive full free allocation; sectors considered to be less exposed will get 30 per cent compared to their demand. Starting from 2026, free allocation will gradually phase out for the less exposed sectors, with the exception of district heating.

Table 4.3

Greenhouse gas emissions in the emissions trading (ETS) sector and non-emissions trading sector in Finland in 2005, 2010, 2015 and 2020, million tonnes CO_2 eq. The ETS figures do not include emissions from aviation in the EU ETS as their coverage under the trading scheme is not consistent with the national greenhouse gas inventory. Total national emissions (also for 1990) and emissions from domestic aviation are also presented.

	1990	2005	2010	2015	2020
ETS	NA	35.5	41.9	25.4	19.6
of which energy	NA	29.6	37.3	21.5	16.0
industrial processes	NA	3.6	4.0	3.9	3.6
Non-ETS	NA	34.2	33.6	29.5	28.1
CO_2 emissions from domestic civil aviation	NA	0.3	0.2	0.2	0.1
Total	**71.18**	**69.9**	**75.7**	**55.0**	**47.8**

Due to a statistical difference between the greenhouse gas inventory and ETS data, sums may not add up.

Scope of the EU ETS in trading period from 2013 to 2020 has been used.

Phasing out coal

Finland has committed to phasing out coal in the energy sector. Achieving this consists of two measures. One is setting a deadline by law; the other is an additional financial incentive to act sooner.

In 2019, a law[23] prohibiting the use of coal in energy production from 1 May 2029 was enforced. The prohibition was estimated to reduce the use of coal by 3 TWh compared to market-based development without the prohibition. The avoided greenhouse gas emissions equal 0.65 million tonnes of CO_2.

To accelerate the coal phase-out, a special incentive package to support replacement investments was introduced for those energy utilities that undertook to give up the use of coal already by 2025.

The Ministry of Economic Affairs and Employment opened a call for investment subsidies for projects accelerating the replacement of coal in energy production. In 2021, almost EUR 23 million was granted for this purpose in the energy aid mandate. The aid was granted to projects that promoted the production or use of renewable energy, energy saving, or more efficient generation and energy use. Priority was given to projects based on technologies other than combustion. After these projects, the priority was given to combined heat and power production before separate heat production. Novelty and the demonstration potential of the projects was also considered. After these projects are completed by 2025 at the latest, coal will be virtually out of the fuel mix used in the energy sector.

Low-carbon roadmaps

The Government Programmes in 2019 stated that sector-specific roadmaps to low-carbon operation would be prepared in cooperation with the sector's operators. The roadmaps would be used to achieve a better understanding of the scale, costs, and conditions of the required actions.

A total of 13 sectors produced their own roadmaps in coordinated cooperation. In addition, a bioenergy association and one labour organisation published reports to contribute to the roadmap project. A separate Roadmap to fossil-free transport (Government resolution on reducing domestic transport's greenhouse gas emissions) was also adopted in 2021. The sectors had independent control over the drafting and execution of their roadmaps – the guiding principle was that each sector would know their field best. The sectors coordinated the production of their roadmaps internally by engaging with and listening to different operators at different stages of the process. The Ministry of Economic Affairs and Employment (MEAE) supported the sectors by coordinating the whole project, offering guidance, and arranging regular discussions and seminars. Low-carbon road maps were prepared for the following sectors [24]:

23 416/2019

24 https://www.climate2035.fi/

– Agriculture
– Bioenergy industry
– Chemical industry
– Commerce
– Construction industry
– Energy industry
– Food industry
– Forest industry
– Hospitality industry
– Logistics and transport
– Property owners and developers
– Sawmill industry
– Technology industries
– Textile industry

Typically, the roadmaps include a comprehensive description of the current situation, an evaluation of emissions-reducing technologies and measures, and an estimate of achievable reductions. The roadmaps also use scenario analysis to assess coming developments. The scenarios include a baseline that depicts the effect of the current operating environment, and nearly all roadmaps included one or two low-carbon scenarios.

The roadmaps show potential for significant reductions in greenhouse gas emissions in different sectors. The results of the roadmap project was used as a direct input for the Government's climate and energy strategy, and many other government plans related to energy and climate policy. Furthermore, the roadmaps will guide the allocation of RDI investments and the preparation of sustainable recovery measures, for example.

Energy efficiency

The Finnish economy is relatively energy-intensive, which has led to fairly high per capita greenhouse gas emissions. Because energy use is efficient by international comparison, the high energy and emission intensities can be explained by structural factors. While the industrial structure has shifted significantly towards less energy-intensive industries, Finland still has a considerable number of energy-intensive industries.

The need for space heating, measured by average heating degree-days, is one of the largest in the world. In addition, the relatively large geographical area and sparse population are factors that increase energy intensity.

In terms of the efficiency of energy use and improving energy efficiency, Finland is among the world's leading countries. Co-generation of heat and electricity, the broad coverage of energy efficiency agreements (the first agreement period started as early as 1997; the third period, 2017 to 2025, is currently ongoing), and the systematic implementation of energy audits since the early 1990s are good examples of successful energy efficiency measures.

Energy Efficiency Directive

The Energy Efficiency Directive (EED) made the energy audits mandatory for big companies. The EED has been implemented mainly with the Energy Efficiency Law[25], which entered into force at the beginning of 2015.

Energy efficiency requirements have designated the public sector as liable for setting an example in promoting energy conservation. Other focus areas include the development of an energy-efficient community structure and enhancement of energy efficiency in the heating of buildings, transport, household use, agriculture, industry, and the entire service sector.

Most energy saving measures are based on EU-wide solutions, regulations and recommendations. Public financing is targeted, inter alia, at research and development activities and enhancement of competences, whereas fiscal solutions emphasise motivating energy savings while ensuring the conditions needed for industry to operate solidly.

For the subsidised energy audit programme, the realised annual CO_2 emissions reductions will decline and are estimated to be 0.37 million tonnes in 2020, and 0.11 million tonnes in 2040. In contrast, the realised annual CO_2 emissions reduction related to mandatory energy audits is estimated to grow, being 0.13 million tonnes in 2020 and 0.31 million tonnes in 2040. The great majority of the emissions reductions, around 95 per cent, is estimated to occur in the emissions trading sector due to the large share of electricity and district heat in energy savings. Buildings' energy use is discussed below in a separate section of this chapter.

Voluntary energy efficiency agreements

Voluntary Energy Efficiency Agreements[26] have played a central role since 1997 in increasing energy efficiency. They cover industries, private services, and municipalities, as well as oil-heated buildings. The agreements have played a central role in implementing both national energy policy and EU energy efficiency obligations. The role of the agreements has been especially important in achieving Finland's binding cumulative energy savings target under EED Article 7. Based on the implemented measures during the agreement period from 2008 to 2016, and the current period from 2017 to 2025, the annual savings in force were about 18.3 TWh of heat and fuels and 5 TWh of electricity at the end of 2020. Energy Efficiency Agreements accounted for well over 60 per cent of the total energy consumption in Finland at the end of 2020.

The estimated annual CO_2 emissions reductions achieved by the Energy Efficiency Agreement was 7.7 million tonnes in 2020, and will be 9.7 million

25 1429/2014

26 https://energiatehokkuussopimukset2017-2025.fi/ (in Finnish, limited content in English https://energiatehokkuussopimukset2017-2025.fi/en/)

tonnes in 2040. Most of the emissions reductions, well over 95 per cent, are expected to occur in the emissions trading sector due to the large share of electricity and district heat in energy savings. The estimates reported for 2040 are calculated based on assumptions that the current agreement period from 2017 to 2025 will continue.

In 2010, an energy efficiency agreement was also launched in the agricultural sector under the Ministry of Agriculture and Forestry. The agreement was updated in 2016 for the period from 2016 to 2020. The new agreement is under preparation. Farms have received energy advice in the scope of the Farm Energy Programme (2010 to 2015) the Rural Development Programme for Mainland Finland (2016 to 2020) and the CAP transitional period 2021 to 2022. Energy efficiency measures in agriculture are farm re-parcelling to reduce energy use in farm traffic, support fresh grain silos where energy use for drying of grain is avoided, and support investments in unheated cattle buildings and heat recovery from pig slurry. The new CAP 2023 to 2027 period begins in January 2023, and it includes similar measures.

Renewable energy

Finland is one of the world's leading users of renewable energy sources, especially bioenergy. The most important renewable energy sources include bioenergy – wood and wood-based fuels and especially the side-products of the forest industry – hydropower, wind power, ground and air heat pump energy and solar energy. In 2020, the share of renewable energy sources increased to 44.6 per cent of final energy consumption. Finland has agreed statistical transfers with Belgium in the fulfilment of binding renewable energy obligations set by the European Union. When considering statistical transfers, the share of renewable energy sources in 2020 was 43.9 per cent of final energy consumption.

The most significant part of the renewable energy supply comes from biomass, especially from the side-products of the forest industry. The remainder of the renewable energy supply comes mainly from hydro and wind power. The capacity of onshore wind power is rapidly becoming market based. The National Energy and Climate Strategy outlines actions to further increase the share of renewable energy. In 2019, Finland set a target in its integrated energy and climate plan of a 51 per cent share for Finland's national contribution to the European Union's jointtarget of 32 per cent of renewable energy in 2030.

Policies and measures in the field of renewable energy focus on promoting renewable energy production from various renewable sources (e.g. wind power, wood chips, solar, biogas and bioliquids) and promoting new energy technology demonstration projects.

The sliding feed-in premium system for the production of electricity from renewable energy sources came into force in 2011. The aid scheme concerns

government support for electricity production based on wind power, biogas and wood fuels. There is also a separate premium scheme for forest chip use (instead of peat and coal) for CHP plants. The sliding feed-in premium is paid for a maximum of 12 years per plant. The premium level slides according to the average electricity price, average emission allowance price, or tax on peat, depending on the energy source. New plants are not approved for the sliding feed-in premium system. The feed-in premium scheme has been replaced by a technology neutral premium scheme based on tendering.

In May 2018, Parliament approved the amendment to the act on production aid for electricity from renewable energy sources, which laid down provisions for the new premium system. The premium system is based on a competitive tendering process, and investments in different renewable energy sources compete so that the cost-effectiveness target is considered. Tendering for 1.4 TWh of renewable electricity took place in December 2018. No new tendering rounds are being planned.

In total, 2,300 MVA of wind power has been approved for the feed-in tariff scheme, and all the winners of the 1.4 TWh tendering process for the premium system were wind power projects. Currently, onshore wind farms have already been developed and built without public financing. Finland's first offshore wind farm was granted a EUR 20 million investment subsidy in 2014 and was completed in 2017. It has a total capacity of 42 MW. This project aimed to demonstrate wind power technologies suitable for winter conditions in the Baltic Sea area where ice conditions can be very challenging due to pack ice. In 2020, the wind power production in Finland was 7.9 TWh.

The Energy Aid (investment subsidy, annual budget approximately EUR 40 million) is targeted at the commercialisation of new technologies, the non-ETS sector (including plants producing advanced biofuels for transport), and non-ETS electricity and heat production (i.e. small-scale production). The aid can be up to 30 per cent of eligible costs for mature technologies and up to 40 per cent for new technology projects. However, the realised aid levels are typically much lower. Moreover, the objective is that the aid for different technologies will be phased out as the technology develops, the costs are reduced, and the competitiveness improves. Farms can also apply for investment aid for energy production plants such as bioenergy boilers or solar PV from another scheme.

The key aim of energy aid is to promote the development of innovative solutions for replacing the energy system with a low-carbon alternative in the long term. Energy aid can be granted for investment and investigation projects that promote:

1) the production or use of renewable energy, which in turn promotes new technology and its commercial utilisation, involves investments in a new plant, or is a replacement investment that significantly increases the production volumes of renewable energy, or that allows the achievement of another positive energy impact that complies with the goal;

2) energy savings or increase the efficiency of energy generation or use;

3) otherwise replacing the energy system with a low carbon one.

Energy aid is discretionary, and priority is given to projects involving new technology.

Since 2019, a separate investment aid budget and call for large-scale energy technology demonstration projects has also been available. For example, in 2021, EUR 90 million was granted to large-scale energy technology demonstration projects. The investment aid is intended for future energy solutions to meet national and EU targets for 2030. The categories of projects they support are renewable biofuels for transport, other than combustion-based heat production and other large-scale demonstration projects involving new technology. The objective of the scheme is to promote nationally and internationally replicable solutions based on new energy technologies.

Other measures that have been implemented to promote renewable energy include an electricity tax exemption for small-scale production, information measures, and in terms of wind power, the development of land-use planning.

The effect on emissions has been estimated based on the assumption that wind power reduces the need to produce electricity mainly in condensing power plants using fossil fuels and peat (for more information on the IMPAKTI calculation tool used to estimate the emissions reduction impacts of renewables, see Section 5.8.3). Using a marginal emission coefficient of 600 t CO_2/GWh, the promotion of wind power will reduce the emissions in 2020 by 4.8 million tonnes CO_2 and in 2030 by 11.1 million tonnes CO_2 (see Table 4.2). The reduction will occur entirely in the ETS sector. The estimate includes the impact of all policies and measures promoting wind power (including the impact of the feed-in tariff).

Increasing the use of forest chips in multi-fuel boilers is the most central and cost-effective way of increasing the use of renewable energy in the generation of power and heat. The use of forest chips will replace the use of other fuels (mainly peat) in heat and power production and heating oil on farms. The estimated emissions reduction achieved due to the use of forest chips was 5.5 million tonnes CO_2 in 2020 and will be 8.1 million tonnes CO_2 in 2030.

Energy taxation provides an incentive for the use of forest chips and forest industry by-products in CHP production and building-specific heat production. The objective is that most forest-based energy will continue to be produced on market terms from the sidestreams of other wood use. Plenty of wood material is produced in forestry management operations and timber harvesting that is unsuitable as raw material for wood processing. By means of various policy measures, this forest biomass will be channelled to replace fossil fuels in heating, CHP production and transport. The use of wood-based

fuels will not be promoted by means of an aid scheme if the use of these fuels is profitable without any aid.

Wind power is promoted by reducing barriers for wind power investment and enabling new demonstration projects for offshore wind power. The historic use of and WM projection for renewable energy in Finland is shown in Figure 4.2 and Table 4.4.

Figure 4.2
Historic development and WM projection for renewable energy, TWh

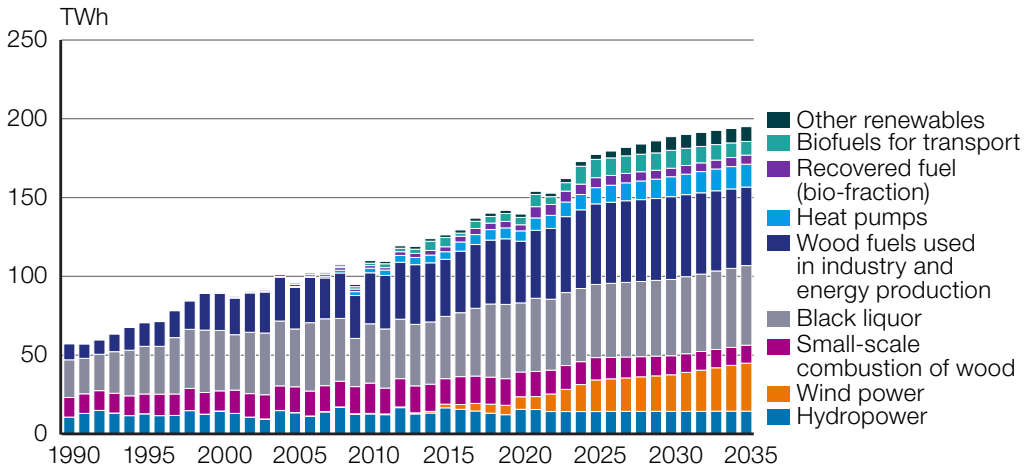


Table 4.4
Historic development and WM projection for renewable energy, TWh

				WM Projection		
	2010	2015	2020	2025	2030	2035
Black liquor	37.7	39.5	43.9	46.5	48.5	50.5
Wood fuels used in industry and energy production	32.3	36.2	39.1	51.1	52.5	49.8
Small-scale combustion of wood	19.2	16.2	15.7	14.1	12.1	11.3
Hydropower	12.7	16.6	15.7	14.3	14.4	14.5
Heat pumps	2.9	4.8	6.6	10.3	12.6	14.5
Wind power	0.3	2.3	7.9	20.0	23.2	30.5
Biofuels for transport	1.6	5.8	4.7	11.6	11.4	8.8
Recovered fuel (bio-fraction)	1.7	3.2	3.8	6.3	5.5	5.7
Other renewables	1.5	1.6	2.2	3.2	8.7	9.3
Total	**109.9**	**126.3**	**139.6**	**177.4**	**188.7**	**195.0**

Renewable energy policies and measures for the transport sector are described in Section 4.5.2.

Energy use in residential and other buildings

Policies and measures for buildings and housing aim to improve energy efficiency, making energy use in buildings smarter, reducing ETS and non-ETS

emissions, and increasing the use of renewable energy sources. Policy measures include standard-setting, economic instruments, the dissemination of information, and education and research. Measures are targeted both at new buildings and the existing building stock, including the use and maintenance of the building stock. In addition to policy measures in the building sector, energy use is affected by the EU emissions trading system ETS via changes in the prices of heat and electricity.

Figure 4.4 shows the predicted development of emissions caused by space heating, according to which emissions will decrease sharply by 2050. CO_2 emissions from the use of energy in buildings are mainly covered by the EU ETS. District heating is the source of about half of all space heating in Finland. Most district heating production falls within the sphere of the EU ETS. The total space heating energy used in residential, commercial and public buildings was 70 TWh in 2020 (24 per cent of the total end use of energy in Finland). Slightly less than 28 TWh of the space heating belonged to the non-ETS sector in 2020.

Finland has some specific conditions in the heating and cooling of buildings. The most common heating source in Finland in 2020 was district heating (40 per cent of heat energy use). The second most common heating source in Finland in 2020 was electricity (22 per cent). The share of small-scale combustion of wood in heating energy consumption was 20 per cent. The number of heat pumps is increasing rapidly, especially in detached housing, and the share of heat energy use was nine per cent in 2020. The use of natural gas in building-level heating systems is practically non-existent in Finland, but oil boilers were still quite popular in 2020 (eight per cent). Demand for cooling remains low in Finland, but it is expected to increase due to climate change (Figure 4.3). The Directive on the Energy Performance of Buildings (EPBD) aims to reduce CO_2 emissions by improving the energy efficiency of buildings. The directive was implemented in Finland by a regulation that came into force at the beginning of 2008. This legislation on the energy efficiency of buildings includes the following:

- Act on Energy Certification of Buildings
- The Ministry of the Environment Decree on Energy Certification of Buildings
- Act on inspection of air conditioning systems
- Amendments to the Land Use and Building Act, which was expanded to cover energy efficiency requirements and details on how energy efficiency should be calculated.

The minimum requirements for thermal insulation and ventilation in new buildings have been set by the National Building Code since 1976. The energy efficiency requirements were tightened by 30 per cent compared to earlier requirements (2003) in December 2008 due to the implementation of the EPBD. The requirements were further tightened (by 20 per cent) in March 2011 due to the implementation of the Directive on the Energy Performance

of Buildings (Recast). The building regulation came into force in July 2012, and it is based on the overall energy consumption, which considers, among other things, air conditioning, cooling, lighting and heating, washing water, and heating energy. The regulation favours the utilisation of district heating and renewable energy in defining the overall energy performance of a building. Moreover, due to the implementation of the Directive on the Energy Performance of Buildings, EPBD, the regulation for the energy efficiency of the existing building stock was given in February 2013, and this Ministry of the Environment Decree on improving the energy performance of buildings undergoing renovation or alteration came into force in June 2013. Due to the implementation of the EPBD, energy regulations were again revised in 2017, and nearly zero-energy regulations for new buildings were given, and new regulations entered into force, on 1 January 2018.

The Ministry of the Environment is responsible for legislation and guidelines for energy performance certificates, energy performance certificate templates, and other instructions concerning the issuance of certificates. All new buildings need an energy certificate when applying for the building permit. For existing buildings, energy performance certificates are needed when the building (or part of it, for example, an apartment) is sold or rented. The Housing Finance and Development Centre of Finland (ARA) is the administrative authority ensuring the quality of certificates and the qualified experts, and the appropriate preparation and use of the certificates.

The regulation for the energy performance of new buildings entails about 6.2 million tonnes of annual emissions reductions of CO_2 by 2030. Almost all the emissions reduction will take place in the EU ETS sector through the reduced use of electricity and district heat.

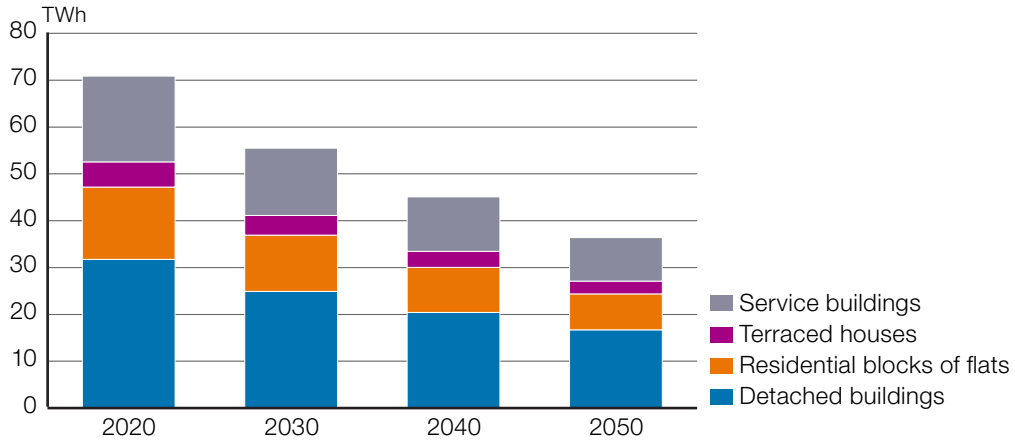
Based on the amendment to the decree of the national building code for sewage and freshwater systems, water measurement instruments became compulsory in new apartment buildings at the beginning of 2011. The aim was to reduce the consumption of water and the need to heat it. The water measurement instruments provide information on the use of water in each apartment and ensure invoicing is done according to actual water use, which provides a direct price signal for inhabitants. The requirement was expanded into the existing building stock in 2013 in the case of pipe and plumbing system repairs subject to a building permit.

Information provision and the campaigns supported by the Government seek to influence the behaviour of building users and owners. Currently, activities exist for giving internet-based informational guidance, e.g. in repair, energy efficiency, and building maintenance issues.

Finland submitted its Long-Term Renovation Strategy (LTRS) to the EU in 2020. It follows the EPBD 2018/844/EU revision and covers the 2020 existing building stock. The main goals of the Finnish strategy are to decrease the

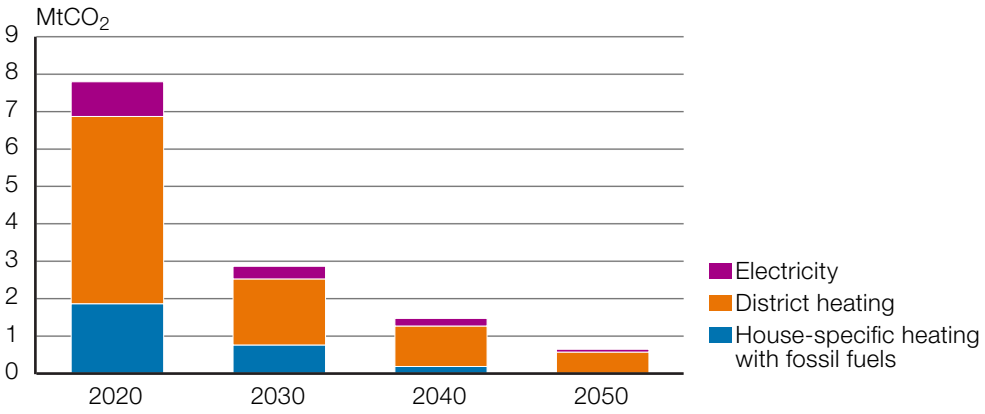
energy use of the existing building stock by 51 per cent by 2050 and the related CO_2 emissions by 92 per cent by 2050. The factors affecting the decrease of energy use and emissions are climate change, removals of buildings from the building stock, retrofitting and building maintenance, the change of heating sources in buildings, and decreasing the emission intensity of electricity and heating production. The improvements of energy performance in renovations and alterations, the phase-out of oil use in heating and related policies, as well as retrofitting subsidies are policy measures supporting the Finnish LTRS.

Figure 4.3
Heating and cooling use of buildings by building type, TWh



Source: Finland's renovation building strategy 2020–2050

Figure 4.4
Heating and cooling energy use CO_2 emissions (million tonnes CO_2)



Source: Finland's renovation building strategy 2020–2050

Due to the implementation of the Directive on the Energy Performance of Buildings (Recast), the regulation for the energy efficiency of the existing building stock was put into effect on 27 February 2013. It is estimated that the emissions reductions due to improvements in energy performance in renovations and alterations will be 1.03 million tonnes CO_2 annually in 2030. Most of the emissions reductions will take place in the EU ETS sector.

However, there are expected non-ETS emissions reductions from oil fuel boiler replacements, especially in detached houses.

Energy subsidies for retrofitting started in Finland as a new policy measure in 2020, and the subsidies have been decided until 2023. The subsidies are aimed at energy efficiency improvements in the housing sector. The estimated annual impact of the energy subsidies for retrofitting is 0.38 million tonnes of CO_2. The new subsidy is a subsidy for renewing the district heating equipment of residential buildings to be suitable for low-temperature district heating. The grant is available in 2022 and 2023. No methods or data to assess the impact of renewing the district heating equipment.

To reduce greenhouse gas emissions from light fuel oil, an obligation to blend bioliquids with light fuel oil used for heating buildings was approved by Parliament in February 2019. According to the Act on the Promotion of the Use of Biofuel Oil, the proportion of biofuel oil in the light fuel oil used for heating and machinery must be at least 3 per cent in 2021 and increasing thereafter by one per cent per year to at least 10 per cent in 2028. However, it is intended to tighten the obligation to distribute biofuel oil, and the proposed changes will be presented by the Government in the autumn of 2022. According to the stricter obligation, the share of biofuel oil should increase annually by 4.6 per cent from 2025 until 2030, from which the share of biofuel oil in heating should be 30 per cent. The effects of promoting the use of bioliquids on greenhouse gas emissions in heating buildings have been calculated in accordance with the stricter obligation – assuming that from 2030, the share of bioliquids in light fuel oil will be 30 per cent.

A commitment to phase out oil heating in the public sector is included in the Medium-Term Climate Change Policy Plan. Two new policy measures for phasing out oil heating started in 2020. The first subsidy system is for phasing out oil heating in detached houses, and the other subsidy system is for buildings owned by municipalities. The annual impact with the grants available in the budget is estimated be 0.22 million tonnes of CO_2. In 2022, the phase-out of fossil gas heating was included in the subsidy systems.

Finland has decided to take measures of advice as an alternative to obligatory inspections of heating and air conditioning systems laid down in articles 14 and 15 of the EPBD. The coordinating advice programme (advice forum) will cover almost all buildings and gather actors in energy efficiency agreements in the building sector. The annual impact is estimated to be 0.015 million tonnes CO_2. This measure is not included in the WM projection, as there is no detailed information on the impact of the measure on the energy balance.

The emission impacts of building-related policy measures have been evaluated using EKOREM and POLIREM calculation models (see Section 5.8.3) and information on the emission coefficients for district heating and electricity. These models calculate heat and energy consumption and the resulting

greenhouse gas emissions of the building stock. The impacts of policy measures are evaluated by modifying the energy efficiency of the building elements (EKOREM) or specific consumptions of energy (POLIREM), or the distribution of heating systems. The energy savings are converted into emissions reductions with an average emission coefficient in the case of district heating (190 kg CO_2/MWh) and a mean marginal emission coefficient in the case of electricity (600 kg CO_2/MWh).

Machinery

There are several existing measures for reducing CO_2 emissions from non-road mobile machinery. Under Act 418/2019, which entered into force in 2019, the biofuel distribution obligation for light fuel oil stands at 3 per cent in 2021 and will rise to 10 per cent by 2028, leading to reduction of CO_2 emissions from non-road mobile machinery as well. According to the government proposal, the distribution obligation of biofuel oil in light fuel oil will be increased to 30 per cent by 2030. It is planned this will enter into force in the autumn of 2022.

The accounting criteria for taxation on heating fuel were revised at the beginning of 2019 to include fuel life cycle emissions in carbon dioxide emissions. At the same time, tax on light fuel oil was raised by about 2 per cent. From the beginning of 2021, tax on light fuel oil was further raised to EUR 2.7 per megawatt-hour, which is an increase of nearly 11 per cent. The tax increases will affect the price of – and therefore demand for – machinery fuels.

In October 2019, the Ministry of the Environment and the Association of Finnish Technical Traders signed a Green Deal on non-road mobile machinery to increase the percentage of low-emission machinery. Through voluntary commitments made under this agreement, those operating in the sector will aim to increase the supply of fully electric and other low-emission non-road mobile machinery and encourage its wider use. In September 2020, the Ministry of the Environment, Senate Properties, and the Cities of Espoo, Helsinki, Turku, and Vantaa signed a voluntary Green Deal to reduce emissions on construction sites. As part of the implementation of the voluntary Green Deals Motiva created in 2021, a training package for non-road mobile machinery with funding and coordination from the Ministry of the Environment. The training package is freely available for operators in the non-road mobile machinery sector.

The conversion of tractors to use biogas is supported as an environmental investment through agricultural investment subsidies. Subsidies are available for modifications to enable biogas use and for the equipment involved, but not for purchasing the tractor itself. Modifications of diesel engines and accessory purchases to convert tractors and other agricultural machinery to use biogas are eligible for a subsidy as environmental improvement measures. The subsidy covers 35 per cent of eligible costs, including costs of the purchase and installation of new equipment.

Municipal climate change solutions programme

The emissions of municipalities in the effort sharing sector decreased by 19 per cent between 2005 and 2020. This quite modest reduction in emissions relative to the carbon neutrality target shows that further action is still needed to promote climate work in municipalities. The municipal climate change solutions programme of the Ministry of the Environment boosts climate work in Finnish municipalities and regions. The aim is to accelerate climate work of municipalities and regions in a way that is fast, cost-effective, and widely accepted. The programme finances municipalities' and regions' own climate projects and national solutions that support their climate work. At the end of 2021, the programme had funded a total of 118 projects to strengthen municipal and regional climate work throughout Finland. Furthermore, 20 new local and regional projects received funding for climate and circular economy projects in 2022. The programme has a wide variety of measures supporting energy efficiency activities and emissions reductions, e.g. in housing and transport.

Customer energy advice

One main aim of the Action Plan for Energy Services[27] in the Energy Efficiency Agreement scheme and Energy Efficiency Agreement for oil-heated buildings[28] is to enhance their customer energy use. Energy advice actions have been running since the first agreement period starting in 1997. Customer energy advice is also one of the policy measures notified for Energy Efficiency Directive (EED) article 7 implementation in Finland. When calculating energy savings for these behavioural measures based on advice services, only conservative one-year energy savings lifetime has been considered. Annual estimated energy savings are constantly around one terawatt hour per year, and the CO_2 emissions reduction is about 0.4 million tonnes per year.

In parallel with customer advice related to voluntary Energy Efficiency Agreements, the Ministry of Economic Affairs and Employment has been building an energy advice infrastructure for consumers since 2010. In 2014, this responsibility was transferred to the Energy Authority. Motiva Oy, a hundred per cent state-owned sustainable development company in Finland, is the national coordination centre for consumer energy advice. In parallel with field activities in projects, coordination activities have been carried out to strengthen internet, telephone and email advisory services and develop advisor training, communications, marketing, and monitoring and evaluation. Energy advisory services enable consumers to rationalise how they use energy, while they also learn about the opportunities offered by renewable energy sources.

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27 https://energiatehokkuussopimukset2017-2025.fi/wp-content/uploads/2020/02/Company-Accession-Document-Action-Plan-for-Energy-Services.pdf

28 https://energiatehokkuussopimukset2017-2025.fi/wp-content/uploads/2020/02/Energy-Efficiency-Agreement-2017-2025-on-the-Distribution-of-Liquid-Heating-Fuels-H%C3%96YL%C3%84-IV.pdf

Besides, in 2018, the Energy Authority commenced strengthening of regional advice services as part of the Energy Authority's programme on regional energy and climate work. The main goal of the regional energy advice service is to increase awareness of energy efficiency and renewable energy. In addition to consumers, the target groups are municipalities and small and medium-sized enterprises. To avoid double counting, impacts on consumer advice activities are not assessed separately from customer advice services related to voluntary Energy Efficiency Agreements, as these actions overlap and support each other.

Policies and measures in the WAM projection

Additional measures planned for the energy sector are:
- Improving energy efficiency and promoting the use of alternative fuels in machinery

Machinery

Some of the planned additional measures for reducing emissions from non-road mobile machinery are extensions to current policy actions, and some are entirely new. Voluntary commitments through Green Deals on zero-emission worksites and non-road mobile machinery will be maintained and expanded. Actions that would promote the attainment of the sector's emissions reduction targets are the inclusion of new machinery classes in the non-road mobile machinery Green Deal and introducing new operators to the zero-emission worksite Green Deal. The aim is to further develop and expand the training project initiated in 2021 in line with the sector's trends.

The Government launched an analysis, assessment and research activity project in September 2021 to investigate political steering mechanisms for reducing emissions from non-road mobile machinery. The results of the investigation will be published in 2022, followed by an assessment of the necessary further measures. The Government is exploring the possibility of introducing procurement support for electric and biogas-powered tractors and other non-road mobile machinery. There is also a continuous effort to improve the knowledge base of emissions calculations from non-road mobile machinery.

The impact of the additional machinery measures on greenhouse gas reduction have yet to be assessed. The measures are thus not included in the overall WAM projection.

Summary of policies and measures.

A summary of the policies and measures in the energy sector is presented in Table 4.2.

Table 4.2
Policies and measures according to the WM (marked with *) and WAM projections in the energy sector (excluding transport)

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Implementation of the emission trade system in Finland	Reduction of GHG emissions (Energy, Industrial processes), Increase in renewable energy, Efficiency improvement in industrial end-use sectors	CO_2, N_2O	Economic, Regulatory	Implemented	The objective of the implementation of the ETS in Finland is reduction of greenhouse gas emissions in the emission trading sector. National implementation in Finland is carried out with national act of emission trade (311/2011) and decrees which are given under that act.	2005	Ministry of Economic Affairs and Employment	NE	NE	NE	NE
* Energy taxation	Switch to less carbon-intensive fuels, Efficiency improvement in industrial end-use sectors, Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2, CH_4, N_2O	Fiscal	Implemented	The current tax structure and tax rates according to the Act on Excise Duty on Liquid Fuels (1472/1994) and the Act on Excise Duty on Electricity and Certain Fuels (1260/1996).	2021	Ministry of Finance	NE	NE	NE	NE
Municipal climate change solution programme	Efficiency improvements of buildings and in services, Modal shift to public transport or non-motorized transport, Improved transport infrastructure	CO_2, CH_4, N_2O	Regulatory	Implemented	Promotes, accelerates and influences the climate work of municipalities and regions.	2018	Ministry of the Environment	NE	NE	NE	NE
* Promoting wind power	Increase in renewable energy	CO_2	Economic, Fiscal, Regulatory, Planning	Implemented	Measures implemented since 1996 include investment subsidies for wind power plants, electricity tax subsidies, feed-in tariff (since 2011), information measures, support for land-use planning and adjustment of land use and building act, technology neutral feed-in premium scheme (auction organised in 2018).	1996	Ministry of Economic Affairs and Employment, Ministry of the Environment, Regional councils, Municipalities	4,763	8,934	11,140	11,708

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Promoting solar power	Increase in renewable energy	CO_2	Fiscal, Economic, Information	Implemented	Solar electricity self-consumers exempted from grid fees and electricity taxes up to 100 kVA system size or 800 MWh yearly production, investment subsidies for municipalities, companies and farms, household tax deduction from solar system installation work and information measures.	2015	Ministry of Economic Affairs and Employment, Ministry of Finance, Ministry of Agriculture and Forestry	131	287	906	1,444
* Promoting wood chips	Increase in renewable energy	CO_2	Economic, Fiscal, Information	Implemented	Measures implemented since 1992 include investment subsidies for heat and power production plants using forest chips, subsidies for harvesting of forest chips, electricity tax subsidies, feed-in tariff and information measures.	1992	Ministry of Economic Affairs and Employment, Ministry of Acriculture and Forestry	5,547	8,017	8,098	7,675
* Promoting biogas in electricity and heat production	Increase in renewable energy, Enhanced CH_4 collection and use, Improved waste treatment technologies	CO_2, CH_4	Economic, Fiscal, Regulatory	Implemented	Measures implemented since 1997 include investment subsidies, electricity tax subsidies and feed-in tariff.	1997	Ministry of Economic Affairs and Employment, Ministry of the Environment, Ministry of Agriculture and Forestry	108	130	137	156
* Promoting the use of bioliquids in machinery	Low carbon fuels	CO_2, CH_4	Fiscal, Regulatory	Adopted	An obligation to blend bioliquids in light fuel oil used in machinery will be increased to 30 % by 2030. According to current legislation the blending obligation is 10 % 2028 onwards.	2022	Ministry of Economic Affairs and Employment	0	150	620	590
* Phasing out coal in energy production	Switch to less carbon-intensive fuels	CO_2	Regulatory, Economy	Implemented	Legislation prohibits use of coal in energy production from 1 May 2029. The act takes into account aspects related to the security of energy supply and emergencies. Investment aid for projects that rapidly phase out the use of coal energy.	2019	Ministry of Economic Affairs and Employment	NE	NE	650	400

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Promoting new energy technology projects	Increase in renewable energy	CO_2	Economic	Implemented	Investment aid for new energy technology demonstration projects.	2019	MInistry of Economic Affairs and Employment	Partly IE	Partly IE	Partly IE	Partly IE
* Act on Ecodesign and Energy Labelling	Efficiency improvement of appliances	CO_2	Regulatory	Implemented	Improvement of energy efficiency of energy-using products by minimum efficiency requirements	2009	Ministry of Economic Affairs and Employment, The Energy Authority	NE	3,585	3,611	3,519
* Energy Audit Programme	Efficiency improvements of buildings, Efficiency improvement in services/tertiary sector, Efficiency improvement in industrial end-use sectors	CO_2	Economic, Information, Voluntary/ negotiated agreements	Implemented	Subsidized energy audits for non-SMEs in industry and in public and private services. Harmonized audit models. Qualification system for auditors. Quality control and monitoring of audits.	1992	Ministry of Economic Affairs and Employment, the Energy Authority	372	152	92	93
* Energy Efficiency Agreements 1997–2007, 2008–2016 and 2017–2025 (Voluntary energy efficiency agreements)	Efficiency improvements of buildings, Efficiency improvement in services/tertiary sector, Efficiency improvement in industrial end-use sectors, Efficiency improvement in the energy and transformation sector	CO_2	Fiscal, Voluntary/ negotiated agreements	Implemented	This measure covers Energy Efficient Agreements in industry, energy sector, municipalities, private services, property and building sector.	1997	Ministry of Economic Affairs and Employment, Ministry of the Environment, The Energy Authority	7,720	8,470	9,538	9,617

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Energy Efficiency Agreements/Customer energy advice	Efficiency improvements of buildings, Efficiency improvement of appliances	CO_2	Information, Voluntary/ negotiated agreements	Implemented	In the Energy Efficiency Agreement for Industries in the Action Plan for Energy Services and in the Energy Efficiency Agreement for oil heated buildings one main aim is to enhance also efficient energy use of the contracting parties' customers. Customer energy advice includes both general information via different channels as well personal internet, telephone and e-mail advisory services etc. This work is in parallel supported by the national and regional energy advice services for consumers which has been ongoing since 2010 (on regional level since 2018).	1997	Ministry of Economic Affairs and Employment, Ministry of the Environment, The Energy Authority	389	393	386	385
* Mandatory Energy Audits	Efficiency improvement in the energy and transformation sector, Efficiency improvement in industrial end-use sectors, Efficiency improvements of buildings, Efficiency improvement in services/tertiary sector	CO_2	Regulatory, Information	Implemented	Mandatory Energy Audits for big companies (non-SMEs) required by EU Energy Efficiency Directive. These audits are not subsided.	2015	Ministry of Economic Affairs and Employment, the Energy Authority	130	232	293	306
* Fresh grain silos (no energy used for drying)	Energy efficiency in agricultural sector	CO_2	Economic	Implemented	Support to gresh grain silos (drying of grain avoided)	2008	Ministry of Agriculture and Forestry	5	6	8	7
* Energy efficiency of unheated cattle buildings and heat recovery in pig farms	Energy efficiency in agricultural sector	CO_2	Economic	Implemented	Support to investments to unheated cattle buildings and heat recovery from pig slurry	2008	Ministry of Agriculture and Forestry	3	3	1	0

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Farm reparcelling to cut down energy use	Energy efficiency in agricultural sector	CO_2	Economic	Implemented	Support to farm reparcelling leading to reduced farm traffic	1995	Ministry of Agriculture and Forestry	27	42	57	72
* Farm Energy Programme and energy advice to the farms	Energy efficiency in agricultural sector	CO_2	Economic, Information	Implemented	Subsidies for the preparation of Farm Energy Plans and for other energy advice.	2010	Ministry of Agriculture and Forestry	4	5	5	4
* Act on energy certificates for buildings	Efficiency improvements of buildings	CO_2	Information	Implemented	Houseowners are obliged to provide information on energy efficiency	2008	Ministry of the Environment	NE	NE	NE	NE
* Building regulations (2003, 2008, 2010)	Efficiency improvements of buildings	CO_2	Regulatory	Expired	Provides minimum standards for new buildings	2003	Ministry of the Environment	3,432	4,559	5,687	6,814
* Renewed Building regulations (2012, 2017)	Efficiency improvements of buildings	CO_2	Regulatory	Expired/ implemented	Provides minimum standards for new buildings, from 2012 switch to full energy based calculation. The new regulations came into force in 2017 and the previous regulations expired, but the effects are still being evaluated with full energy based calculation.	2012	Ministry of the Environment	222	371	520	670
* Information dissemination and campaigns targeted to residents and other users of buildings	Efficiency improvements of buildings, Demand management/reduction	CO_2	Information	Implemented	New energy regulations and other energy use related matters, retrofitting, renovating and maintaining buildings have been disseminated to both professionals and consumers through versatile means like seminars, building fair events, presentations, articles and webpages.	2001	Ministry of the Environment, The dedicated state owned company Motiva	NE	NE	NE	NE

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Subsidies for energy efficiency in buildings (single houses, residential apartment houses and row houses)	Efficiency improvements of buildings	CO_2	Economic	Implemented	Dedicated subsidies for improving energy efficiency and promoting the use of renewable energy	2007	Ministry of the Environment, Ministry of Finance	323	323	323	326
* Nearly zero-energy regulation	Efficiency improvements of buildings	CO_2	Regulatory	Implemented	Regulations for new buildings. A definition of a nearly zero-energy building and the demand to build all new buildings according to the nearly zero-energy building requirements were added to the Land use and building act in 2016 (in force January 2017). Accordingly, The Ministry of the Environment gave a decree on energy efficiency for new buildings in 2017. The decree deals also with building extensions.	2018	Ministry of the Environment, A number of companies/ businesses/ industrial associations	NE	NE	NE	NE
* Revision of the Land Use and Building Act (EV 123/2012 vp – HE 81/2012 vp)	Efficiency improvements of buildings	CO_2	Regulatory, Information	Implemented	Specific provisions demanding energy and resource efficiency in the renovation of buildings, possibility of detailed specification by decree and building regulations	2013	Ministry of the Environment, Municipalities	NE	NE	NE	NE
* Minimum standards for improving the energy performance of buildings undergoing renovation or alteration.	Efficiency improvements of buildings	CO_2	Regulatory	Implemented	Ministry of the Environment Decree (4/2013, amendment 2/2017) provides minimum standards for improving energy performance of buildings in renovations and alterations	2013	Ministry of the Environment	394	701	1,027	1,365
* Decree on water measurement instruments	Efficiency improvements of buildings, Demand management/reduction	CO_2	Information, Economic	Implemented	Provides information on the use of water in each apartment and allows billing that is based on the water consumption. The flat-specific invoicing reduces water consumption and the amount of the energy needed to heat the water.	2011	Ministry of the Environment	33	51	86	NE
* Long term planned real estate maintenance	Efficiency improvements of buildings	CO_2	Information	Implemented	Provide information for appropriate use of the buildings and the proper adjustment and settings of heating, ventilation and air conditioning equipment, as well as maintenance and repair plans	2000	Ministry of the Environment	NE	NE	NE	NE

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Promoting the use of bioliquids in heating of buildings	Reduction of GHG emissions, Increase in renewable energy	CO_2	Regulatory, Fiscal	Implemented	An obligation to blend bioliquids in light fuel oil used for heating of buildings will be increased to 30% by 2030. According to current legislation blending obligation is 10% from 2028 onwards.	2019	Ministry of Economic Affairs and Employment	0	70	200	120
* Subsidies to replace fossil oil and gas heating in detached housing	Reduction of GHG emissions	CO_2	Economic	Implemented	The aim of the grant is to accelerate the abandonment of fossil oil and gas heating system and transition to other heating systems in detached houses. Available budget for grants is ca. EUR 28.7 million in 2020, 34.4 million in 2021 and 68.9 million in 2022.	2020	Ministry of the Environment	NE	174	174	174
* Commitment to phase out oil heating in the public sector	Reduction of GHG emissions	CO_2	Other, Voluntary/ negotiated agreements	Implemented	Commitment to phase out oil heating in central government premises and encouraging all public-sector operators to do the same	2021	Ministry of the Environment	0	130	130	130
* Subsidies to replace oil and gas heating in municipality owned buildings	Reduction of GHG emissions	CO_2	Economic	Implemented	The aim of the grant is to accelerate the abandonment of fossil oil and gas heating system and transition to other heating systems in buildings owned by municipalities. Available budget for grants in 2020 is ca. EUR 14.9 million and in 2022 EUR 9.9 million.	2020	Ministry of the Environment	NE	48	48	48
* Subsidies for retrofitting in housing	Efficiency improvements of buildings	CO_2	Economic	Implemented	The aim is to improve the energy performance of existing residential houses on a higher level than the energy regulations require and increase the production and use of renewable energy in a building. The aim is also to increase the number of nearly zero-energy buildings in renovation. Available budget for grants in 2020, 2021 and 2022 is EUR 138 million in total.	2020	Ministry of the Environment	NE	380	380	380

Table 4.2 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Advice to users on heating and air-conditioning systems	Efficiency improvements of buildings	CO_2	Voluntary/ negotiated agreements	Implemented	Energy performance of heating and air-conditioning systems are improved by means of coordinated advisory and communication activities for a broad target group based on extensive advice and communication carried out in Finland to promote the energy performance of systems. The measure is an alternative to the inspections required in EPBD (2018/844/EU), articles 14–15.	2020	Ministry of the Environment	NE	15	15	15
* Land-use planning	Demand management/ reduction (Energy, Transport)	CO_2	Regulatory, Planning	Implemented	General guidance for land use planning is based on law (Land Use and Building Act). Regional and municipal planning are directed by national land use guidelines. Land use planning creates the preconditions for a sound and vital residential and living environment and supports the regional availability of services and transport. Finland's land use planning system, as defined in the legislation, gives municipalities a high degree of autonomy in local land use planning and thus also possibilities to influence climate change mitigation.	2009	Ministry of the Environment, Regional councils, Municipalities	NE	NE	NE	NE
Improving energy effiency and promoting the use of alternative fuels in machinery	Efficiency improvement of appliances, Low carbon fuels	CO_2, CH_4	Information, Fiscal, Other	Planned	Promoting the use of biogas in machinery, increasing the share of energy-efficient and low emission machinery through public procurement, promoting the energy-efficient use of machinery through information and training, EU-level measures.	2022 and later	Ministry of the Environment	0	NE	240	NE

NE = not estimated
IE = included elsewhere

4.4.2 Transport

Policies and measures in the WM projection

This chapter focuses on measures related to road transport, although the biofuels distribution obligation also slightly reduces emissions from recreational boats. Measures related to maritime and air transport are described in Chapter 4.4.3, as they mainly concern international transport and bunker fuel emissions. In the WM and WAM projections, the maritime and aviation emissions are, nonetheless, reported in accordance with the CRF-classification of the greenhouse gas inventory.

By 2030, Finland will reduce emissions from domestic transport (without domestic aviation) by at least 50 per cent compared to the 2005 level. The aim is to achieve an entirely fossil-free transport sector by 2045. The measures also contribute to achieving the EU's Effort Sharing Decision target.

In line with the Government Programme, the Ministry of Transport and Communications has prepared a Roadmap for fossil-free transport to reduce greenhouse gas emissions from transport[29]. The Government resolution on the reduction of greenhouse gas emissions in domestic transport, i.e. the Roadmap to fossil-free transport, was completed in May 2021. It formed the basis for planning and sizing the emissions reduction measures for transport in the new Medium-Term Climate Change Policy Plan. The Roadmap includes three phases. In the first, a wide range of aids and incentives to promote emissions-free transport will be implemented. For example, these are the inclusion of biogas and electro-fuels in the distribution obligation legislation, various aids related to the procurement and distribution infrastructure of electric and gas vehicles, support for promoting walking, cycling, and public transport services, transport infrastructure maintenance, and digitalisation in logistics. In the second phase, more measures will be added. More information is needed on their effects on emissions before new decisions on measures can be taken. The possible measures include raising the level of obligations in the distribution obligation act, increasing remote work, promoting both combined transport operations in freight transport and digital solutions for transport, and promoting transport services. In the third phase, once the progress of EU-level measures and the impacts of all the measures of phases 1 and 2 are known, the Government will assess and decide on the possible need for additional national measures in the transport sector. Phase three of the Roadmap is conditional.

The WM projection describes the likely evolution of GHG emissions from road transport according to the best information available, and it includes all measures for which there is a decision by August 2022 (a financing decision on measures requiring funding, or which are otherwise likely to occur). In addition, the projection includes assumptions about the effects of remote work,

29 Publications of the Ministry of Transport and Communications 2021:19 http://urn.fi/URN:ISBN:978-952-243-604-7

HCT transport, and digitalisation in logistics, although they are not actual measures. The WM projection contains the following themes, under which there are several measures: 1) Replacing fossil fuels with alternative transport fuels; 2) improving the energy efficiency of vehicles; and 3) improving the energy efficiency of the transport system.

Replacing fossil fuels with alternative transport fuels

The main measures under this theme included in the WM projection are the Biofuels distribution obligation and the Inclusion of biogas and electrofuels in distribution obligation.

The amendment to the national Act on promoting the use of biofuels in transport[30] came into force on 1 January 2011. Under the Act, the annual minimum share of biofuels, measured from the total energy content of petrol, diesel and biofuels delivered for consumption, had to be six per cent in 2011 to 2014 and then gradually rise to 20 per cent in 2020. The energy content of second-generation biofuels, i.e. biofuels produced, for example, from waste material, was considered as double its actual energy content when calculating the share of biofuels for the distribution obligation.

The level of ambition was raised with the amendment to the national Act that came into force on 1 April 2019. Under the Act, the annual minimum share of biofuels, measured from the total energy content of petrol, diesel and biofuels delivered for consumption, must be 18 per cent in 2021 and gradually rise to 30 per cent in 2029. There is also a subtarget for advanced biofuels, starting from two per cent in 2021 and rising to 10 per cent in 2030. Advanced biofuels are produced from feedstock listed in Annex IX Part A of the EU's Renewable Energy Directive (RED II, recast)[31]. After this amendment, there will no longer be double counting of second-generation biofuels in the distribution obligation.

The national Act on promoting the use of biofuels in transport was amended in the spring of 2021 to transpose the EU's Renewable energy directive requirements (RED II, recast)[32] for the transport sector to national legislation. The amendment came into force on 30 June 2021. These requirements include limitations to the shares of food- and feed-based biofuels, biofuels produced from used cooking oil and category 1 and category 2 animal fats and biofuels with a high indirect land-use change-risk. Besides the RED II requirements, the amendment included biomethane and renewable liquid and gaseous transport fuels of non-biological origin in the distribution obligation. The annual minimum share of advanced biofuels and biogas produced from the feedstock listed in Part A of Annex IX of the Renewable Energy Directive and renewable liquid and gaseous transport fuels of non-biological origin

30 446/2007
31 (EU) 2018/2001
32 (EU) 2018/2001

must be two per cent in 2021 and rise to 10 per cent in 2030. The legislation has been applied to biogas since 2022 and will be applied to renewable liquid and gaseous transport fuels of non-biological origin from 2023. The name of the act changed to the Act on promoting the use of renewable fuels in the transport sector.

The national Act on promoting the use of renewable fuels in the transport sector was recently amended again so that the annual minimum share of biofuels would be temporarily lowered to 12 per cent during 2022. This amendment was made because of rising fuel prices. The amendment came into force on 8 July 2022. It is also planned to temporarily lower the obligation for the following year; the annual minimum share of biofuels would be 13.5 per cent in 2023. It is planned to raise the obligation on the annual minimum share of renewable fuels in transport to 34 per cent in 2030. These amendments to the national Act on promoting the use of renewable fuels in transport have been prepared and are expected to come into force on 1 January 2023.

The measure of biofuel distribution obligation achieved an estimated reduction of 1.2 million tonnes of CO_2 in transport-related greenhouse gas emissions in 2020. It is expected that biofuels will account for 34 per cent (no double counting) of all fuels consumed in transport in 2030. This means that fossil fuels equating to emissions of an estimated 3.1 million tonnes of CO_2 will be replaced by biofuels in 2030.

The WM projection includes new annual distribution obligation percentages for biofuels for 2022 to 2030, which are 12, 13.5, 28, 29, 29, 30, 31, 32, and 34 per cent (from 2030). The share of biofuels (biogas, biodiesel, electro-fuels) in consumption increases, and the share of fossil fuels (natural gas, diesel, gasoline) in consumption decreases. Biogas and electro-fuels must be included in the distribution obligation in accordance with the Act[33] during 2022 to 2050. The bio-share of transport gas will increase by 5 percentage points per year until the share reaches the 99 per cent level. Biogas replaces biodiesel in fulfilling the distribution obligation: biogas consumption increases, and the corresponding amount of energy decreases from the consumption of biodiesel.

The WM projection estimates that the emissions reduction effects of the increased distribution obligation percentage for biofuels and the inclusion of biogas will total around 0.33 million tonnes CO_2 eq. in 2030.

Improving the energy efficiency of vehicles

The main measures under this theme included in the WM projection are (1) CO_2 emissions performance standards for new passenger cars and new light commercial vehicles, (2) a purchase subsidy for electric passenger cars, (3) a conversion subsidy for passenger cars, (4) a purchase subsidy for electric or

33 446/2007

gas-powered light commercial vehicles, and (5) a purchase subsidy for electric or gas-powered heavy-duty vehicles. The vehicle taxation as well as for example support for charging and distribution infrastructures are important measures, but the emissions reduction effects of these measures are difficult to separate from that of other measures and therefore has not been assessed separately.

The regulation of the European Parliament and of the Council[34] setting binding CO_2 emissions performance standards for new passenger cars entered into force in 2009. The objective of the regulation was to establish manufacturer-specific emission performance standards for new passenger cars registered in the EU. The amended Regulation setting CO_2 emission performance standards for new passenger cars and new light commercial vehicles[35] (2019) sets new EU fleetwide CO_2 emissions targets for 2025 and 2030, for both newly registered passenger cars and light commercial vehicles. These targets are defined as a percentage reduction from the 2021 starting points: for cars, a 15 per cent reduction from 2025 and a 37.5 per cent reduction from 2030 on, and for light commercial vehicles a 15 per cent reduction from 2025 and a 31 per cent reduction from 2030.

The WM projection includes the CO_2 emission targets in accordance with the EU's Fit for 55 proposal, i.e. the CO_2 emission declared by the manufacturer for new passenger cars should be 55 per cent less in 2030 and 100 per cent less in 2035 than in 2021. The corresponding reductions are 50 per cent and 100 per cent for new light commercial vehicles. In addition, the EU's Fit for 55 proposal to revise the 2014 directive on the Alternative Fuels Infrastructure (AFIR) for the construction of electric car charging stations and hydrogen refuelling stations is considered.

In Finland, the tax on passenger vehicles consists of several elements differentiated according to vehicle-specific emissions (CO_2 g/km). Initially, at the first registration, a one-time tax ("car tax") is paid. The car tax rate for new passenger cars and light commercial vehicles powered entirely by electricity or hydrogen is 0 for vehicles introduced since October 2021. The highest tax rate (48.9 per cent) using the WLTP method applies to cars with CO_2 emissions exceeding 360 g/km.

Furthermore, the basic part of the vehicle tax, which is paid annually, is also differentiated according to the CO_2 emissions of each vehicle, as with the registration tax. This basic part of the emissions-based vehicle tax is EUR 0.15 to 1.80 per day, depending on the car's specific CO_2 emissions. Vehicle tax is collected from the period when it is declared that the vehicle will be used in traffic, or from a period of 365 days if it has been declared that the vehicle has been taken out of traffic. However, for zero-emission vehicles, the amount of tax is now also affected by the date of introduction in traffic. If such a vehicle

34 2009/443/EU

35 2019/631/EU, adopted in 2019 and applied since 1 January 2020

was used in traffic for the first time on or after 1 October 2021, the amount of basic tax levied per day will be the lowest amount of tax in the tax table plus EUR 0.178.

The second part of the annual tax is based on the type of fuel the cars uses. Petrol-fuelled cars have no additional tax. Cars fuelled with diesel, methane, or electricity have an additional annual tax (fuel fee) that is relative to the mass of the car ("mass in running order"), but not to the specific CO_2 emission rate itself. However, the CO_2 rate and vehicle mass have a certain correlation.

In addition, some changes were implemented in the taxation of fringe benefits from the beginning of 2021. The taxable value of the company car benefit for fully electric vehicles has been reduced by EUR 170 per month for 2021 to 2025. Employer-provided charging of electric vehicles is exempted for 2021 to 2025. Employer-subsidised commuter tickets are tax-free up to EUR 3,400 of the taxable value per year, and employer-provided bicycles are tax-free up to EUR 1,200 of taxable value per year. The tax relief for low-emission cars, which applies to company cars with carbon dioxide emissions (WLTP) between 1 and 100 g/km, went into effect from 2022. The amount of the deduction from the taxable value of the company car benefit is EUR 85 per month, which equates to half the rateable value of fully electric cars of 170 EUR/month. All company cars below the emissions limit will receive a discount, regardless of their propulsion power. The emissions reduction effects of vehicle taxation measures are difficult to separate from that of other measures and have therefore not been assessed separately.

Vehicles' energy efficiency is also promoted by different purchase subsidies. The Act on periodic support for the purchase of an alternative propulsion vehicle or conversion of a vehicle to alternative propulsion will be effective between 1.1.2022 and 31.12.2026[36]. As of 2018, and currently until 31 December 2022, people who are either buying a new electric car or signing a long-term lease agreement for an electric car may receive a EUR 2,000 purchase subsidy from the Finnish government. For the same period, a conversion subsidy can be obtained for converting a petrol-fuelled passenger car for use with gas or ethanol. The conversion subsidy amounts to EUR 1,000 if the car is converted for use with gas and to EUR 200 if the car is converted for use with ethanol. Nearly 9,000 electric car purchase subsidies were granted between 2018 and 2021, amounting to roughly 18 million euros. A total of nearly EUR 1.7 million of conversion subsidies was granted between 2018 and 2021 to approximately 5,600 ethanol vehicles and 500 gas vehicles. Electric cars became increasingly popular between 2018 and 2021, and for the first time, more than 10,000 new fully electric cars were registered in Finland in 2021. Many factors are driving this development, and the purchase subsidy has certainly played a role in accelerating demand for low-emission vehicles.

36 1289/2021 and Government proposal HE 171/2022 vp for its amendme

The Government also promotes the use of alternative transport fuels by supporting the construction of public charging point infrastructure for electric cars and for renewable hydrogen and biogas distribution stations until 2025[37]. Between 2018 and 2021, a total of about EUR 15 million was spent on investment subsidies. In addition, vehicles' energy efficiency is promoted by the support designed for housing companies' charging point infrastructure. A total of EUR 31,5 million was reserved for the recharging infrastructure aid in the period 2018–2021. The aid has been very popular.

The purchase of a new electric- or gas-powered light commercial vehicle or lorry or electric trailer may also receive financial support from the Transport and Communications Agency Traficom. The amount of aid is between EUR 2,000 and EUR 50,000, depending on the size and the propulsion method of the vehicle. In the 2022 budgets, an appropriation of EUR 4.5 million has been allocated to the purchasing subsidies for vans. In addition, the Government has proposed an additional appropriation of EUR 1.5 million for 2023. A total of EUR 6 million was reserved for the subsidies for the lorries in the period 2020–2022. In addition, the Government has proposed an additional appropriation of EUR 1 million for heavy goods vehicles for 2023.

Finland has been active in providing people with more information about the CO_2 emissions and energy efficiency of passenger cars. Examples of this include the Car Calculator[38] published by the Finnish Climate Change Panel, which is designed to support a consumer's car purchase decisions and displays the cumulative full-life cycle greenhouse gas emissions and costs of different propulsion alternatives. Purchase subsidies and scrapping bonuses have been the subject of much communication and have been of great interest to consumers. The Finnish Transport and Communications Agency Traficom has published a Guidance[39] on the creation of an energy label for cars, as well as an information campaign for alternative power sources[40]. Motiva publishes information on sustainable choices along with a Choosing a Car website[41]. In addition, a Green Deal model for car dealerships was concluded in 2018, directing them to present low-emission vehicle alternatives to customers.

The method for measuring emissions from new passenger cars has changed from the NEDC (New European Driving Cycle) method to the WLTP (Worldwide Harmonised Light Vehicle Test Procedure) method. During the 2008 to 2018

37 Government Decree on infrastructure support for electric transport, biogas, and renewable hydrogen between 2022 and 2025 (178/2022) https://finlex.fi/fi/laki/alkup/2022/20220178

38 https://www.ilmastopaneeli.fi/autokalkulaattori/

39 https://www.traficom.fi/sites/default/files/media/regulation/Ohje_Kulutus-%20ja%20p%C3%A4%C3%A4st%C3%B6tietojen%20esitt%C3%A4minen%20henkil%C3%B6autoja%20myyt%C3%A4essa.pdf

40 https://www.traficom.fi/fi/ajavaihtoehtoa (only in Finnish)

41 https://www.motiva.fi/ratkaisut/kestava_liikenne_ja_liikkuminen/nain_liikut_viisaasti/valitse_auto_viisaasti (in Finnish)

period, the average CO_2 emissions (NEDC) of new cars decreased by 28 per cent. The average CO_2 emissions of new cars in 2021 was 103.2 g/km (WLTP). It decreased by 26 per cent between 2019 and 2021. A total of some 98,500 new cars were sold in 2021, of which 31 per cent were electric cars.

The WM projection estimates that the emissions reduction effects of improving the energy efficiency of cars and light commercial vehicles will total around 0.21 million tonnes CO_2 eq. in 2030, and 0.6 million tonnes CO_2 eq. in 2035. The estimate includes the impact of new CO_2 emission performance standards for new passenger cars and light commercial vehicles and the AFIR proposal.

In addition to passenger cars and light commercial vehicles, the energy efficiency of heavy-duty vehicles is expected to further improve. The EU Regulation[42] setting CO_2 emissions standards for heavy-duty vehicles entered into force on 14 August 2019. These first EU-wide CO_2 emissions standards for heavy-duty vehicles set targets for reducing the average emissions from new lorries for 2025 and 2030. The targets are expressed as a percentage reduction of emissions compared to the EU average in the reference period (1 July 2019 to 30 June 2020), and from 2025, the target is a 15 per cent reduction. From 2030, the target is a 30 per cent reduction.

A Car Scrapping Premium campaign took place in 2020 and 2021[43]. The State paid a scrapping premium of between EUR 1,000 and 2,000, depending on the power source of the car to be purchased. The premium could also be used for buying an electric bicycle, a seasonal ticket for public transport services, or a mobility service including public transport, in which case the maximum sum was EUR 1,000. A scrapping premium of EUR 2,000 was awarded for purchasing a new flex-fuel car, i.e. a high blend ethanol car, a gas-fuelled vehicle, a full-electric vehicle, or a rechargeable hybrid with maximum emissions of 95 grams per kilometre, and EUR 1,000 for purchasing a car with maximum CO_2 emissions of 120 grams per kilometre. A total of a little more than 6,500 scrapping premiums was granted, the majority (71 per cent) of which was used for purchasing an electrically assisted bicycle. This new interest in electrically assisted bicycles was a welcome surprise and tangible proof of the popularity of this relatively new mode of transport. The share of new vehicles of the amount of subsidies granted was a little over a quarter, whereas only a few per cent of the subsidies was used for public transport tickets. A total of eight million euros was allocated for the scrapping premiums.

Measures of vehicle fleet renewal create a so-called slow change in the development of road transport: the change accumulates over the years, as the vehicle fleet rebuilds towards zero emissions. With an increasing proportion of energy consumption in road transport being electricity and hydrogen, the emissions impact of fossil fuel substitution measures is reduced. Measures are

42 2019/1242/EU

43 839/2020

mutually supportive – the distribution of biofuels will create precise emissions reductions over the next 10 to 20 years, during which the vehicle fleet will be renewed, and the importance of the biofuel distribution obligation as an emissions reduction measure will decrease.

The stricter new CO_2 emission performance standards for new passenger cars and light commercial vehicles and the recharging and refuelling infrastructure to be built with the AFIR proposal will result in the largest GHG emissions reduction in the WM projection under this theme. The emissions reduction effect will increase in time, as the share of zero-emission vehicles in the fleet increases, especially after 2035. The impact of the purchase subsidy for electric passenger cars is the most significant of all purchase subsidies. The effect will peak in 2030 (−19 kt CO_2 eq.), followed by a steady decline.

The incentivising of various procurers to invest in environmentally friendly vehicles has been promoted since the EC Clean Vehicles Directive[44](CVD) entered into force. The revised Clean Vehicles Directive[45] promotes clean mobility solutions in public procurement tenders, providing a boost to demand and further deployment of low- and zero-emission vehicles. The Directive sets minimum procurement targets for the share of both light-duty vehicles and heavy-duty vehicles like lorries and buses. The Directive strongly promotes electricity, although biofuels, i.e. biogas or renewable diesel, are also accepted, especially at an early stage. Adopted in 2019, the revised Directive is implemented nationally by the Act on environmental and energy efficiency requirements in vehicle and transport services[46], which entered into force in August 2021, and it places obligations on local and central government to ensure a certain proportion of zero and low-emission vehicles in public procurement processes. For example, the Act applies to the procurement of vehicles and transport services in relation to school transport, waste collection, local bus transport, and transport reimbursed by the Social Insurance Institution of Finland.

The WM projection estimates that the emissions reduction effects of the new measures improving the energy efficiency of vehicles described above will total around 0.41 million tonnes CO_2 eq. in 2030.

Improving the energy efficiency of the transport system

The main measures or phenomena under this theme included in the WM projection are: (1) the investment programme for walking and cycling; (2) urban transport system plans; (3) remote work; and (4) High Capacity Transport (HCT) and digitalisation in logistics.

Finland is a sparsely populated country, which is why cars will be a vital means of transport both now and in the future. Fortunately, especially in urban areas

44 2009/33/EC
45 2019/1161/EU
46 740/2021

and inter-urban transport, there are also alternatives to cars, such as public transport, shared transport, walking and cycling. Goods transport can also be made more efficient or moved from roads to rail or waterways. The objective of the Roadmap to fossil-free transport[47] is that the vehicle-kilometres of passenger cars will no longer increase in the 2020s. If people's mobility needs continue to increase, the aim is that this growth in urban areas and inter-urban transport will be directed towards sustainable modes of transport. This would represent an increase of about 10 per cent growth in the traffic performance of each sustainable mode of transport in 2030. For individual households in rural areas, car vehicle-kilometres may continue to increase, but as the population concentrates in urban areas, the combined vehicle-kilometres of households throughout the country should remain at the 2019 level.

Improving the energy efficiency of the transport system can be achieved through measures such as promoting walking, cycling and public transport, as well as transport and land-use coordination. Energy efficiency in the transport sector can also be improved by enabling and developing new mobility services and shared mobility. Intelligent transport and the use of information technology (IT) will help improve both traffic safety and fluency, as well as achieving the environmental targets in the transport sector. It will also create significant business opportunities for companies.

A Programme for the Promotion of Walking and Cycling and a Government Resolution to promote walking and cycling were adopted in 2018. The resolution and the programme include ten sets of measures aiming to increase the number of walking and cycling trips by 30 per cent by 2030. At least half of this increase should come from replacing car journeys. An entirely new measure in the programme is a joint Investment Programme by the State and municipalities to improve the conditions for walking and cycling within cities' street networks. To launch the investment programme, a total of EUR 7 million has been allocated for 2018 to 2019, EUR 31.5 million for 2020, EUR 22.4 million for 2021, and an estimated EUR 6.5 to 11 million for 2022.

There is an annual state subsidy of EUR 12.25 million for large urban areas (4 areas) and EUR 8.625 million for medium-sized urban areas (10 areas) to support local public transport. In addition, there is separate EUR 20 million climate-based funding for the competent authorities for public transport. The funding will support low-emission public transport and increase the modal share of public transport. The main part of the climate-based funding is allocated to large urban areas and cities. Due to the Covid-19 pandemic, there was additional state funding for the competent authorities to ensure the level of public transport services. The additional state funding was approximately EUR 220 million between 2020 and 2021. In general, public transport is regulated with the requirements of the EU's PSO regulation. The competent public authorities organise public transport in their area if there is no market-oriented transport.

47 Roadmap to fossil-free transport; http://urn.fi/URN:ISBN:978-952-243-604-7

The popularity of public transport, walking, and cycling is also promoted through Mobility Management. Mobility Management is a broad concept, the objective of which is to reduce dependence on private cars. The aim is to offer better information about alternative transport modes and services, and to promote public transport, cycling, walking, carpooling and car sharing. Mobility Management activities at the city or regional level are supported through an annual appropriation of approximately EUR 0.6 million from the Government. Cities, regions and non-profit organisations can apply for this funding every year. Around 30 to 35 projects have been funded annually since 2012.

The aim of the Mobility-as-a-Service (MaaS) concept is to improve the service level of transport by combining public and private transport services. The entity includes both existing services that have already been established, such as public transport and taxis, and new services that are still under development or becoming established, such as shared-use cars or peer rental. With respect to a positive impact, it is essential that MaaS solutions mainly reduce the vehicle-kilometres of cars and enable an increase in the proportion of public transport modes.[48]

Measures related to improving the efficiency of the transport system have been developed in connection with the preparation of the National Transport System Plan (Traffic12)[49]. The Plan is drawn up for a period of 12 years (2021 to 2032) and will be updated each Government term. The National Transport System Plan addresses the overall transport system, and its objectives are associated with sustainability, accessibility, and efficiency. Measures promoting the integration of different mobility services and new services will be specified in more detail as part of the preparation and implementation of the National Transport System Plan. The objective of the plan is that opportunities to choose more sustainable modes of mobility will improve, particularly in urban areas. In urban areas and inter-urban transport, there needs to be a systematic shift from the current car-centric system to a sustainable mobility system. Under a sustainable mobility system, mobility and transport needs are managed by utilising and combining various transport modes and services. Digitalisation and transport-related information are key. Automation can also help achieve transport emissions reduction targets by improving the competitiveness and attractiveness of public transport, for example.

The development of new service models and the revolution of the transport market has been promoted by the introduction of a unified regulatory act (Act on Transport Services[50]). The Act will provide a better response to user needs, facilitate companies' access to the market and promote the interoperability of different parts of the system. At the same time, the deployment of new technologies, digitalisation, and new business concepts is encouraged. The

48 Roadmap to fossil-free transport; Publications of the Ministry of Transport and Communications 2020:19; pages 38–39

49 The National Transport System Plan for 2021 to 2032; Publications of the Finnish Government 2021:77; http://urn.fi/URN:ISBN:978-952-383-804-8

50 320/2017

Act envisages that essential data on transport services will be made open, laying down provisions for the interoperability of different ticket and payment systems, to facilitate combinations of different transport services. The Act brings together transport market legislation and creates preconditions for the digitalisation of transport. Digitalisation of transport services in large urban areas was promoted through an annual EUR 3.5 million government subsidy between 2018 and 2022. This has especially supported the development of ticketing and payment systems.

Improving the energy efficiency of the transport system is also promoted by coordinating transport and land use in urban areas and in transport system planning, e.g. through land-use, housing and transport agreements (MAL agreements). Agreements are made between the State and municipalities of the biggest city regions. The aim is to build carbon neutral urban regions and increase the proportion of sustainable means of transport.

It is assumed that driving kilometres will decrease when the same mass can be transported with fewer vehicles. It is assumed that the vehicle-kilometre reduction will change linearly between 2022 and 2030 and remain constant after 2030, as enabling HCT[51] transports requires infrastructure investment such as extensions of intersection areas to suit large combinations. HCT transports have therefore presumably yet to achieve the full potential. It is assumed that digitalisation will contribute to the full potential of HCT transport by increasing operational efficiency, transport smoothness, and optimisation. The impact of digitalisation on emissions is estimated to be small in the short term, but the effect will increase in the longer term. However, Finland is a small country, and the volume of transports may be insufficient to introduce digitalisation cost-effectively. HCT transports and digitalisation are expected to support each other and potentially overlap in terms of impacts, and their impact reductions have therefore been assessed together in the WM projection.

HCT transport and digitalisation in logistics will result in the largest greenhouse gas emissions reduction in the WM projection under this theme. The WM projection estimates that the emissions reduction effects of improving the transport system's energy efficiency will total around 0.081 million tonnes CO_2 eq. in 2030.

51 High Capacity Transport

Policies and measures in the WAM projection

Table 4.6 sets out the main policies and measures included in the WAM projection for the transport sector. The WAM projection includes the measures that had not been decided or financed by August 2022 or were uncertain for other reasons. It contains the following themes, under which there are several measures: (1) replacing fossil fuels with alternative transport fuels (additional measure); (2) improving the energy efficiency of vehicles (additional measure); and (3) improving the energy efficiency of the transport system (additional measure).

Replacing fossil fuels with alternative transport fuels (additional measure)

In the longer term, renewable or zero-emission fuels and power sources such as electricity, biofuels, and electro-fuels must replace all fossil fuels in transport. In the WAM projection, the idea is to end the sale of fossil transport fuels for domestic transport in 2045. If fossil fuels continue to be used in transport in 2045, the objective of fossil-free transport cannot be realised.[52] The WAM projection includes annual distribution obligation percentages for biofuels for 2031 to 2045, which are: 35, 36, 37, 38, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, and 100 per cent from 2045.

Of all the measures in the WAM projection, increasing the biofuel distribution obligation to 100 per cent will result in the largest reduction in greenhouse gas emissions of all the measures considered in the WAM projection. The WAM projection estimates that the emissions reduction effects of replacing fossil fuels with alternative transport fuels (additional measure) will total around 0.089 million tonnes CO_2 eq. in 2031, peaking at approximately 2.8 million tonnes CO_2 eq. in 2045.

Improving the energy efficiency of vehicles (additional measure)

The main measures under this theme included in the WAM projection are new CO_2 emissions standards for heavy-duty vehicles and a new scrapping premium campaign.

In its Work Programme for 2022, the European Commission plans to review the CO_2 emissions standards for heavy-duty vehicles and establish a legislative framework for the harmonised measurement of transport and logistics emissions to support the transition to zero-emission mobility. It is planned to publish the proposal for the review of the CO_2 emissions standards for heavy-duty vehicles at the end of 2022[53]. The reduction in CO_2 emissions of heavy-duty vehicles with the tightening of standards creates significant GHG emissions reductions. The estimated emissions reduction effect will increase

52 Roadmap to fossil-free transport; Publications of the Ministry of Transport and Communications 2020:19; page 49

53 COM (2021) 645 final, page 4

until 2035 (0.16 million tonnes CO_2 eq. in 2035), after which the effect will decrease, although the level of uncertainty about this measure is relatively high.

Thus far, three scrappage premium campaigns have been implemented in Finland. Scrappage premium campaigns should occasionally be repeated to enhance functionality. If necessary, the terms of the campaign should be amended so that the criteria for the cars to be supported reflect the changing situation in the car market as much as possible. Petrol and diesel cars will have to be eliminated altogether in the long term, and support for them will no longer be appropriate closer to 2030.[54] The WAM projection assumes that anyone scrapping their car (model year 2010 or older) in 2023 will receive a scrapping premium when purchasing a new low-emission car (gas car, <95 g/km charging hybrid, full electric, or <120 g/km other internal combustion engine car), public transport season ticket or electric-assisted bicycle. The greenhouse gas emissions reduction effect of the scrappage premium campaign is greatest immediately during and after the implementation of the measure (0.015 million tonnes CO_2 eq. in 2023), although the reduction effect at the level of support studied is moderate. No decision on the new scrappage premium campaign has so far been taken, meaning it will have to be taken separately.

The WAM projection estimates that the emissions reduction effects of improving the energy efficiency of vehicles (additional measure) will total around 0.16 million tonnes CO_2 eq. in 2035 and decrease thereafter.

Improving the energy efficiency of the transport system (additional measure)

The main measures under this theme included in the WAM projection are (1) the Mobility-as-a-Service concept (full potential); (2) the combination of urban transport system plans (rest of the potential), increase in the State funding to public transport for large and medium-sized urban areas, and the increase in the state funding for Mobility Management; (3) the Investment Programme for walking and cycling (full potential); and (4) the EU Emissions Trading System for road transport.

In June 2021, the European Commission published a large legislative package that proposed the establishment of a separate emissions trading system for emissions from road transport. The new emissions trading system would operate alongside the existing one. In Finland, the new emissions trading would cover the emissions from fossil fuels used in road transport[55]. The EU Emissions trading for road transport was included in the theme of Improving the energy efficiency of the transport system, as its effect on the calculation model was to reduce vehicle-kilometres. It could also be transposed to the theme of

54 Roadmap to fossil-free transport; Publications of the Ministry of Transport and Communications 2020:19; page 27

55 Medium-Term Climate Change Policy Plan – Towards a carbon neutral society in 2035; Publications of the Ministry of the Environment 2022, p. 103

Improving the energy efficiency of vehicles if the impact of emissions trading on the vehicle fleet was modelled. The emissions reduction effect of emissions trading will be greatest in the years immediately following the implementation of the measure. The impact will be reduced in line with other vehicle-kilometre reduction measures, while the share of zero-emission vehicles in the vehicle fleet increases. The uncertainty created by the synergies towards the emissions reduction effect of emissions trading will be lowest until 2035 and will increase thereafter, as with the measures in question. According to an estimate included in the WAM projection, the impact of the new emissions trading for road transport will be greatest in 2026 (approximately −0.25 million tonnes CO_2 eq.) and decrease thereafter.

The aim of the Mobility-as-a-Service concept is to improve the service level of transport by combining public and private transport services. The core purpose of MaaS is to provide user-friendly, reliable, affordable, and competitive door-to-door mobility services to reduce the need for use of a privately owned car and thus reduce passenger car kilometres. The environmental impact of promoting mobility services will depend on how they are implemented. According to an estimate included in the WAM projection, the impact of MaaS will be greatest in 2030 (approximately −0.029 million tonnes CO_2 eq.) and decrease thereafter.

Under the ′Transport system planning and sustainable transport subsidies theme, there are three measures for which emissions reductions must be jointly assessed. These three measures aiming to reduce passenger car kilometres were combined, as all of them were insufficient to calculate the individual impact of the measures. However, the measures have sufficient background data overlaps and similarities to be combined and thought of as mutually supportive measures. In the development of sustainable transport, it is important to pay attention to the fact that the development conditions depend on cooperation between many different parties and operators. For example, sustainable transport can be promoted through MAL[56] agreements or other contractual procedures, as well as urban transport system plans and related funding.

First, for the urban transport system plans, it was estimated[57] that 15 per cent of activities for promoting sustainable transport in urban areas by 2030 had taken place between 2020 and 2022. A similar rough estimate can also be used for the estimated CO_2 reduction related to the measure.

Second, a measure to increase the allocation of existing public transport support for large and medium-sized urban areas beyond 2024 was included in the projection. By increasing the subsidies for public transport, preparations can be made for increasing passenger volumes, especially in large and medium-sized urban areas, where the emissions reduction potential of public transport is greatest. The

56 Land-use, housing and transport agreements made between the State and municipalities of the biggest city regions.

57 The Finnish Transport and Communications Agency Traficom's impact assessment (1.7.2022).

funding levels for public transport after 2025 to 2032 will be further specified as part of the preparation and implementation of the Traffic12 plan.[58]

Third, sustainable transport can be supported by Mobility Management. Currently, between EUR 0.6 and EUR 0.9 million per year is spent on central government transfers for mobility management. It is proposed to increase the budget for state transfers to municipalities and non-profit organisations to EUR 2.5 million per year. In addition, the grant should be extended to private employers to manage workplace mobility.[59]

State funding will also be directed through the investment programme for projects that improve the conditions and attractiveness of walking and cycling and thus increase the number of walking and cycling trips and their contribution to modes of transport. Between 2022 and 2024, the State will direct EUR 30 million/year for the investment programme for walking and cycling. At least EUR 10 million/year of funding will be allocated to improving the conditions of walking and cycling infrastructure on highways and traffic nodes. Funding would therefore amount to EUR 40/year, or a total of EUR 120 million in 2022 to 2024, of which EUR 79.5 million would be additional funding. The subsidy levels after 2024 will be decided as part of the implementation of the Traffic12 plan.

The greenhouse gas emissions reduction effect of measures aimed at reducing passenger car kilometres will be greatest in the 2020s and 2030s and will begin to decline as the number of zero-emission vehicles in the vehicle fleet increases. The transport system plans in urban areas and the state funding of public transport have the greatest emissions reduction potential of these three measures. The emissions reduction impact of the Investment Programme for walking and cycling is moderate at a relatively low level of funding. The uncertainty created by the synergies towards the emissions reduction effect of these measures will be low until 2035, after which the uncertainty will increase significantly by all measures. The uncertainty is likely to be increased by different orders of magnitude of the effects of the different measures. The biofuel distribution obligation, which has a relatively high impact on emissions, will have a stronger impact from 2035.

The WAM projection estimates that the emissions reduction effects of improving the transport system's energy efficiency (additional measure) will peak at around 0.31 million tonnes CO_2 eq. in 2026 and decrease thereafter.

Summary of policies and measures

A summary of the policies and measures in the transport sector is presented in Table 4.5.

58 Roadmap to fossil-free transport; Publications of the Ministry of Transport and Communications 2020:19; page 46.

59 Roadmap to fossil-free transport; Publications of the Ministry of Transport and Communications 2020:19; page 34.

Table 4.5
Policies and measures according to the WM (marked with *) and WAM projections in the transport sector

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Promoting the use of biofuels in the transport sector	Low carbon fuels	CO_2	Regulatory	Implemented	The annual minimum share of biofuels in road transport delivered for consumption shall be 18% in 2021 rising gradually to 30% in 2029.	2019	Ministry of Economic Affairs and Employment	1,201	2,509	2,689	2,129
* Promoting the use of biofuels in the transport sector, amending minimum levels	Low carbon fuels	CO_2	Regulatory	Implemented, changes adopted	This measure changes the level of biofuel shares in the distribution obligation legislation. The minimum share for 2022 is temporarily lowered to 12%. Also the share for 2023 is proposed to be temporarily lowered due to high fuel prices. In order to compensate for the decreased emission reductions, obligation levels for 2024 to 2029 are proposed to be increased. In addition, the 2030 distribution obligation is proposed to be increased to 34%.	2020	Ministry of Economic Affairs and Employment, Ministry of Finance	0	555	399	340
* Inclusion of biogas and electrofuels in the distribution obligation legislation	Low carbon fuels	CO_2	Regulatory, Fiscal	Adopted	Compliant fuels in the distribution obligation legislation will be extended to include biogas from 2022 and renewable liquid and gaseous transport fuels of non-biological origin from 2023.	2022	Ministry of Economic Affairs and Employment, Ministry of Finance	0	–44[1)]	–67[1)]	–96[1)]
* Car tax	Efficiency improvements of vehicles	CO_2	Fiscal	Implemented	This measure includes tax rates as the situations is 1.1.2020 according to Car Tax Act (1482/1994).	1967	Ministry of Finance	IE	IE	IE	IE
* Vehicle tax	Efficiency improvements of vehicles	CO_2	Fiscal	Implemented	This measure includes tax rates as the situations is 1.1.2020 according to Vehicle Tax Act (1281/2003).	1966	Ministry of Finance	IE	IE	IE	IE

Table 4.5 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Temporary reductions of taxable values of company-car benefit for battery electric vehicles and employer-provided charging of electric vehicles	Efficiency improvements of vehicles, Electric cars	CO_2	Fiscal	Implemented	Taxable value of company-car benefit for zero emission cars is reduced by EUR 170 per month. Employer-provided charging of electric vehicles in workplace or in public charging point is exempted.	2021	Ministry of Finance	0	NE	NE	NE
Changes to taxable values of employer-provided commuter tickets and bicycles	Modal shift to public transport or non-motorized transport	CO_2	Fiscal	Implemented	From 2021 onwards employer-provided commuting ticket is tax-free up to EUR 3,400 and taxable value of bicycle is tax-free up to EUR 1,200.	2021	Ministry of Finance	0	NE	NE	NE
* Purchase subsidy for electric passanger cars	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Implemented	The support for electric passanger cars will increase the use of electricity instead of petrol and diesel.	2018	Ministry of Transport and Communications, Ministry of Finance	NE	17	19	16
* Conversion subsidy for passanger cars	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Implemented	The support for converting petrol or diesel engine car for use with gas or ethanol will decrease the use of fossil fuels.	2018	Ministry of Economic Affairs and Employment, Ministry of Finance	NE	–4[1)]	–2[1)]	–1[1)]
* Purchase subsidy for electric or gas-powered light commercial vehicles	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Implemented	The support for electric or gas powered light commercial vehicles will increase the use of electricity and gas instead of petrol and diesel.	2022	Ministry of Transport and Communications, Ministry of Finance	0	4	4	2
* Purchase subsidy for electric or gas-powered heavy duty vehicles	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Implemented	The support for electric or gas powered trucks will increase the use of electricity and gas instead of petrol and diesel.	2022	Ministry of Transport and Communications, Ministry of Finance	0	9	5	2

Table 4.5 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* CO_2 emission performance standards for new passenger cars and for new light commercial vehicles incl. AFIR (Alternative Fuels Infrastructure Regulation)	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory	Implemented/ Planned	CO_2 limit values according to the EU Fit for 55 proposal, by which the CO_2 emissions of new passenger cars reported by the manufacturer should be –55% less in 2030 and –100% less in 2035 than in 2021. The corresponding reductions are –50% and –100% for light commercial vehicles. The infrastructure of electric car charging stations and hydrogen filling stations according to the EU Fit for 55 AFIR proposal.	2022	Ministry of Transport and Communications, Ministry of Economic Affairs and Employment, Ministry of Finance	0	41	210	604
* HCT transports and digitalisation in logistics	Demand management/ reduction	CO_2	Regulatory	Implemented/ Planned	The Regulation on the HCT (High Capacity Transport) vehicle combinations for road transport (1257/1992) was amended and entered into force in 2019 increasing the maximum length of combination to 34.5 metres. This will decrease kilometres driven when the same mass can be transported with fewer vehicles.	2022	Ministry of Transport and Communications	0	30	60	55
* Urban transport system plans	Demand management/ reduction, modal shift to public transport or non-motorized transport	CO_2	Voluntary/ negotiated agreements, planning, economic	Implemented/ Planned	The aim is to reduce the number of solo car journeys and to halt the increase in the vehicle-kilometres in urban areas regardless of a growing population by promoting the conditions for walking, cycling, public transport and new travel services, especially in urban areas.	2023	Ministry of Transport and Communications	0	6	13	10
* The investment programme for walking and cycling	Demand management/ reduction, modal shift to public transport or non-motorized transport	CO_2	Voluntary/ negotiated agreements, planning, economic	Implemented/ Planned	The aim is to enhance the requirements necessary for walking and cycling in Finland's municipalities, support the reduction of GHG-emissions in traffic and promote public health. The investment programme promotes the the target set for walking and cycling in 2030, i.e a 30% increase in the amount of travel.	2023	Ministry of Transport and Communications, Ministry of Finance	0	4	8	6

Table 4.5 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Improved regulation of the development of major retail centres	Demand management/ reduction	CO_2	Regulatory, Planning	Implemented	Strenghtening of available policy instruments in land use and building act to avoid disruptive land use development and increased transportation needs due to construction of retail centres based on private car transportation	2000	Ministry of the Environment, Regional councils, Municipalities	NE	NE	NE	NE
* Other miscellanious changes	Efficiency improvements of vehicles	CO_2	Regulatory, economic, fiscal, other	Implemented/ Planned	Changes in vehicle taxation, charging and distribution infrastructure subsidies, market-based changes in new registrations and driving power of imported used cars.		Ministry of Transport and Communica-tions, Ministry of Finance	NE	101	175	222
Biofuel distribution obligation 100 per cent in 2045	Low carbon fuels/ electric cars	CO_2	Regulatory	Planned	Increasing the obligation to biofuel distribution to 100 per cent from 2030 by 2045. Consumption of bio-based and other fuels classified as renewable will increase and the share of fossil fuels in consumption will decrease and completely cease in 2045.	2031	Ministry of Economic Affairs and Employment, Ministry of Finance	0	0	0	447
CO_2 emissions performance standards for new heavy duty vehicles	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory	Planned	The proportion of first registered zero-emission electric and hydrogen-powered heavy duty vehicles among all first registrations will increase until 2030 so that the average CO_2 value of all first registrations is 30% less than the average in Finland in 2021. After 2030, the situation will remain constant.	2023	Ministry of Economic Affairs and Employment, Ministry of Finance	0	18	91	157
Scrapping premium campaign	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Planned	New premium for scrapping car (model year 2010 or older) in 2023 for purchasing a new low emission car (gas car, <95 g/km charging hybrid, full electric or <120 g/km other internal combustion engine car), public transport season ticket or electric-assisted bicycle.	2023	Ministry of Transport and Communica-tions, Ministry of Finance	0	10	5	2

Table 4.5 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Services in the Mobility-as-a-Service concept – full potential	Demand management/ reduction, modal shift to public transport or non-motorized transport	CO_2	Voluntary/ negotiated agreements, planning, economic	Planned	The main purpose of Mobility as a Service (MaaS) is to provide user-friendly, reliable, affordable and competitive door-to-door mobility services to reduce the need to use a privately owned car and thus decrease vehicle-kilometres.		Ministry of Transport and Communications, Ministry of Finance	0	15	29	19
Additional measures to improve the energy-efficiency of the transport system	Demand management/ reduction, modal shift to public transport or non-motorized transport	CO_2	Voluntary/ negotiated agreements, planning, economic	Planned	A combination of three measures aimed at the same goal to reduce the need to use a privately owned car and decrease vehicle-kilometres: – urban transport system plans (full potential) – increase the state funding to public transport for large and medium-sized urban areas – increase the state funding to mobility management		Ministry of Transport and Communications, Ministry of Finance	0	34	67	45
The investment programme for walking and cycling – full potential	Demand management/ reduction, modal shift to public transport or non-motorized transport	CO_2	Voluntary/ negotiated agreements, planning, economic	Planned	Assumed a funding level of > EUR 26.5 million/ year for the Walking and Cycling Investment Programme according to the Roadmap to Fossil Free Transport.		Ministry of Transport and Communications, Ministry of Finance	0	2	3	2
Emissions trading system for road transport	Efficiency improvements of vehicles, Low carbon fuels/electric cars	CO_2	Regulatory, economic	Planned	Emissions trading in transport sector fossil fuels under the EU's Fit for 55 proposal is estimated to decrease vehicle-kilometres for passenger cars and light commercial vehicles		Ministry of Transport and Communications, Ministry of Economic Affairs and Employment, Ministry of Finance	0	0	189	83

NE = not estimated
IE = included elsewhere

1) The measure increases the emissions of the WM projection in relation to the previous WM projection, where biogas was not included in the distribution obligation but provided additional emission reductions. In the new WM projection, biogas/high-blend ethanol fuel reduces the amount of other biofuel in the distribution obligation and therefore increases emissions compared to the previous projection.

4.4.3 International bunkers

Policies and measures in the WM projection

Finland has actively participated in the International Maritime Organization's (IMO) and International Civil Aviation Organisation's (ICAO) work to limit emissions from international transport.

The 2010 ICAO Assembly adopted the existing global aspirational goals for the international aviation sector of 2 per cent annual fuel efficiency improvements and carbon neutral growth from 2020. Finland welcomes that the ICAO Assembly in 2016 adopted a global carbon-offsetting scheme for international aviation, CORSIA. With this decision, aviation became the first industrial sector to have a global market-based measure scheme in place. Finland has fully supported ICAO's work on the development of Annex 16, Volume IV to the Convention on International Civil Aviation containing the Standards and Recommended Practices (SARPs) for the implementation of CORSIA and has confirmed its participation in the CORSIA from its outset.

Finland welcomes that the Initial IMO Strategy on Reduction of Greenhouse Gas Emissions from Ships was adopted in 2018. It envisages a reduction in total greenhouse gas emissions from international shipping and identifies three levels of ambition. First, the carbon intensity of ships should decline through the implementation of further phases of the Energy Efficiency Design Index (EEDI) for new ships. Second, the carbon intensity of international shipping should decline with reductions in CO_2 emissions per transport work, as an average across international shipping, by at least 40 per cent by 2030, pursuing efforts towards 70 per cent by 2050 compared to 2008. Third, greenhouse gas emissions from international shipping should peak as soon as possible, and the total annual emissions should be reduced by at least 50 per cent by 2050 compared to 2008. According to the Roadmap, by 2023, IMO Member States should agree a final strategy on short-, medium-, and long-term measures, taking the results from the IMO Data Collection System into account. In 2021, the IMO agreed to initiate the revision of the Initial 2018 IMO Strategy on Reduction of GHG Emissions from Ships, recognising the need to strengthen the ambition during the revision process. A final draft Revised IMO GHG Strategy will be considered by 2023 with a view to adoption.

The EU MRV Regulation[60] on monitoring, reporting and verification of carbon dioxide emissions from maritime transport entered into force in 2015. The EU regulation applies to ships greater than 5000 gross tonnage, irrespective of their flag, undertaking following voyages in EU and EFTA regions and it requires ships to monitor and report their CO_2 emissions, fuel consumption, transport work and average energy efficiency. In 2016, the IMO approved amendments to the Annex VI on Data Collection System (DCS) for the fuel oil consumption of ships of the International Convention for the Prevention of Pollution from Ships

60 (EU) 2015/757

(MARPOL). Under the amendments, ships of 5,000 gross tonnage and above are required to collect consumption data for each type of fuel oil they use, as well as other additionally specified data including proxies for transport work. The aggregated data are reported annually to the flag State, which issues a Statement of Compliance to the ship. Flag States are required to subsequently transfer this data to an IMO Ship Fuel Oil Consumption Database. The IMO is required to produce an annual report for the MEPC, summarising the collected data. These measures were implemented in Finland's national legislation[61] in 2021.

In 2021, the IMO adopted amendments to MARPOL Annex VI, which will require ships to reduce their greenhouse gas emissions. These amendments combine technical and operational approaches to improve the energy efficiency of ships, also providing important building blocks for future GHG reduction measures. The new measures will require all ships to calculate their Energy Efficiency Existing Ship Index (EEXI) by following technical means to improve their energy efficiency and establish their annual operational carbon intensity indicator (CII) and CII rating. Carbon intensity links greenhouse gas emissions to the amount of cargo carried over the travelled distance. Ships will be rated for their energy efficiency (A, B, C, D, E – where A is the best). A ship rated D for three consecutive years, or E, is required to submit a corrective action plan to show how the required index (C or above) would be achieved. The new regulations on EEXI and CII will be implemented in Finland's national legislation between 2023 and 2024.

The EU Emissions Trading System (EU ETS) currently applies to aviation and covers all intra-European Economic Area flights. As a member of the European Union, Finland has participated in the EU ETS from its outset. The EU Emissions Trading System has generally been seen as a cost-effective way to reduce emissions from the activities it covers, as it provides a better incentive to reduce emissions and improve energy efficiency than through air passenger taxes, for example. On the other hand, the system enables additional purchases of emissions rights if it will be very expensive or impossible to reduce emissions by means of new technology, for example. The Commission has estimated that the EU ETS has reduced aviation CO_2 emissions by more than 17 million tonnes per year[62].

Based on the Roadmap for fossil-free transport described in Section 4.4.2 the Government made Resolutions on reducing greenhouse gas emissions from aviation, as well as maritime and inland waterway transport. According to the Government Resolution[63], emissions from domestic and international air traffic departing from Finland will be reduced by 15 per cent from 2018 levels by 2030 and by 50 per cent by 2045. The emissions reduction target concerns

61 29.6.2021/669

62 https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-aviation_en

63 Government resolution on reducing greenhouse gas emissions from aviation; Publications of the Ministry of Transport and Communications 2021:22; http://urn.fi/URN:ISBN:978-952-243-616-0

emissions within the sector; in addition, aviation delivers emissions savings in other sectors through various market mechanisms. The Resolution includes 23 measures to reduce aviation emissions through renewable fuels, energy efficiency, and pricing. Finland's 5th Action Plan to Reduce CO_2 Emissions from Aviation[64] was submitted to the ICAO in 2021.

The Government Resolution[65] for maritime transport proposes several measures to facilitate the transition to alternative fuels and propulsion technologies and to support energy efficiency improvements in existing vessels and the development of new low-emission vessels in Finland. In addition, the Resolution highlights the importance of actively exerting influence internationally to reduce emissions from maritime transport, as the greatest impact on the international maritime sector can be achieved by global measures. Finland has shared its National Action Plan to address greenhouse gas emissions from ships at the IMO in 2022.

The Black Carbon (BC) emissions also have a large impact on climate change, especially in the polar regions, and Finland is committed to decreasing black carbon emissions. Accordingly, the Finnish Transport and Communications Agency Traficom with the Finnish Meteorological Institute (FMI), and VTT Technical Research Centre of Finland Ltd have been conducting studies to test the candidate measuring methods and collect data on black carbon emissions from shipping. The results of these studies will be introduced at the IMO. In 2021, the IMO adopted a resolution urging Member States and ship operators to voluntarily use distillate or other cleaner alternative fuels or methods of propulsion safe for ships and could contribute to the reduction of black carbon emissions when operating in or near the Arctic and report on measures and best practices to reduce black carbon emissions from shipping. Accordingly, in 2022, Finland and Denmark proposed draft Black Carbon Guidelines to specify the recommendations for the testing, survey, and certification of marine diesel engines, exhaust gas treatment systems, and low-emission fuels to ensure low black carbon emissions from the engine, installed equipment, or fuel used. The IMO guidelines will be developed based on this proposal.

Policies and measures in the WAM projection

As part of the EU's Fit for 55 package, the Commission has proposed a comprehensive set of changes to the existing EU Emissions Trading System (EU ETS), which should result in an overall emissions reduction of 61 per cent in the sectors concerned by 2030 compared to 2005. The increased ambition is to be achieved by strengthening the current provisions and extending the scope of the scheme. Aviation has been included in the EU ETS since 2012,

64 https://www.traficom.fi/sites/default/files/media/publication/Finlands%20Action%20Plan%20to%20Reduce%20CO2%20Emissions%20from%20Aviation%20Revision%202021.pdf

65 Government Resolution on reducing greenhouse gas emissions from maritime and inland waterway transport; Publications of the Ministry of Transport and Communications 2021:11; http://urn.fi/URN:ISBN:978-952-243-615-3

and it applies to flights between airports in the European Economic Area. During aviation's third emissions trading period, which started in 2021, the total number of emissions allowances will be reduced annually with a linear reduction factor of 2.2 per cent. According to the proposal, the free allocation of allowances will be phased out by 2027, and their linear reduction factor will be tightened from 2.2 to 4.2 per cent from 2024. The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) aims to address any annual increase in total CO_2 emissions from international civil aviation above 2020 levels. Under CORSIA, aircraft operators will be required to purchase offsets for the growth in CO_2 emissions covered by the scheme from 2021. Finland welcomes that CORSIA will be integrated into the EU ETS and will be implemented in it.

The proposal concerning maritime transport in the Fit for 55 package notably aims to include emissions from maritime transport in the EU ETS, increase funding available from the modernisation and innovation funds, and revise the market stability reserve to continue ensuring a stable and well-functioning EU ETS.

The ReFuelEU Aviation and FuelEU Maritime proposals aim to ramp up the production and deployment of renewable and low-carbon fuels. The ReFuelEU Aviation proposal includes a blending obligation for fuel suppliers for sustainable aviation fuel (SAF) and a submandate for synthetic aviation fuel. The goal of FuelEU Maritime is to reduce the greenhouse gas intensity of the energy used onboard by ships by up to 75 per cent by 2050, by promoting the use of greener fuels by ships. Despite progress in recent years, the maritime sector still relies almost entirely on fossil fuels and constitutes a significant source of greenhouse gases and other harmful pollutant emissions.

The Fit for 55 package also includes other proposals related to international bunkers – for example, the Alternative Fuels Infrastructure Regulation (AFIR)[66]. According to the proposal, at least 90 per cent of container ships and passenger ships at the busiest seaports will have access to shoreside electricity supply and at most of the inland waterway ports, at least one installation providing shoreside electricity by 2030. At airports, there should be electricity supply for all aircraft stands next to the terminal by 2025 and all remote stands by 2030 (except airports with fewer than 10,000 flights per year).

In line with this momentum on climate change action, the ICAO has sought to explore the feasibility of a long-term global aspirational goal (LTAG) for international aviation. Over the last two years, the ICAO Committee on Aviation Environmental Protection (CAEP) undertook its technical work on the feasibility study of the LTAG. The LTAG report[67] was unanimously

66 https://www.consilium.europa.eu/en/infographics/fit-for-55-afir-alternative-fuels-infrastructure-regulation/

67 https://www.icao.int/environmental-protection/LTAG/Pages/LTAGreport.aspx

approved at the CAEP/12 meeting in February 2022. The High-Level Meeting on LTAG (HLM-LTAG) was held in July 2022 to prepare for the LTAG deliberations at the 41st ICAO Assembly. Finland welcomes that the Assembly finally reached in October 2022 a historic agreement and adopted a LTAG for international aviation of net-zero carbon emissions by 2050 in support of the UNFCCC Paris Agreement's temperature goal.

Summary of policies and measures

A summary of the policies and measures for international bunkers is presented in Table 4.6.

Table 4.6
Policies and measures for international bunkers according to the WM (marked with *) and WAM projections

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)	To offset and reduce emissions	CO_2	Regulatory, economic	Implemented	Global market-based measure Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) was adopted in ICAO and implemented in the EU.	2021	Ministry of Transport and Communications	0	NE	NE	NE
Energy Efficiency Design Index (EEDI) for new ships, Energy Efficiency Existing Ship Index (EEXI)	To save energy and reduce emissions	CO_2	Regulatory	Implemented/ adopted	The IMO regulations set binding energy efficiency targets based on EEDI for new ships and to calculate Energy Efficiency Existing Ship Index (EEXI) to improve energy efficiency.	2018	Ministry of Transport and Communications	NE	NE	NE	NE
IMO data collection system (DCS)	To reduce emissions from international shipping	CO_2	Regulatory	Implemented	Ships of 5,000 gross tonnage and above are required to collect and report consumption data for each type of fuel oil they use.	2021	Ministry of Transport and Communications	0	NE	NE	NE
Maritime Transport MRV Regulation	To reduce emissions from international shipping	CO_2	Regulatory	Implemented	In order to reduce CO_2 emissions from shipping at EU level, a system for monitoring, reporting and verification (MRV) of CO_2 emissions based on the fuel consumption of ships has been set up as a first step of a staged approach for the inclusion of maritime transport emissions in the EU's greenhouse gas reduction commitment.	2015	Ministry of Transport and Communications	NE	NE	NE	NE
Aviation Emissions Trading	To reduce emissions	CO_2	Regulatory, economic	Implemented	Aviation is included in EU emissions trading since 2012.	2012	Ministry of Transport and Communications	NE	NE	NE	NE
Government resolution on reducing greenhouse gas emissions from aviation	To reduce emissions, to increase the use of renewables	CO_2	economic, fiscal, regulatory, information, other	Implemented/ adopted/ planned	The Resolution includes 23 measures to reduce aviation emissions through renewable fuels, energy efficiency and pricing.	2021	Ministry of Transport and Communications	0	NE	NE	NE
Government resolution on reducing greenhouse gas emissions from maritime and inland waterway transport	To reduce emissions, to increase the use of renewables	CO_2	economic, fiscal, regulatory, information, other	Implemented/ adopted/ planned	This Resolution on reducing emissions from maritime and inland waterway transport addresses the possibilities of both exerting influence at the international level and taking national measures.	2021	Ministry of Transport and Communications	0	NE	NE	NE

Table 4.6 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Maritime Emissions Trading	To reduce emissions	CO_2	Regulatory, economic	Planned	The Commision proposal to include maritime transport in the EU ETS.		Ministry of Transport and Communications, Ministry of Economic Affairs and Employment	0	NE	NE	NE
Liquefied natural gas and other alternative fuels in the sea transport	To increase the use of alternative fuels, including renewables	CO_2, CH_4, N_2O	Regulatory, economic, information	Planned	The use of alternative fuels in marine transport is promoted. FuelEU Maritime proposal aims to reduce GHG emissions of energy used on board ships with gradually increasing requirement on the GHG intensity targets. The Alternative Fuels Infrastructure Regulation (AFIR) proposal promotes ship's access to shore-side electricity supply.		Ministry of Eco-nomic Affairs and Employment, Ministry of Transport and Communications, Finnish Transport and Communications Agency Traficom	0	NE	NE	NE
Alternative fuels and Sustainable Aviation Fuels (SAF) in air transport	To increase the use of renewables	CO_2, CH_4, N_2O	Regulatory and/or economic	Planned	The use of Sustainable Aviation Fuels (SAF) in aviation is promoted. The ReFuelEU Aviation proposal aims to boost the supply and demand for sustainable aviation fuels in the EU. The Alternative Fuels Infrastructure Regulation (AFIR) proposal promotes electricity supply for aircrafts stands.		Ministry of Economic Affairs and Employ-ment, Ministry of Transport and Com-munications, Finnish Transport and Com-munications Agency Traficom	0	NE	NE	NE
ICAO Long Term Aspirational Goal (LTAG)	To reduce emissions from international air transport	CO_2	Regulatory	Planned	To introduce a long-term global aspirational goal (LTAG) for 2050 for international aviation.		Ministry of Transport and Communications	0	NE	NE	NE
Regulations on Black Carbon (BC)	Mitigate GHG-emissions and decrease BC emissions in the polar regions	BC	Regulatory	Planned	To introduce legally binding regulations on black carbon in the Polar Code.		Ministry of Transport and Communications	0	NE	NE	NE

NE = not estimated
IE = included elsewhere

4.4.4 Industrial processes and product use

The most important greenhouse gas emissions from industrial processes are CO_2 emissions from iron and steel, hydrogen and cement production. The main factors affecting the development of these emissions have until now mainly included changes in industrial production activity. However, one can observe a clear change today, in which the manufacturing industry is actively seeking low-carbon technology alternatives and significantly reduced process emissions. This is typically not the result of a single measure but several measures strengthening the overall feasibility of new technology investments.

In the WM projection, the growth of industrial production increases emissions, while technology changes reduce them. Most of the industrial process emissions reported in this sector are part of the EU ETS, which is also the main measure for reducing process emissions. The steep rise in EU ETS prices with lower electricity tax, new investment grants and increased climate awareness is motivating manufacturing industry to reduce process emissions. The measures are the same as those for reducing energy emissions and a description of them can be found in Chapter 4.4.1. No additional measures targeting CO_2 emissions from industrial processes are planned.

The policies and measures described in this chapter therefore only address measures related to F gases.

Policies and measures in the WM projection

The amount of emissions from F gases (HFC, PFC, SF_6) was two per cent of the total greenhouse gas emissions in 2020. HFC emissions have increased significantly since the early and mid-1990s when they were introduced as substitutes for ozone-depleting substances in many applications. The peak level of HFC emissions occurred at the end of the 2000s but have since started to decline. The share of PFC emissions of total F gas emissions was only 0.2 per cent in 2020. There is a fluctuation in the total annual PFC emission level. In recent years, emissions have decreased from their peak. The peak level of SF_6 emissions occurred in the early and mid-1990s. The level of emissions has since decreased, but there is fluctuation in the total annual emissions level due to the use of SF_6 in specific applications in which the consumed amount of SF_6 varies year-on-year. F gases are not produced in Finland.

The most important regulations affecting the use and emissions of these gases are the F gas regulation[68] and the directive related to HFC emissions from air conditioning systems in motor vehicles.[69] Technical development has also affected the development of emissions. The main features of the F gas regulation in cutting F gas emissions are a phase-down of HFCs that can be placed on the

68 2014/517/EC

69 2006/40/EC

EU market, bans on the use of HFCs in certain applications and obligations related to leak checking and repairs, F gas recovery and technician training.

The WM projection for F gases includes the impacts of the EC regulation and the EC directive referred to above. Emissions from refrigeration and air conditioning equipment are expected to decline due to regulatory measures. The main features of the F gas regulation in cutting the emissions will lead to a replacement of HFCs with low GWP alternatives in most applications.

Emissions from electricity distribution equipment have declined from their peak because of voluntary actions by the industries. A steady increase of emissions is assumed in the future, but the peak emissions level in the 1990s will not be reached. Restrictions forced by the EU regulation will have a decreasing effect on emissions from foam blowing and aerosols in the future.

Policies and measures in the WAM projection

The current measures in the WM projection will already cut the emissions strongly. The WAM projection of F gases is based on a few additional measures that will slightly accelerate the decrease of emissions. These additional measures include the revision of the F gas Regulation, improved control of F gas banks and recovery of F gases, and promotion of alternative non-HFC technologies.

It is estimated that the emissions reduction achieved by these additional measures will be 0.2 million tonnes CO_2 eq. in 2030.

Summary of policies and measures

A summary of the policies and measures in the industrial processes and product use sector is presented in Table 4.7.

Table 4.7
Policies and measures according to the WM (marked with*) and WAM projections in the industrial processes and product use sector

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Regulation of the Finnish Transport Safety Agency TRAFI/437519/03.04.03.00/2017 on technical requirements of road vehicles and trailers	Replacement of fluorinated gases by other substances (Industrial Processes, Transport)	HFC, PFC, SF_6	Regulatory	Implemented	Implementation of the directive 2006/40/EC of the European Parliament and of the Council to reduce use of F-gases by restricting use of certain F-gases in air-conditioning systems of new passenger cars and light duty vehicles	2017	The Finnish Transport and Communica-tions Agency Traficom	NE	IE	IE	IE
* Revised Environmental Protection Act (423/2015) and related Government Decree (766/2016)	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory	Implemented	Implementation of the EU F-gas regulation (Regulation 517/2014).	2015	Ministry of the Environment	NE	IE	IE	IE
* Improved enforcement of F-gas regulations	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory, Information	Implemented	Enhance cost effective compliance monitoring: further support and information for inspectors, targeted information dissemination on new regulation to different groups of stakeholders	2015	Ministry of the Environment, Finnish Environment Institute, Finnish Safety and Chemicals Agency	NE	IE	IE	IE
* The EU-wide measures of Regulation 517/2014/EU	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory	Implemented	The EU-wide measures of regulation 517/2014 where no national implementation takes place (e.g. phase-down schedule on placing on the market of HFCs, enhanced leackage prevention and bans on certain equipment)	2015	Ministry of the Environment	NE	IE	IE	IE
* Criteria for green public procurement to avoid equipment containing high GWP F-gases	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Information	Implemented	Criteria for green public procurement to avoid equipment containing F-gases to promote the transition from HFC technologies to alternative low GWP technologies.	2020	Ministry of the Environment, Finnish the Environment Institute	NE	IE	IE	IE

Table 4.7 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Information and education campaign to promote alternative non-HFC technologies	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Information	Planned	Information and education campaign to promote alternative non-HFC technologies	2023	Ministry of the Environment, Finnish Environment Institute	0	IE	IE	IE
Revision of Regulation 517/2014/EU	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory, Information	Planned	Revision of the EU F-gas regulation (Regulation 517/2014)	2024	Ministry of the Environment	0	IE	IE	IE
Improved control of F-gas banks and recovery of F-gases	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory, Information	Planned	Improved control of F-gas banks and recovery of F-gases by way of information campaingns, education, guidance and direction and voluntary actions	2022	Ministry of the Environment, Finnish Environment Institute	0	IE	IE	IE
* PAMs related to F-gases in With Measures (WM) scenario (HFCs, PFCs and SF_6)	Replacement of fluorinated gases by other substances (Industrial Processes, Transport)	HFC, PFC, SF_6	Regulatory, Information	See individual PaMs	PAMs related to F-gases in With Measures (WM) scenario (HFCs, PFCs and SF6). Please see the single PAMs for more information	See individual PaMs	See individual PaMs	NE	2,665	3,204	3,464
PAMs related to F-gases in With Additional Measures (WAM) scenario (HFCs, PFCs and SF_6)	Replacement of fluorinated gases by other substances (Industrial Processes)	HFC, PFC, SF_6	Regulatory, Information	See individual PaMs	PAMs related to F-gases in With Additional Measures (WAM) scenario (HFCs, PFCs and SF_6). Please see the single PAMs for more details.	See individual PaMs	See individual PaMs	0	154	150	107

NE = not estimated
IE = included elsewhere

4.4.5 Agriculture

Policies and measures in the WM projection

Finnish agricultural policy is based on the view that the competitive disadvantage due to natural conditions such as the short growing period, low temperatures, frosts, and problematic drainage conditions must be compensated to have profitable domestic production and make agriculture sustainable and multifunctional. The objectives of sustainable and multifunctional agriculture include taking greenhouse gas emissions, the possible need for adaptation measures, and other environmental and socioeconomic aspects into account. These objectives can be reached through the Common Agricultural Policy (CAP) of the EU, as well as through national measures. According to conclusions of the European Council, agricultural production should continue in all areas of the Community.

The starting point of agriculture emissions projection is that domestic food production will be secured and maintained at the current level, and mitigation policies will be implemented where the most cost-effective reduction potential exists. Some of the effective climate policy measures may conflict with other agricultural policy objectives and measures such as securing the availability of food, animal welfare, and the biodiversity of rural areas. If Finnish food consumption patterns remain unchanged, a reduction in domestic agricultural production would probably not reduce global greenhouse gas emissions because domestic production would be replaced by production elsewhere.

There are measures in the CAP aim to reduce greenhouse gas emissions. Agri-environment-climate measures are part of the Rural Development Programme for Mainland Finland from 2014 to 2020 and the CAP transitional period from 2021 to 2022. Agri-environment payments are essential tools for promoting sustainable development in agriculture, and in previous years, some 85 per cent of Finnish farmers have committed themselves to the agri-environment scheme. Their objectives are to decrease nutrient loading from agriculture in surface waters and groundwaters and to preserve plant and animal biodiversity and the rural landscape. The measures also aim to maintain or improve the productive capacity of agricultural land and reduce greenhouse gas and ammonia emissions, as well as to adapt to climate change.

In the Rural Development Programme for 2014 to 2020 and for the CAP transitional period between 2021 and 2022, there are several measures for climate change mitigation and adaptation: an environment payment for the incorporation of slurry into the soil; recycling of nutrients and organic matter; control of runoff waters; environmental management of grassland; and plant cover on arable land in the winter. Agricultural investment support can be targeted to controlled subsurface drainage and more efficient handling, storage, and use of manure. There is also a support system for investments in renewable energy – for example, an investment system for biogas plants. As

part of the programme, advisory services will be provided regarding cross-compliance conditions, greening payments, climate change mitigation and adaptation, biodiversity, the protection of water and soil, environment payments, the maintenance of agricultural land, organic production, and issues related to environmental efficiency, including more efficient energy use and renewable energies. The new CAP period from 2023 to 2027 begins in January 2023, and it includes similar, partly improved, climate and agri-environment measures. There will also be a new element: an eco-scheme. The eco-scheme's measures differ from the climate and agri-environment commitments and are more demanding than climate and environmental legislation.

The Rural Development Programmes for Mainland Finland have been the main instruments for implementing climate change mitigation and adaptation measures in the agricultural sector. Rural Development Programmes are evaluated as defined in the Parliament and Council regulation.[70] At programme level, Finland has defined evaluation and implementation plans to evaluate climate change issues[71].

As it is neither possible nor appropriate to implement all climate change mitigation or adaptation measures in agriculture through the EU's Common Agriculture Policy, national measures are also required.

The new Climate Plan for the Land Use Sector[72] complements the climate measures targeted at agricultural peatlands. Alternative measures include raising the groundwater level on peaty arable land to prevent peat decomposition, the promotion of perennial grasslands without tilling and converting agricultural land into managed wetlands (when the area would no longer be used for agricultural production). These measures targeted at agricultural soils also reduce CO_2 emissions in the land use, land-use change and forestry (LULUCF) sector.

In the most recent Medium-Term Climate Change Policy Plan, measures targeting agriculture are partly the same as mentioned in the CAP. However, the plan also includes other national measures that are currently implemented or adopted in Finland. Enteric methane emissions from ruminants can be reduced by changing feeding practices for dairy cows. Using rapeseed cake in the feeding of dairy cows can reduce methane emissions by approximately 10 per cent per litre of milk if the cows are fed predominantly with roughage, i.e. grass[73]. However, as more than 40 per cent of the feed of dairy cows is concentrated feed, rapeseed cake would mostly replace the currently widely used rapeseed meal, and the actual reduction in methane emissions would probably be three to five per cent per cow.

70 1305/2013/EU (rural development regulation)
71 http://urn.fi/URN:ISBN:978-952-326-822-7
72 https://urn.fi/URN:ISBN:978-952-366-388-6
73 Maanavilja L. et al. (2021)

Of the feed additives that reduce enteric methane production, research has advanced furthest regarding 3-NOP (3-nitrooxypropanol), which has recently been approved in the EU as a feed additive for dairy cows and cows for reproduction. In the best-case scenario, this additive may reduce methane emissions from dairy cows by up to 25 per cent, but would entail additional costs for farmers at the same time.

The food consumption measures highlighted in the Medium-Term Climate Change Policy Plan include reducing food waste and eating according to nutritional recommendations. The national target of halving food waste in Finland by 2030 is also in line with Sustainable Development Goal 12.3, "By 2030, halve per capita food waste". The total food waste in the Finnish food chain is estimated to be around 400 to 500 million kilogrammes a year. Food waste occurs at every stage of the food chain, and in terms of volume, it is divided as follows: primary production 12 per cent; industry 20 per cent; trade 18 per cent; food services 20 per cent; and households 30 per cent. The Natural Resources Institute Finland has developed a National Food Waste Road Map[74]. Measures for reducing food waste have been categorised in thematic areas: regulation and policy instruments; education and information guidance; changes in sustainability practices; technological solutions and new business models; research-driven solutions; and cooperation between operators. Emissions impacts of reducing food waste arise when the amount of food waste decreases, and correspondingly, the demand, production and imports of food decrease. As a result, the climate impact of food production will diminish in both the agricultural and land use, land-use change and forestry sectors. EU Member States are also obligated to measure the amount of food waste and report on it in accordance with the Commission's Delegated Decision (EU) 2019/1597.

In addition to the measures referred to above, many other factors may contribute to a reduction in the greenhouse gas emissions from agriculture in 2035. However, the magnitude remains difficult to estimate. For example, gender-selected semen is a relatively new technology. The goal is to reduce the number of male dairy calves and increase the share of faster-growing dairy–beef crossbreed calves among dairy cattle. More research is needed on the use and effects of gender-selected semen, but the method is already rapidly gaining popularity.

Prime Minister Sanna Marin's Government Programme also sets the following implemented measures for reducing emissions in the agricultural sector: improving real estate composition of fields; increasing organic production; the Catch the Carbon programme and recycling of nutrients; and promoting biogas production.

74 Riipi, I. et al. (2021)

The Ministry of Agriculture and Forestry of Finland has drawn up a development programme for the real estate composition of fields, including the preparation and implementation of the associated measures to improve the competitiveness of agricultural production, while taking the impact on the environment, waters, climate and biodiversity into account. The real estate composition of fields can be markedly improved by parcel or land arrangements. The composition could also be affected by measures in the upcoming Common Agricultural Policy plan and matters associated with ownership, renting systems, and taxation of fields.

One of the methods mentioned in the Government Programme for achieving a climate and environmentally friendly food system is to increase the share of domestic organic products in food production, food processing, domestic consumption, and exports. Organic production is based on good soil management. The cultivation methods used promote the sequestration of organic matter and carbon in soil, which is a precondition for the fertility of fields. At the same time, these methods promote nutrient recycling, reduce dependence on fossil energy and increase farms' nutrient self-sufficiency. The new national organic farming programme, Luomu 2.0[75], was published in the spring of 2021. A more detailed implementation plan and its performance indicators are currently being prepared in cooperation with stakeholders in the organic farming sector.

The Catch the Carbon Research and Innovation Programme is a new kind of climate programme for the agricultural, forestry, and land-use sectors. Catch the Carbon began in 2020 and is implemented under the Government Programme. More than 100 research, development and innovation projects have been funded as part of the programme. These projects create new knowledge on climate-sustainable solutions for agriculture and forestry, engage stakeholders and actors, reduce greenhouse gas emissions, and enhance carbon sinks and reservoirs. There is a special emphasis on communication, interaction and competence to build better and strong implementation of climate-smart agriculture and forestry practices.

The Making Use of Agricultural Nutrients Project[76] was a three-year pilot programme carried out between 2016 and 2018. It was part of the government key project for the circular economy, introduced in the Government Programme. It conveyed information on the funding possibilities related to the recycling of nutrients and essential research knowledge to practical operators. It identified the bottlenecks in nutrient recycling and facilitated their elimination. It also promoted the networking and new experiments of nutrient recycling operators. The project has also been continued in Prime Minister Sanna Marin's Government Programme 2019. In addition to the Making Use of the Agricultural Nutrients Project, there has been investment

75 http://urn.fi/URN:ISBN:978-952-366-196-7

76 https://mmm.fi/ravinteetkiertoon

aid for biogas and advanced biomass processing technologies, i.e. investment aid for nutrient recycling. The aid is intended for larger-scale activities, and it is granted for investments in machinery, equipment, and buildings for processing manure or biogas plant rejects into highly processed fertiliser or other nutrient products that are easily movable and storable. The pilot project and investment aid together support the entire biogas and nutrient cycling chain from the ideation and product development level to production-scale operations. Efforts have also been made to develop statistics for and monitor nutrient recycling, as nutrient recycling is a new challenge for the industry and needs statistical and monitoring mechanisms.

Ammonia is to some extent involved in greenhouse gas emissions because part of the ammonium nitrogen landing on the ground is transformed into nitrous oxide. International treaties and EU legislation oblige Finland to reduce its ammonia emissions into the air. Approximately 90 per cent of Finland's ammonia emissions originate from agricultural sources. The most effective measures for reducing ammonia emissions from agriculture involve manure, its storage, and its application. Ammonia emissions can also be reduced by measures involving the feeding of domestic animals, but these measures are more difficult to regulate, and impact is more difficult to assess, than measures related to the management of manure[77].

Policies and measures in the WAM projection

In December 2021, the Finnish government set an ambitious emissions reduction target of 29 per cent for Finnish agriculture (including agricultural emissions in the effort sharing sector and land use, land-use change and forestry sector) by 2035. This means emissions from agriculture should decrease by 4.6 Mt CO_2 equivalent by 2035. The potential measures to achieve this target are specified in the Carbon Euro Programme[78]. Many of these measures are also mentioned in the WM projection, but the scale and parameters vary. Controlled subsurface drainage, the promotion of paludiculture, the reduction and replacement of one-year cereal cultivation with grassland, the removal of poorly productive arable land from agricultural production and the afforestation of low-yield arable land are considered the most effective means to reduce emissions from agriculture in organic soils. For mineral soils, carbon sequestration and afforestation have been identified as potential measures for emissions reduction in Finland's conditions. The above-mentioned measures reduce emissions in the agricultural sector, as well as in the land use, land-use change, and forestry sector. Other measures that could help to achieve the 29 per cent emissions reduction target in agriculture are more precise nitrogen fertilisation, the use of additives in feeds for bovines, as well as a decrease in the number of bovines and utilising renewable energy in agriculture.

77 http://urn.fi/URN:ISBN:978-952-366-192-9

78 https://mmm.fi/documents/1410837/1516663/HERO_selvitys_2022.pdf/fd751aad-a2f2-a31a-396a-872d034f823b/HERO_selvitys_2022.pdf?t=1650519685134

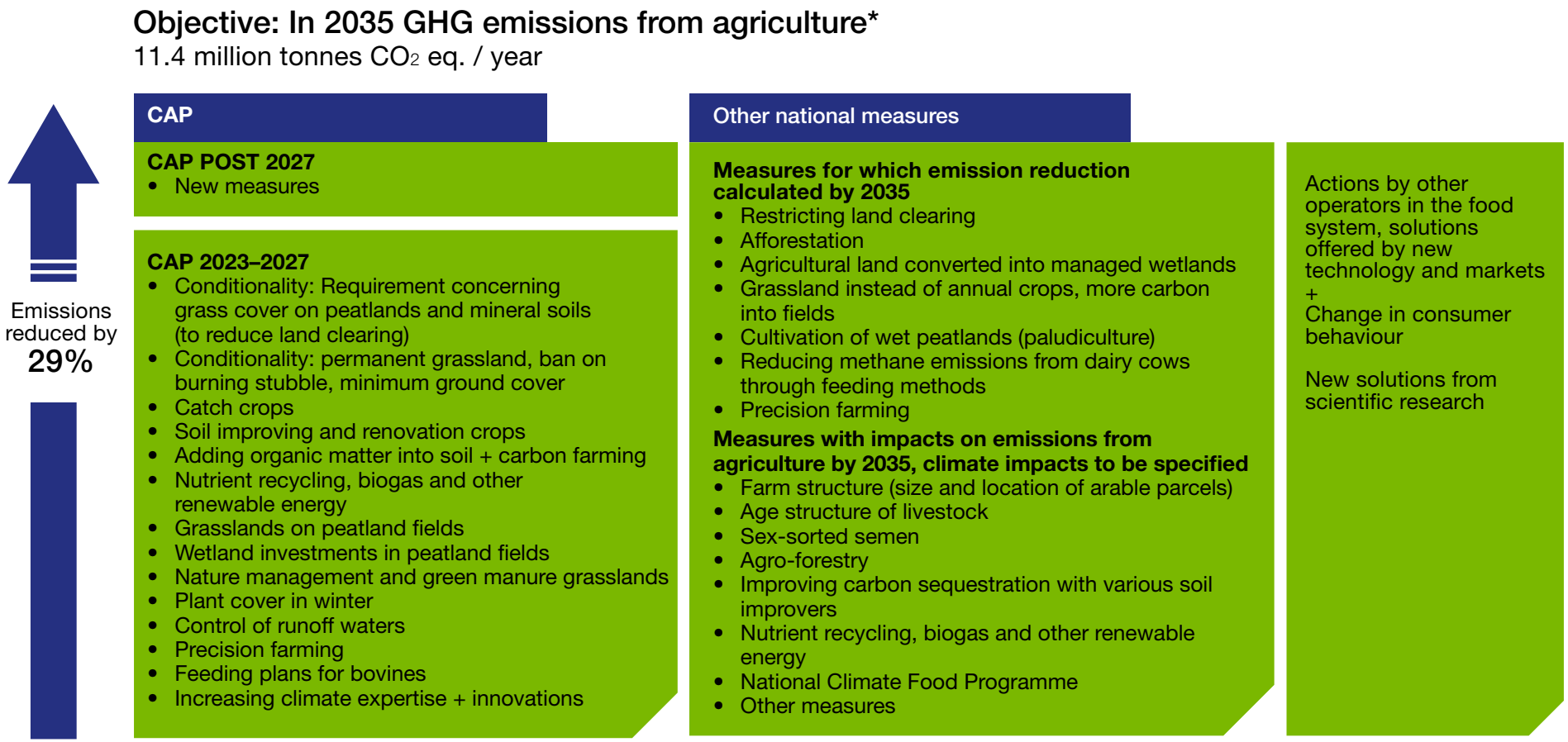
These measures are partly the same as those identified in the CAP strategic plan for 2023 to 2027, in the Climate Plan for the Land Use Sector, and in the Medium-Term Climate Change Policy Plan.

In addition to the mitigation measures mentioned above, it is important to ensure the adequate adaptation of agriculture to climate change. In the agricultural sector, adaptation measures are often also good for mitigation. There is more about adaptation in agriculture in Chapter 6.

Achieving the challenging 29 per cent emissions reduction target is unlikely to be possible with public guidance and incentives alone. Hence, private emissions compensation payments, food industry climate and responsibility programmes, and farm-level solutions and goals, including yield targets, will be needed.

Figure 4.5 specifies the potential measures to achieve the 29 per cent emissions reduction target. The measures are carried out either through the Common Agricultural Policy (CAP) or other national measures.

Figure 4.5
Potential measures to reach the 29% emission reduction target for Finnish agriculture by 2035



*Agriculture and measures concerning agricultural reneweable energy in the effort sharing sector and agricultural land in the land use sector. Based on current inventory estimates.

In line with the Government Programme, the Ministry of Agriculture and Forestry is currently preparing a Climate Food Programme that aims to support society's transition to a climate-resilient food system. The programme includes measures to enhance sustainable food production and food services. There is a particular emphasis on scaling up the plant protein sector. A climate-resilient food system takes all the dimensions of sustainability into account: social; economic; cultural; and ecological. The programme also supports the objective of the Finnish Government to achieve carbon neutrality in 2035.[79] The emissions reduction impact of the Climate Food Programme has not been estimated.

Finland's national nutrition recommendations are based on the Nordic Nutrition Recommendations, which are currently being updated. The new Nordic recommendation will be launched by the end of 2022, and it will seek to clarify the link between nutrition and sustainable development. There is a potential to reduce the climate impact of diets by changing diet content and taking care of carbon sequestration[80]. A climate-friendly diet may be achieved in multiple ways, but in all cases, it requires a reduction in meat consumption. The emissions reduction impact of the new nutrition recommendations has not been estimated.

A shift towards more plant-based consumer diet will change agricultural production and land-use in a direction with lower emissions, but the greatest emissions reductions will realize after 2035. This is due to dynamics and time lags in milk and beef production and implied land-use change.

Despite the national dietary change, the reduction of greenhouse gas emissions may be slow, if exports of dairy products increase due to strong global demand and prices. Then structural development and productivity will progress, and the change in production and land use will remain small.

Whether consumers reduce their consumption of meat and dairy products as assumed in the scenario depends on the development of consumers' taste and eating habits. When implemented, a more plant-based diet will significantly reduce emissions from livestock production and, together with land use measures, it will also give the opportunity to reduce emissions from cropland, which are currently around 75 per cent of total agricultural emissions.

In the Medium-Term Climate Change Policy Plan[81] in 2022, additional measures to cut emissions from the agriculture sector that are not yet included in the projections scenario are related to the age structure of cattle and agroforestry. As the life expectancy of cows increases, fewer new heifers will be needed. This will contribute to reducing methane emissions in agriculture.

79 https://mmm.fi/en/climatefriendlyfoodprogramme
80 http://urn.fi/URN:ISBN:978-952-287-773-4
81 http://urn.fi/URN:ISBN:978-952-361-262-4

Currently, however, no policy measures influence the age structure of cattle. By means of agroforestry, it may be possible to improve the fertility of fields, reduce erosion and nutrient leaching, increase biodiversity, and sequester carbon to both soil and vegetation. There is currently very little agroforestry production in Finland. Hence, no concrete policy measures for agroforestry are in practice. Suitable operating models for agroforestry in northern conditions are currently being identified. Therefore, the emission reduction estimate is pending.

Summary of policies and measures

A summary of the policies and measures in the agricultural sector is presented in Table 4.8.

Table 4.8
Policies and measures according to the WM (marked with *) and WAM projections in the agricultural sector

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
Implementation of the Nitrates Directive (1991/676/EEC)	Reduction of fertilizer/ manure use on cropland, Improved animal waste management systems	N_2O	Regulatory	Implemented	Decreases greenhouse gas emissions and the use of mineral fertilisers.	2014	Ministry of Agriculture and Forestry	NE	NE	NE	NE
* Organic soil activities [1)]	Improved management of organic soils, Activities improving grazing land or grassland management, Other LULUCF	CO_2, N_2O	Economic, Information, Research	Implemented, Adopted	The target is to reduce emissions from organic soils for example by intensifying long-term grass cultivation. Alternative measures also include cultivation of wet peatlands (paludiculture) and agricultural land converter into managed wetlands (when the area would no longer be used for agricultural production). Same measures reduce the N_2O emissions from agriculture sector and the CO_2 emissions from the LULUCF sector. Measures are implemented through CAP and Climate Change Plan for the Land Use Sector.	2014	Ministry of Agriculture and Forestry	NE	350	748	1,084
* Mineral soil activities [1)]	Other activities improving cropland management	CO_2, N_2O	Economic, Information, Research	Implemented, Adopted	The target is to increase the amount of carbon in mineral soils. Measures are implemented through CAP.	2014	Ministry of Agriculture and Forestry	126	202	273	245
* Reducing methane emissions from dairy cows through feeding	Improved livestock management	CH_4	Economic, Information	Adopted	The aim is to reduce emissions, especially from the digestion of cattle, by refining feeding, using emission-reducing feed additives, etc.	2022	Ministry of Agriculture and Forestry	0	298	295	289
* Food loss and food waste [3)]	Other agriculture	CO_2, N_2O	Other, Information	Implemented	Emission impacts are caused by a reduction in food waste and, correspondingly, a reduction in food demand, production and imports, which reduces the climate impact of food production in both the agricultural and land use sectors.	2020	Ministry of Agriculture and Forestry	NE	NE	NE	NE

Table 4.8 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Gender-Selected Semen	Improved livestock management	CH_4	Information, Education, Research	Implemented	Gender selection of semen affects the sex of the calf born. The aim is to reduce the number of bull calves and to increase the number of faster-growing beef-milk crossbreed calves in dairy herds. Gender Selected Semen is a relatively new technology so more research on the use and effects of the method is needed. However, the method is rapidly becoming more widespread.		Ministry of Agriculture and Forestry, Public and private sector actors	NE	NE	NE	NE
* Real estate composition of fields [3)]	Other activities improving cropland management, activities improving grazing land or grassland management, improved management of organic soils	CO_2, N_2O	Economic, Other	Implemented	The aim of the programme is to prepare and implement measures related to the structure of arable lands to improve the competitiveness of agricultural production, taking into account environmental, waterway, climate and biodiversity impacts. The structure of arable land can be improved clearly through land consolidation. The structure can also be affected, for example, by the measures implemented through CAP as well as matters related to the ownership and leasing systems and tax subsidies for arable land.	2020	Ministry of Agriculture and Forestry	NE	NE	NE	NE
* Programme for Organic Production 2030 [3)]	Other agriculture	N_2O, CO_2, CH_4	Other	Implemented	The programme promotes the share of organic farming and organic products at the market towards sustainable food systems.	2021–2030	Ministry of Agriculture and Forestry	NE	NE	NE	NE

Table 4.8 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Catch the carbon – programme [3)]	Other activities improving cropland management, improved livestock management, activities improving grazing land or grassland management, improved management of organic soils, other agriculture and LULUCF objectives	N_2O, CO_2	Other, Information	Implemented	The programme funds projects that produce new knowledge and innovative solutions for agriculture and land use sector. Development projects are practical projects based on research data that promote the transition towards climate-resilient agriculture, forestry and other land use. The projects speed up the reduction of emissions in the land use sector, enhance carbon sinks and reservoirs, and promotes preparation for and adaptation to climate change.	2020	Ministry of Agriculture and Forestry	NE	NE	NE	NE
* Recycling of nutrients	Improved livestock management, other agriculture	CH_4, N_2O	Economic, Information	Implemented	Government's Key project on nutrient recycling. The aim of recycling of agricultural nutrients is the processing of manure, water treatment sludge and other side products of agriculture in order to recycle and utilise the beneficial nutrients they contain – particularly phosphorus and nitrogen – as fertiliser, for instance.	2016	Ministry of Agriculture and Forestry, South Ostrobothnia Centre for Economic Development, Transport and the Environment	NE	9	14	18
* Action plan to Reduce Ammonia Emissions from Agriculture in Finland 2021–2027	Other agriculture	NH_3, N_2O, CH_4	Regulatory, Information, Education	Implemented	International treaties and EU legislation oblige Finland to reduce its ammonia emissions into the air. The most effective measures to reduce ammonia emissions from agriculture involve manure, its storage, and its application. Ammonia emissions can also be reduced by measures involving the feeding of domestic animals, but these measures are more difficult to regulate and to assess their impact than measures relating to the management of manure.	2021	Ministry of Agriculture and Forestry	0	NE	NE	NE

Table 4.8 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Promoting the use of biogas in agriculture [2)]	Increase in renewable energy, Reduction of GHG emissions (Energy, Agriculture)	CO_2, CH_4	Economic	Adopted	The target is to replace fossil fuels with biogas in agriculture	2021	Ministry of Agriculture and Forestry	0	150	279	390
Climate Food Programme [3)]	Other agriculture	N_2O, CO_2, CH_4	Other, Information	Planned	The program includes measures to enhance sustainable food production and food services. Special focus is in scaling-up plant protein sector.	2022	Ministry of Agriculture and Forestry	0	NE	NE	NE
Nutrition recommendations [3)]	Other agriculture	N_2O, CO_2	Other, Information	Planned	The Nordic Nutrition Recommendations for humans are currently being updated. The new recommendations aim to clarify the links between nutrition and sustainable development. The reform of the national recommendations will begin after the Nordic recommendations have been accepted.	2022–2023	Ministry of Social Affairs and Health, Ministry of Agriculture and Forestry	0	NE	NE	NE
Age structure of cattle	Improved livestock management	CH_4	Information, Education	Planned	As the life expectancy of cows increases, less new heifers will be needed, and methane emissions will also decrease. At the moment, there are no policy measures to influence the age structure of cattle.		Ministry of Agriculture and Forestry	0	NE	NE	NE
Promoting agroforestry [3)]	Other activities improving cropland management, improved management of organic soil, afforestation and reforestation, other LULUCF	N_2O, CO_2	Economic	Planned	By means of agroforestry, it may be possible to improve the fertility of fields, reduce erosion and nutrient leaching, increase biodiversity and bind carbon to both soil and vegetation. At the moment, there is very little agroforestry production in Finland and that is why there are no concrete policy measures for agroforestry in practice. Suitable operating models for agroforestry in northern conditions are currently being identified.		Ministry of Agriculture and Forestry	0	NE	NE	NE

NE = not estimated

1) The measure affects emissions both in the agriculture sector and the LULUCF sector. The total reduction in N_2O and CO_2 emissions is presented in this table. In the projections for the agricultural sector, however, only the impact on the emissions from the agricultural sector, as defined in the GHG inventory, is included.

2) The mitigation impact figures for promoting the use of biogas include also emissions reduction in energy use. In the projections for the agricultural sector, however, only the impact on the emissions from the agricultural sector, as defined in the GHG inventory, is included.

3) The measures are estimated to affect the agriculture and LULUCF sectors, but no impact assessment is available

4.4.6 Land use, land-use change, and forestry

Policies and measures in the WM projection

The land use, land-use change, and forestry (LULUCF) sector contributes to the mitigation of climate change in three different ways, by:

- Maintaining and enhancing carbon storages and sinks
- Creating new carbon storages and sinks
- Substitution, i.e. replacing fossil-based energy, raw materials, and products with renewable biomass.

The overall LULUCF sector is a net sink in Finland because the emissions for which it accounts are smaller than the removals. This net sink from the LULUCF sector can vary greatly from one year to the next: the highest sink was 33.8 million tonnes CO_2 eq. in 2009, and the lowest was 10.3 million tonnes CO_2 eq. in 2018. According to the National Forest Inventory, the annual increment of growing stock has been increasing since the 1970s, reaching its current level of 108 million cubic metres, of which 103 million cubic metres are in forests available for wood supply. The high fluctuation in net biomass removals in the forest land category have been caused mainly by the changes in the international market for forest industry products, which affect the amount of domestic commercial roundwood felling.

The Climate Plan for the Land Use Sector, published in 2022, specifies how climate emissions from the land use, land-use change and forestry sector can be reduced, and carbon sinks and reservoirs strengthened. The Plan brings together ongoing measures such as the updated ownership policies of the State Forests (Metsähallitus), the ash fertilisation of peatland forests (part of the Fixed-term Act on the Financing of Sustainable Forestry since 2020), and the Act on Fixed-Term Support for Afforestation, and outlines additional measures categorised in four themes: resource-efficient land use and land-use change; climate-resilient use of peatlands; other measures to promote carbon sequestration and carbon storage; and crosscutting measures (see Table 4.9 and 4.10). In addition to the ongoing measures presented above, the new measures focus on, e.g. actions in the peatland fields and forests, development of carbon markets, the swift and timely forest regeneration, increasing the amount of dead wood for climate and biodiversity perspectives, promoting training and expertise and communication. The most effective measures have been identified in halting deforestation and promoting actions in the peatlands. The Catch the Carbon programme has been advancing climate measures in the LULUCF sector since its launch in 2020[82].

Finland's forest policy aims for sustainable forest management, and the policy measures include legislation, the National Forest Strategy 2025 (NFS), financial support, and extensive public forestry organisations. More information on them is provided in Finland's Seventh National Communication, Section 4.3. The National Forest Strategy 2025 was adopted by the Government in 2015. It is implemented by ten key projects that were updated in 2019.

82 In line with the Government Decree 5/2021.

According to the NFS, forest growth and health will be maintained and enhanced through active forest management. Climate change mitigation and adaptation in forests are supported by diversifying forest management. Over the long term, forest management techniques must be adapted to new and changing climate conditions. Timely and careful forest management can improve both the growth and resistance of growing stock to damage, while safeguarding the ecosystem services of forests and producing wood biomass sustainably. The strong legislative and structural basis already in place in Finland can be used to reach multiple climate and forest related objectives of current policies: this includes legislation to prevent forest pests and diseases; ensure forest regeneration and protect habitats and species biodiversity; a long-term programme of forest tree improvement to ensure good-quality seeds to different climatic conditions; ongoing projects to further develop research-based silvicultural measures; and extensive extension services for forest owners in forest management and silviculture. Several updates have been made over the years to this legislative and structural basis, such as amendments to the Forest Act[83] and the Forest Damages Prevention Act[84] to take climate change adaptation into account by allowing more diverse forest management and adjusting timber removal practices to earlier occurrence of pests due to the warming climate. Measures related to the adaptation to climate change are described in more detail in Chapter 6 and in NC7. The relevance and functioning of both the Forest Act and the Forest Damages Prevention Act were reviewed recently.

Forests will be a key part of the Finnish bioeconomy, and the NFS therefore aims to increase the use of wood to replace fossil resources with renewable biomass. The objectives and measures in the National Energy and Climate Strategy for 2030 are consistent with the policy defined in the NFS regarding the increase in industrial roundwood and energy wood, and they will help achieve the target set by the directives on promoting the use of energy from renewable sources.[85] Global economic development will greatly influence the achievements of the NFS goals.

The national measures are set out in the NFS[86]. The measures, consistent with the National Energy and Climate Strategy for 2030, aim to secure the climate advantages provided by forests and ensure the availability of renewable raw materials. The strategy is implemented by ten strategic projects updated in 2019. The completely new projects added to the National Forest Strategy apply to climate sustainable forestry, international forest policy, and EU policies, as well as new products made from wood. More projects than before also include the diversification of forest management methods, the safeguarding of biodiversity, water protection and the diversification of business. Projects to be considered crosscutting include the improvement of the availability and

83 1093/1996 (amendment 1085/2013)

84 1087/2013 (amendment 1168/2021)

85 2001/77/EC and 2009/28/EC

86 http://mmm.fi/en/nfs

usability of forest, nature and environmental data and the facilitation of their integration with other data sources. The crosscutting projects also include an aim to build common understanding and cooperation between various actors with pluralistic communication and interaction.

Regarding agricultural soils, measures affecting CO_2 emissions and removals from croplands and grasslands are presented in Table 4.9.

Table 4.9
Measures identified in the Climate Plan for the Land-Use Sector

<table>
<tr><th>Resource efficient land use, land use change</th><th>Climate-resilient use of peatlands</th><th>Other measures to promote carbon sequestration and carbon storage</th><th>Enabling environment – cross-cutting measures</th></tr>
<tr><td rowspan="2">To prevent forest conversion to other land uses:
• Preventing the conversion of forests into fields
• Developing the structure of arable land
• Preventing the clearing of forests for settlements
• Land use change fee for all land uses</td><td rowspan="3">Climate-resilient use of peatland fields:
• Raising the groundwater level in peatland fields to prevent the decomposition of peat
• Managed wetland on peatland field
• Perennial grasslands without tilling
• Wetting of low-yield, thick-peat fields and cut-over peatlands to establish managed wetlands
• Preparing a roadmap for the use of peatland fields</td><td>Climate actions in state owned forests (Metsähallitus)</td><td>Competence, training and guidance</td></tr>
<tr><td rowspan="3">Promoting markets and incentives related to carbon sequestration and storage and the reduction of emissions</td><td rowspan="2">Communication and interaction</td></tr>
<tr><td rowspan="3">EU and international cooperation</td></tr>
<tr><td rowspan="3">To promote afforestation:
• Act on fixed-term support for afforestation
• Afforestation of low-yield fields suitable for afforestation</td><td rowspan="2">Promoting carbon sequestration and storage in fields</td></tr>
<tr><td rowspan="2">Development and adoption of technologies</td></tr>
<tr><td rowspan="2">Promoting the fertilisation of mineral soil forests</td></tr>
<tr><td rowspan="2">Promoting rapid and efficient forest renewal</td><td rowspan="2">HERO programme</td></tr>
<tr><td rowspan="2">Sectoral low-carbon roadmaps</td></tr>
<tr><td rowspan="3">Climate-resilient management and use of peatland forests:
• Comprehensive planning of peatland forest management
• Promoting ash fertilisation of peatland forests</td><td rowspan="3">Increasing carbon stocks of decaying wood in commercial forests due to biodiversity and climate considerations by leaving retention trees in place</td><td rowspan="2">Local and regional cooperation</td></tr>
<tr><td rowspan="2">Development of the greenhouse gas inventory and monitoring system</td></tr>
<tr><td rowspan="2">Catch the Carbon Research and Innovation Programme</td></tr>
<tr><td rowspan="2">Climate-resilient continued use of cut-over peatlands</td><td rowspan="3">Piloting and implementation (Catch the Carbon development projects)</td></tr>
<tr><td rowspan="2">Promoting carbon stocks in long-lived wood products and structures</td></tr>
<tr><td>Catchment area planning</td></tr>
</table>

Table 4.10

Preliminary climate impacts in 2030 and 2035 of the measures presented in the Climate Plan for the Land Use Sector (million tonnes of carbon dioxide equivalent)

Measure	Area	Climate impact in 2030, million tonnes CO_2 eq.	Climate impact in 2035, million tonnes CO_2 eq.
Owner policy of Metsähallitus		0.4	0.7–0.9
Preventing the conversion of forests into fields	about 1,700–1,900 ha per year		0.5
Act on fixed-term support for afforestation	3,000 ha per year, of which 40% in peat production areas	0.09	0.11
Afforestation of low-yield fields	9,000 ha in 2024–2028	0.09	0.10
Raising the groundwater level in peaty agricultural lands (grasslands) –30 cm	2030: 20,000 ha	0.135	0.219
	2035: 32,500 ha		
Paludiculture, groundwater level –30 cm	2030: 5,000 ha	0.047	0.094
	2035: 10,000 ha		
Paludiculture, groundwater level –5 – –10 cm	2030: 2,500 ha	0.047	0.094
	2035: 5,000 ha		
Managed wetlands	2030: 4,000 ha	0.072	0.136
	2035: 7,500 ha		
Perennial grasslands without tilling	2030: 40,000 ha	0.081	0.081
	2035: 40,000 ha		
Wetting of low-yield, thick-peat fields to establish wetlands	2030: 10,000 ha	0.181	0.181
	2035: 10,000 ha		
Comprehensive planning of peatland forest management (avoidance of remedial ditching)	–	–	–
Comprehensive planning of peatland forest management (continuous cover forestry in mires)	6,000 ha per year	0.21	0.21
Ash fertilisation of peatland forests	26,000 ha per year	0.18	0.40
Promotion of forest fertilization on mineral soils	25,000 ha per year	0.46	0.28
Increasing the carbon stocks of decaying wood in commercial forests due to biodiversity and climate considerations by leaving retention trees in place	–	–	–
Total		**1.99**	**3.11–3.31**

Source: Natural Resources Institute Finland 2022

Policies and measures in the WAM projection

The Climate Plan for the Land Use Sector was adopted in 2022. There are no additional measures targeted especially at the LULUCF sector. However, some agricultural measures also affect the emissions in the LULUCF sector.

Information on the 29 per cent emissions reduction targets set for agriculture and measures to achieve this target can be found in paragraph 4.4.5. "Policies and measures in the WAM projection".

Measures identified in the Medium-Term Climate Change Policy Plan related to reducing emissions from organic soils from the agricultural sector also affect emissions from the LULUCF sector (see Section 4.4.5).

Summary of policies and measures

A summary of the policies and measures in the LULUCF sector is presented in Table 4.11.

Table 4.11
Policies and measures according to the WM (marked with *) and WAM projections in the LULUCF sector

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* National Forest Strategy 2025	Conservation of carbon in existing forests, Enhancing production in existing forests, Increasing the harvested wood products pool, Enhanced forest management, Strengthening protection against natural disturbances, Substitution of GHG-intensive feedstocks and materials with harvested wood products. Contribute to increase in renewable energy supply.	CO_2, CH_4, N_2O	Economic, Regulatory, Fiscal, Information	Implemented	The main elements of Finnish forest policy are defined in the National Forest Strategy. A large number of non-governmental organisations (NGOs) and other stakeholders have been closely involved in the preparation and further development of the strategy. Regional objectives are outlined in Regional Forest Programmes.	2015	Ministry of Agriculture and Forestry, Public and private sector actors	NE	NE	NE	NE
Fixed-term act on the financing of sustainable forestry 34/2015	Enhancing production in existing forests, Increasing the harvested wood products pool, Enhanced forest management, Restoration of degraded lands, Protection of waters	CO_2, CH_4, N_2O	Economic	Implemented	The purpose of the Act is to promote economically, ecologically and socially sustainable management and use of forest. The purposes of the aids are to increase the growth of forests, maintain the road network for forestry purposes, secure the biodiversity of forests and promote the adaptation of forests to climate change.	2015	Ministry of Agriculture and Forestry, Finnish Forest Centre	NE	NE	NE	NE
* New owner policy of Metsähallitus (Climate actions in state owned forests)	Conservation of carbon in existing forests, Enhanced forest management	CO_2, CH_4, N_2O	Regulatory	Implemented	The new policy measures aim to coordinate even better the different forms of land use and the objectives relating to sustainable forestry, supply of wood raw material, biodiversity, recreational use and climate policy. The new actions include changes in the treatment of peatlands, increasing forest growth through fertilisation and bred planting material, and a programme on new nature management measures.	2020	Ministry of Agriculture and Forestry, State Forests Enterprise	NE	NE	400	700–900

Table 4.11 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Actions to prevent deforestation (Prevent forest conversion to fields, Developing the structure of arable land, Preventing the clearing of forests for settlements, Land use change fee for all land uses)	Prevention of deforestation	CO_2, CH_4, N_2O	Economic, Fiscal, Voluntary/ negotiated agreements, Regulatory, Information, Education, Planning, Other	Adopted	The Climate Plan for the Land Use Sector includes several measures aiming at halting deforestation. These include: preventing conversion of forest land to cropland (CAP), improving spatial distribution of cropland, prevention of deforestation due to construction and exploring the possibility of taxation on land use change or requiring permission for forest clearance.	2022–2035	Ministry of Agriculture and Forestry, Public and private sector actors	0	NE	NE	500
* Actions to promote afforestation (Act on fixed-term support for afforestation, Afforestation of low-yield arable land)	Afforestation and reforestation	CO_2, CH_4, N_2O	Economic	Implemented/ planned	The purpose of the Act is to promote with financial support afforestation to increase forest area and carbon sinks, decrease greenhouse gases from afforested sites without undiminishing biodiversity. Subsidies can be granted to private landowners. The Finnish Forest Centre is responsible for the implementation of the Act. The purpose is to develop a system for afforesting low-yielding, mineral and (thin peat) peaty arable land.	2021–2028	Ministry of Agriculture and Forestry, Public and private sector actors	0	NE	180	210
* Climate-resistant management of peatland forests (continuous cover forestry and avoidance of remedial ditching)	Conservation of carbon in existing forests, Enhanced forest management, Prevention of drainage or rewetting of wetlands	CO_2, CH_4, N_2O	Fiscal, Information, Education	Adopted	The aim is to reduce emissions from peatland forests by avoiding remedial ditching and promoting continuous-cover forest management in lush forests. The measures are included in the new act on financing of sustainable forestry, which is due to become effective in 2023. Estimate includes only the effect of continuous cover forestry in mires.	2023	Ministry of Agriculture and Forestry, Public and private sector actors	0	NE	210	210

Table 4.11 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Other non-quantifiable measures to improve carbon sequestration in the land use sector	Conservation of carbon in existing forests, Enhancing production in existing forests, Enhanced forest management, Other LULUCF	CO_2	Economic, Voluntary/ negotiated agreements, Information, Education, Research, Planning, Other	Adopted	The aim is to improve carbon sequestration and to increase carbon storage in the land use sector. The measures are included in the Climate Plan for the Land Use Sector: Catchment area planning, promoting carbon markets, education and training, information and knowledge sharing, international and EU-level cooperation, development of new technologies, sectoral low-carbon roadmaps, local and regional cooperation, promotion of rapid and efficient renewal of forests, Increasing carbon stocks of decaying wood in commercially utilised forests by leaving trees for biodiversity and climate reasons, climate-friendly usage of former peatlands, promotion of the use of wood in long-lived products and construction, research and innovation programme, piloting and dissemination, development of GHG emission inventory and monitoring system.	2022–2035	Ministry of Agriculture and Forestry, Public and private sector actors	0	NE	NE	NE
* Ash fertilisation of peatland forests (temporary)	Enhanced forest management	CO_2, CH_4, N_2O	Economic	Implemented	The ash fertilisation of peatland forests is to promote the growth of trees that lack of potassium, phosphorus or boor on peatlands. The measure is included in the new act on financing of sustainable forestry, which is due to become effective in 2023.	2020	Ministry of Agriculture and Forestry, State Forests Enterprise	NE	NE	180	400

Table 4.11 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Catch the carbon programme	Other activities improving cropland management, Improved livestock management, Activities improving grazing land or grassland management, Improved management of organic soils, Other agriculture, Other LULUCF	CO_2, N_2O	Other, Information	Implemented	The programme funds projects that produce new knowledge and innovative solutions for agriculture and land use sector. Development projects are practical projects based on research data that promote the transition towards climate-resilient agriculture, forestry and other land use. The projects speed up the reduction of emissions in the land use sector, enhance carbon sinks and reservoirs, and promotes preparation for and adaptation to climate change.	2020	Ministry of Agriculture and Forestry	NE	NE	NE	NE
Fixed-term act on the financing on sustainable forestry (renewal in process)	Enhancing production in existing forests, Increasing the harvested wood products pool, Enhanced forest management, Restoration of degraded lands, Protection of waters	CO_2, CH_4, N_2O	Economic	Adopted	The purpose of the Act is to promote economically, ecologically and socially sustainable management and use of forest. The purposes of the aids are to increase the growth of forests, maintain the road network for forestry purposes, secure the biodiversty of forests and promote the adaptation of forests to climate change.	2023	Ministry of Agriculture and Forestry	0	NE	NE	NE

NE = not estimated

4.4.7 Waste management

Policies and measures in the WM projection

A Waste Tax Act (1126/2010) entered into force at the beginning of 2011. The purpose of the Waste Tax Act is to collect tax from those waste fractions which could be technically and environmentally recovered, but which are disposed of in landfill sites. The tax list of waste is based on Commission Decision 2000/532/EC on the Waste List. The industrial landfills are also under taxation. The waste tax has been EUR 70 per tonne since 2016.

The National Waste Plan for 2027 was approved by the Government in March 2022. The National Waste Plan includes both a plan to reduce the volume and harmfulness of waste and a waste management plan. The vision of the plan is e.g. to reduce the generation of waste and increase recycling, while reducing greenhouse gas emissions. The Waste Plan proposes measures to achieve the vision and objectives.

The general reform of waste legislation has been conducted in 2021. For example, the following legislation has been amended: the Waste Act[87]; the Decree on Waste[88]; the Government Decree on Landfills[89]; and the Government Decree on Packaging and Packaging Waste[90]. For example, the reform provides the basis for more effective waste management with respect to recycling and reuse, enhanced separate collection of waste, reduction of waste generation, and further reduced landfilling of organic waste, all contributing to reduced greenhouse gas emissions. It applies to all forms of waste production and waste management. Enforcement of the amended Waste Act[91] and the Decree on Waste[92] will increase recycling and recovery. Landfilling has been reduced, and greenhouse gas emissions of the waste sector have diminished. The Decree on Packaging and Packaging Waste[93] is also intended to increase recycling.

The restrictions on the landfilling of biodegradable municipal solid and other organic wastes have been made stricter. The Decree on Landfills[94] restricts the amount of biodegradable and other organic waste to less than 10 per cent of total organic carbon or loss on ignition. These restrictions increased the incineration of waste and decreased landfilling. A Biowaste-strategy was prepared in 2004. The objective of the strategy was to ensure that the amount of biodegradable municipal waste placed in landfills would be reduced in

87 646/2011
88 978/2021
89 331/2013
90 1029/2021
91 646/2011
92 978/2021
93 1029/2021
94 331/2013

accordance with the schedule and numerical targets given in the directive on the landfill of waste[95]. Those targets were achieved and the landfilling of organic waste was heavily restricted in Finland from 2016.

The estimated total emissions reduction of waste management measures is roughly 4 million tonnes of CO_2 eq. per year.

Policies and measures in the WAM projection

The Waste Tax Act is currently being amended, and if the amendment is adopted, the amount of the waste tax will be EUR 80 per tonne from the beginning of 2023. In addition, small changes to the tax list of waste have been proposed in the same context. The changes are likely to have a minor impact on greenhouse gas emissions, but it is challenging to assess them. The impact of planned waste sector measures is therefore not included in the overall WAM projection.

Summary of policies and measures

A summary of the policies and measures in the waste sector is presented in Table 4.12.

95 1999/31/EC

Table 4.12
Policies and measures according to the WM (marked with *) and WAM projections in the waste sector

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Government decree on packaging and packaging waste 962/1997, 1025/2000, 987/2004, 817/2005, 2014/518, 1029/2021	Demand management/ reduction, Enhanced recycling, Waste incineration with energy use, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Implemented	The Degree (1092/2021) is regulatory by specifying the essential requirements and labelling of the packaging as well as recycling targets for packaging waste, reporting oblications and requirements for organizing the reception of packaging waste. It is basically regulatory, but also economic in nature by specifying the system for the economic handling of waste obligations in terms the conditions for handling packaging waste.	1997	Ministry of the Environment	NE	IE	IE	IE
* Government decree on Landfills (861/1997) revised 2013 (331/2013), revised in 2021 (1030/2021), Biowaste strategy 2004.	Improved landfill management, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Implemented	Regulation on landfills setting quantitative limits on amount and proportion of organic waste in land fill waste. Implementing and going beyond landfill directive.	2016	Ministry of the Environment, Regional and local environmental authorities	NE	IE	IE	IE
*Waste tax (1126/2010)	Demand management/ reduction, Enhanced recycling, Enhanced CH_4 collection and use, Improved treatment technologies, Improved landfill management, Waste incineration with energy use, Improved wastewater management systems, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Implemented	The waste tax is EUR 70 per tonne.	2011	Ministry of the Environment	NE	IE	IE	IE

Table 4.12 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affect-ed	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Decree on waste (978/2021)	Demand management/ reduction, Enhanced recycling, Enhanced CH_4 collection and use, Improved treatment technologies, Improved landfill management, Waste incineration with energy use, Improved wastewater management systems, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Implemented	Decree on waste was revised in 2021. The repealed Decree was from 2012.	2021	Ministry of the Environment	NE	IE	IE	IE
* Waste Act (646/2011)	Demand management/ reduction, Enhanced recycling, Enhanced CH_4 collection and use, Improved treatment technologies, Improved landfill management, Waste incineration with energy use, Improved wastewater management systems, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Implemented	Waste Act was revised in 2021. The Act provides the basis for more effective waste management with respect to for example reduction of the quantity and harmfulness of waste, recycling, source separation and separate collection of waste.	2021	Ministry of the Environment	NE	IE	IE	IE
* Updated National Waste Plan 2027	Enhanced recycling, Improved treatment technologies, Objectives and measures for waste management and prevention	CO_2, CH_4, N_2O	Information, Planning	Implemented	Waste plan lays down the objectives and measures for waste management and prevention in Finland to 2027.	2022	Ministry of the Environment, Regional environmental authorities	NE	IE	IE	IE
* Biowaste strategy 2004	Improved landfill management, Reduced landfilling of biowaste	CO_2, CH_4, N_2O	Information, Planning	Implemented	National strategy to reduce landfilling of the amount of biowaste. In 2006, 75% of biodegradable municipal waste will be landfilled, 50% in 2009 and in 2016, only 35% of the amount of biodegradable waste generated in 1994.	2005	Ministry of the Environment	NE	IE	IE	IE

Table 4.12 continued

Name of policy or measure/ mitigation action	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact in kilotonnes CO_2 equivalent			
								2020	2025	2030	2035
* Aggregated all implemented PAMs/WASTE	Demand management/ reduction, Enhanced recycling , Waste incineration with energy use, Reduced landfilling, Enhanced CH_4 collection and use, Improved treatment technologies, Improved landfill management, Objectives and measures for waste management and prevention	CO_2, CH_4, N_2O	Regulatory, Economic, Information, Planning, Planning	See individual PaMs	The total combination of measures directed to improve waste management and reduce GHG emissions from waste.	See individual PaMs	See individual PaMs	NE	3,825	4,077	4,295
Waste tax act amendment	Demand management/ reduction, Enhanced recycling, Enhanced CH_4 collection and use, Improved treatment technologies, Improved landfill management, Waste incineration with energy use, Improved wastewater management systems, Reduced landfilling	CO_2, CH_4, N_2O	Regulatory	Planned	The waste tax amendment. Waste tax will be EUR 80 per tonne from the beginning of 2023.	2023	Ministry of the Environment	NE	NE	NE	NE

NE = not estimated
IE = included elsewhere

4.4.8 Land-use planning and spatial structure

The development of the urban structure has long-term effects on greenhouse gas emissions from transport and buildings. The most significant solutions that concern the cutting of emissions in the urban structure are associated with sustainable urban development: the urban structure and effective functioning of urban subregions; the coordination of land use and transport; the creation of preconditions for renewable energy production; and enabling a low-emission lifestyle. In urban subregions, the preconditions for this include good public transport services and a network of pedestrian and cycling routes, a living and well-functioning city centre, and good accessibility to recreational and green areas. Effective urban subregions are a prerequisite for a thriving business life and Finland's competitiveness. There may be significant differences between the practical solutions used to reduce emissions in different parts of the country.

The preconditions for increasing wind power production include the coordination of wind power construction with land use in the surrounding areas, giving sufficient consideration for negative impacts and ensuring local acceptability. To promote planning, the Land-Use and Building Act[96] contains specific provisions on local master plans that directly apply to wind power construction. Rapid progress has been made in recent years in land-use planning for wind power construction. An amendment to the Land Use and Building Act (2017) for the installation and construction of solar panels and solar collectors harmonises and streamlines the permit procedure so that permit consideration will only be required for solar panels or collectors that have significant impacts on the townscape or the environment.

In land-use planning, Finland will prepare to extensively utilise the country's wind power potential. To minimise the negative impacts of wind power plants, the primary effort will be made to centralise wind power construction in large units at a sufficient distance from permanent housing.

Nearly all the regions in Finland and many individual municipalities have prepared their own climate strategies. However, it is difficult to provide quantitative emissions reduction potentials for the policies and measures concerning land-use planning and the urban structure. For example, the urban form influences emissions mainly in the energy sector through its effects on transport and the heating of buildings. Emissions from daily mobility especially may be many times higher in car-oriented zones than in urban centre areas. Emissions from the heating of buildings depend greatly on energy solutions for the dwelling and possible district heating. The location of a dwelling is also connected with emissions via the consumption of goods and services, as well as long leisure trips, mainly due to spatial differences in income levels. The overall reductions in emissions in different regions thus depend not only on the urban

96 132/1999

structure but on complex processes that include lifestyle changes, as well as economic conditions and development.

The land-use planning measures are included in the energy and transport sector Tables 4.2 and 4.5.

4.5 Energy taxation and related measures

4.5.1 Energy taxation

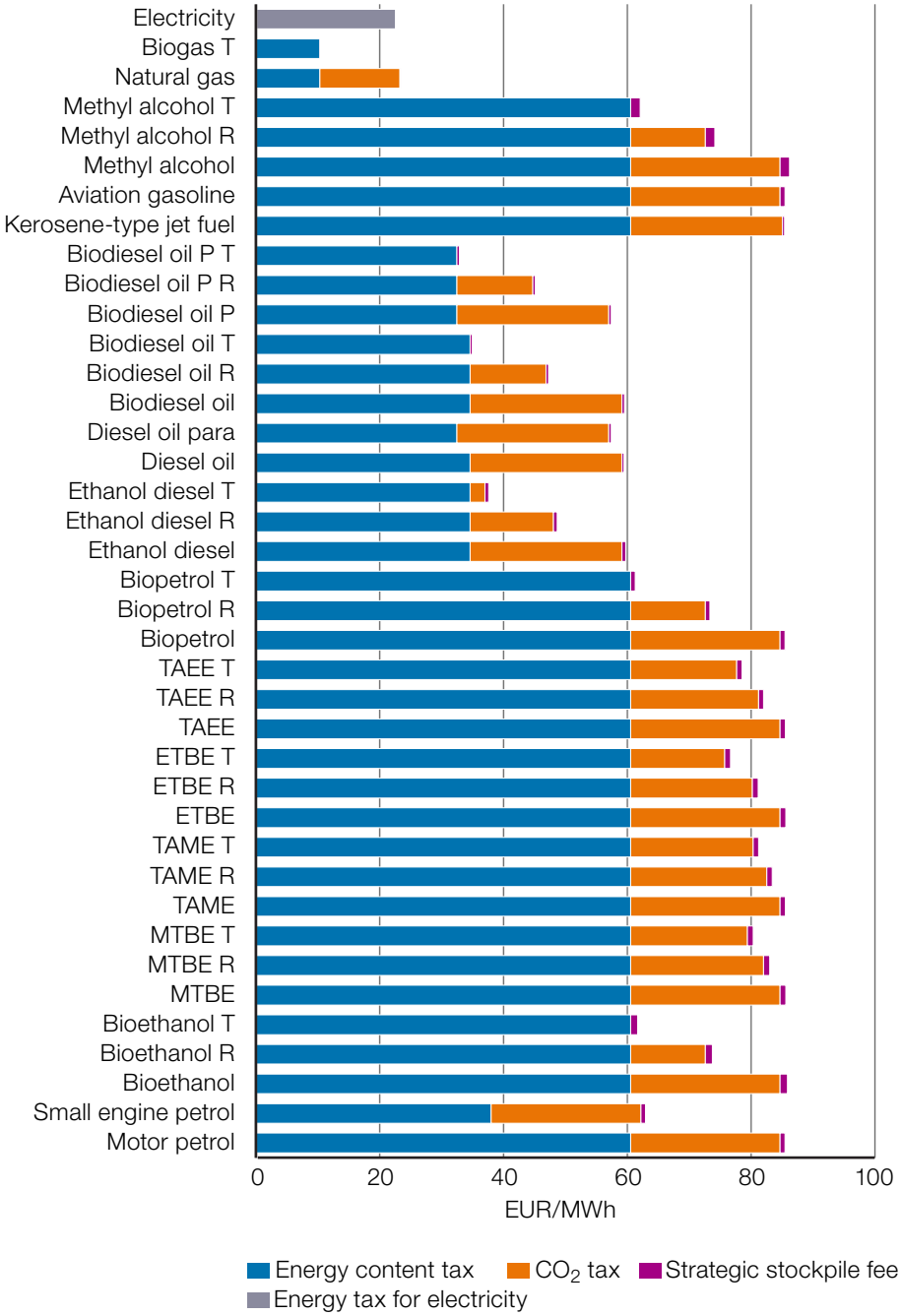
Energy taxation is a key instrument of the Government's climate and energy policy. Energy taxes are levied on electricity, coal, natural gas, peat, tall oil and liquid fuels.[97] The energy taxation of fuels is based on the energy content, life cycle carbon dioxide emissions and local emissions of fuels. The energy content component is levied on both fossil fuels and biofuels, based on their volumetric energy content. The CO_2 component is based on the lifetime CO_2 emissions of the fuel in question, and biofuels are therefore subject to a CO_2 tax rate that is reduced from 50 to 100 per cent if they meet the European Union's sustainability criteria. In connection with the excise duties on electricity, coal, natural gas and liquid fuels, the Government also collects a strategic stockpile fee, which is transferred to the National Emergency Supply Agency.

The energy tax rates of fuels used in transport are presented in Figure 4.6. The basis for calculating the carbon dioxide tax on petrol and diesel oil, as well as the corresponding biofuels, is the price of carbon dioxide, or EUR 77 per tonne, and the carbon dioxide emission coefficient specific to each fossil product.[98] The energy content tax on petrol and corresponding biofuels is EUR 0.01681 per MJ, except for small engine petrol, which has a tax reduction of EUR 0.20 per litre. The energy content tax on fossil and bio-based diesel is approximately EUR 0.0072 per MJ lower than on petrol. By imposing a lower tax on diesel, an effort has been made to reduce the costs of HGV transport and consequently the export industry, as well as bus and coach transport. Furthermore, until the end of 2022, a reduction of EUR 0.02 per litre for paraffinic fossil diesel oil and biodiesel is granted on the energy content tax, as the fuels have lower local emissions than conventional fossil fuels. Fuels for commercial aviation and shipping are exempt. Gas oil used in rail transport is taxed at a lower rate; the rate on light fuel oil and electricity used in rail transport is exempt.

97 1260/1996 and 1472/1994

98 As the carbon dioxide tax also factors in the fuel's life cycle carbon dioxide emissions, the price per tonne of carbon dioxide used in the calculation of the CO_2 tax (EUR 77) should be increased by approximately 20 per cent to be comparable to the price of carbon dioxide tonnes calculated based on emissions from combustion alone.

Figure 4.6
Energy tax rates of fuels used in transport in 2022

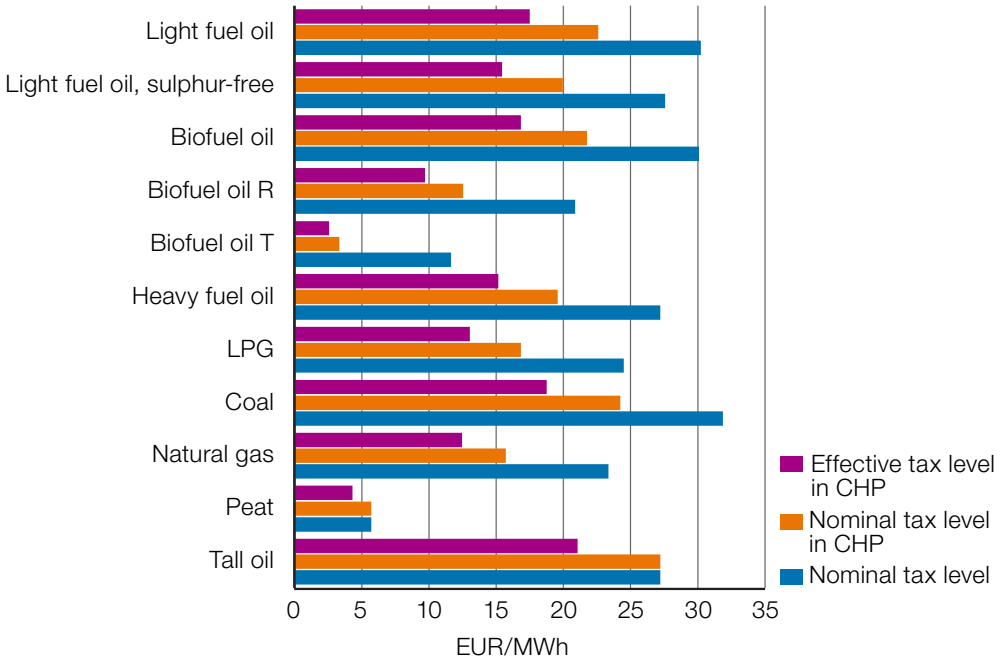


As the energy content tax on diesel is lower than the environmental criteria of the tax require, and there are no other environmental or other grounds for favouring diesel cars, diesel-powered cars are subject to the tax on driving power as part of annual vehicle tax. It complements fuel taxation and harmonises the cost differences for motorists, arising from the different tax treatment of petrol and diesel based on the average annual transport performance. In addition to diesel cars, the tax on driving power is levied on cars fuelled by other driving powers such as electricity or gas, whose taxation is based on less stringent criteria than the taxation on petrol. Tax on driving

power for passenger cars is set as cents per day for each partial or complete 100 kilograms of total vehicle mass. The tax level is 5.5 cents for diesel, 1.5 for electricity, 0.5 for electricity and petrol, 4.9 for electricity and diesel, and 3.1 for methane.[99]

Energy tax rates for fuels used for heating, as well as in power plants and mobile machinery, which are later referred to as heating fuels, are presented in Figure 4.7. The value used in the calculation of the carbon dioxide tax is EUR 53 per tonne of carbon dioxide, and the energy content tax is EUR 10.33 per MWh. As the taxation of peat and tall oil is not based on the environmentally related tax model, they are subject to a separate energy tax rather than the energy content and carbon dioxide taxes. In addition, peat is only subject to tax for the part exceeding 10,000 MWh per plant.[100] Tall oil used for heating is subject to excise duty equivalent to that on heavy fuel oil. The purpose of the tax is to encourage the further processing of tall oil as a chemical industry raw material rather than using it for energy. Gaseous and solid biofuels in heating use are exempt. For professional agriculture, the energy content tax component included in the price of light fuel oil, heavy fuel oil, and biofuel oil is refunded.[101]

Figure 4.7
Energy tax rates for fuels used for heating, as well as in power plants and mobile machinery in 2022



99 1281/2003

100 The limit for tax-free use of peat for energy will be 10,000 MWh per plant for the period between 2022 and 2026, and 8,000 MWh per plant for the period between 2027 and 2029. From 2030, peat will be subject to a tax in heat production when used in a power plant or heating plant whose peat use exceeds 5,000 MWh.

101 603/2006 https://finlex.fi/fi/laki/ajantasa/2006/20060603

The fuels used to produce electricity are exempt from tax in both separate condensing power plant production and CHP. Electricity consumption is subject to tax, and taxes are levied on all electricity, regardless of the production method.[102] The tax exemption for fuels used to produce electricity is based on the EU Energy Taxation Directive and motivated by the need to coordinate the functioning of the electricity market and taxation, especially in the import and export of electricity. The excise duty on electricity is differentiated into two categories. Category I tax is generally levied on business activities such as services, forestry, and construction, as well as on electricity used in the public sector and households. Category I electricity tax is EUR 22.4 per MWh. The lower Category II tax covers electricity consumption in industry, mining, data centres, and greenhouses, as well as electricity supplied to certain heat pumps, electric boilers, and recirculating water pumps. While other areas of agriculture also fall into tax Category II, this reduction takes the form of an energy tax refund for agriculture. Category II electricity tax is EUR 0.5 per MWh.

Energy-intensive industry (including mining and greenhouses) is eligible for a tax refund insofar as the amount of excise duties included in the price of taxable energy products used or purchased by it, other than electricity, transport, and machinery fuels, exceeds 1.7 per cent of the company's value added. In this respect, the company is eligible for an 85 per cent refund of the excise duties it has paid. However, a contribution of EUR 50,000 is deducted from the refund. Under the currently valid act, the tax refund for energy-intensive enterprises will be phased out gradually by 2025.

Taxation is included in the mitigation measure tables for the energy and transport sector, ie. Table 4.2 and 4.5. In the WM and WAM projections, the taxation structure and levels remain constant as they are in 2022 as there is no plans of changes at the present.

4.5.2 Government expenditure on energy and climate policy

The Finnish government supports the transformation to a greener economy with a variety of different subsidies. The total Government expenditures on energy and climate policy have increased significantly in recent years, with the budget for 2022 being EUR 2,554 million. This expenditure covers a wide range of sectors, and the largest outlays are in subsidies given to energy and agriculture.

Government appropriations for the energy and climate policy are discussed, and the relevant decisions are made within the central government spending

102 However, exemptions apply to small-scale electricity production for one's own use. If electricity generated in a micro or small power plant is transmitted through the electricity grid for consumption, however, the tax exemption is not transferred with the electricity, and the network operator transmitting the electricity for consumption is liable to pay Category I or II energy tax on it.

limits in the General Government Fiscal Plan, coordinated with the public economy's other expenditure needs.

One of the main ways in which the Government supports the transition to greener energy production is a direct subsidy for projects that aim to cut emissions at the firm or municipality level ("Energy Subsidy"). The current total level of this subsidy is EUR 230 million for 2022 (including RRF[103] funding), which is substantially higher than just a few years ago, when it was around EUR 50 million.

In addition, there have been separate fixed-term aid schemes for renewable energy and additional budget authorities for different large demonstration projects. As renewable energy has become more profitable, direct subsidies for renewable production have decreased. These energy-related measures include the Government's key projects related to energy (in total, EUR 100 million between 2016 and 2018), energy projects replacing coal (in total, EUR 90 million between 2020 and 2021), and current Recovery and Resilience Facility (RRF) energy projects (around EUR 500 million between 2022 and 2023) and large demonstration projects. Initially, a total of EUR 200 million was earmarked for large demonstration projects in the period from 2019 to 2022. The Ministerial Working Group on Preparedness decided to increase the budget authority for the energy aid item for the period from 2022 to 2023 by a total of EUR 150 million. At the same time, an additional budget authority was decided for hydrogen projects (EUR 150 million) and battery ecosystem projects (EUR 50 million). The development is partly based on the policies of the previous climate and energy strategy on shifting the focus of renewable energy subsidies from production subsidy type aid schemes to supporting new technologies. In addition, the number of projects has increased significantly and national targets have become stricter.

On top of these subsidies, the Government also actively provides support for R&D projects and rail projects and funding for private sector projects that aim to cut emissions. While this support is divided over several smaller measures, they amount to a total of several hundred million euros annually.

Table 4.13 shows a compilation of funding related to the energy and climate policy from 2018 to 2022 under the General Government Fiscal Plan.

103 EU's Recovery and Resilience Facility

Table 4.13
Funding under the current General Government Fiscal Plan in accordance with the Government report on the National Energy and Climate Strategy for 2030.

Appropriation	2018	2019	2020	2021	2022
	EUR million				
Ministry of Economic Affairs and Employment					
Energy aid	58	47	61	101	231
Investment and operating subsidies for renewable energy and new energy technologies	354	215	337	294	135
Subsidies for green R&D and innovation	120	121	130	143	176
Other measures	189	146	155	180	190
Ministry of Agriculture and Forestry					
Agri-environment payment measures	218	218	185	236	263
Other measures	313	313	398	353	413
Ministry of Transport and Communications					
Investment in rail infrastructure	0	0	8	26	123
Other measures	150	127	521	267	281
Ministry of the Environment					
Investment subsidies for lower emission heating systems	65	70	306	261	323
Other measures	85	86	116	105	105
Ministry for Foreign Affairs					
Development aid for environmental, water and energy related projects	144	159	199	266	283
Other measures	65	70	236	186	184
Total appropriations	**1,761**	**1,573**	**2,651**	**2,418**	**2,706**

4.6 Use of Kyoto mechanisms

The Kyoto Protocol includes the use of project mechanisms (the Clean Development Mechanism (CDM) and Joint Implementation (JI)) or acquisition assigned amount units (AAU) through international emissions trading (JI) or acquisition assigned amount units (AAU) through international emissions trading.

Finland's Government activities to provide Kyoto mechanisms started in the form of the CDM/JI pilot programme from 1999 until early 2006, followed by the Kyoto mechanism purchase programme that covers the period from 2006 to 2020. The total budget for the acquisition of emissions reductions from the Kyoto Protocol flexible mechanisms has been approximately EUR 70 million. The programme includes 10 bilateral projects and investments in several multilateral carbon funds.

In total, in the first Kyoto commitment period, Finland procured approximately 6.2 million tonnes of project units. These units have been carried over to the second commitment period.

4.7 Effect of policies and measures on longer-term trends

Finland has a long tradition of assessing longer-term energy and climate development. The Government's Foresight Report on Long-Term Climate and Energy Policy (published in 2009) highlighted possible paths to a low-carbon Finland. Moreover, the report of the parliamentary committee from 2014, the Energy and Climate Roadmap 2050, analysed the means of constructing a low-carbon society and achieving an 80 to 95 per cent reduction in greenhouse gas emissions from the 1990 level in Finland by 2050. The background material for the 2014 roadmap included four scenarios on alternative development paths for a low-carbon society until 2050 made by the Low Carbon Finland 2050 platform research project. Finland's target of carbon neutrality by 2035 was officially laid out as part of the Government Programme in 2019. The target is reflected in the Long-Term Strategy (LTS), which was submitted to the UN and EU in 2020 and contains updated possible scenarios for how to achieve the target. The latest Climate and Energy Strategy prepared in 2022 is also closely tied to the carbon neutrality target and includes the most recent scenarios assessing if the target can be achieved with the current existing and additional policy measures.

A large proportion of current Finnish climate and energy policies also contributes to reducing greenhouse gas emissions in the longer term, in particular when they are based on creating structural changes in the respective systems. For example, buildings have long lifetimes, and the regulations for improving the energy efficiency of new and existing buildings will therefore have long-lasting impacts.

Land-use planning also yields permanent emissions reductions in buildings and transport, for example, by allowing the use of low-emission heating modes or improving the possibilities for walking, cycling, and using public transport. However, the actual emissions reductions will depend on a large array of factors, including general economic development.

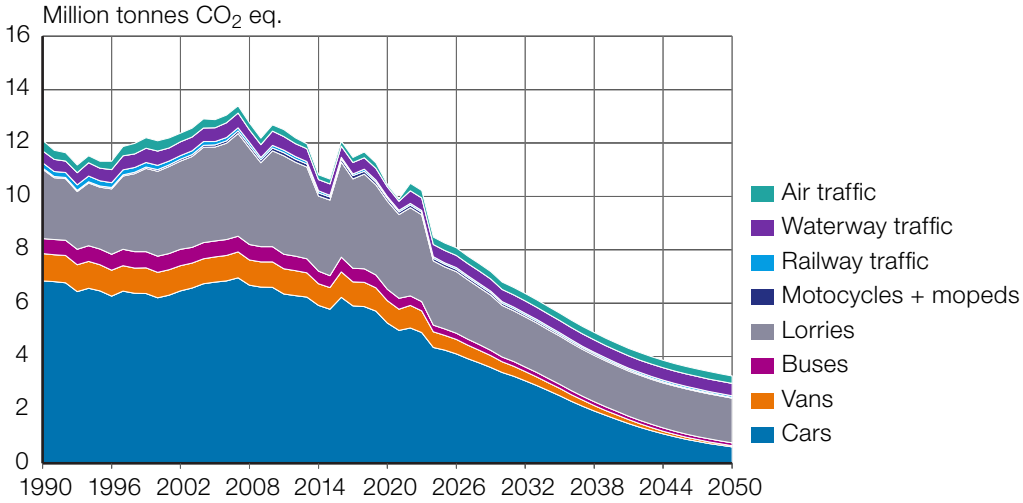
Investments in the energy infrastructure have long lifetimes. Measures that promote investment in renewable energy and improve the competitiveness of renewable energy sources will therefore reduce greenhouse gas emissions in the longer term. Measures that would in principle contribute to emissions reductions only if the measure is ongoing, such as feed-in tariffs for renewable energy, also have long-term emissions reduction effects, provided the measure has triggered investment.

Prohibiting uses of certain F gases and the replacement of F gases with low GWP alternatives or halting the disposal of biodegradable waste on landfills can be expected to lead to permanent changes in current practices, and therefore to yield permanent emissions reductions.

Since 2022, the impact of policies and measures on the longer-term trend in greenhouse gas emissions from road transport have been calculated using a new standalone model called ELIISA, which is an upgraded version of its predecessor ALIISA. ELIISA computes the development of the vehicle fleet, kilometrage, consumption and greenhouse gas emissions (including CO_2, CH_4 and N_2O) until 2050. ELIISA considers all possible powertrain options for vehicles in Finland. The changes in the vehicle fleet are based on the estimated annual sales of new vehicles and imported vehicles and the vehicle scrappage rate. Fuel and energy consumption estimates are based on actual fuel sales.

According to the projections, transport volumes continue to grow over the forecast period, whereas the GHG emissions start to decline (see Figure 4.8). The main reasons for emissions reductions are the replacing of fossil fuels with alternative transport fuels and improving the energy efficiency of the vehicles and the transport system.

Figure 4.8
Projection of the longer-term trend in greenhouse gas emissions in transport



4.8 Mitigation benefits other than greenhouse gas reduction

Environmental impact assessments (EIAs) have been made for all of Finland's national energy and climate strategies and for the Medium-Term Climate Change Policy Plan. The EIAs include a general examination of the benefits and adverse impacts of the strategies and the Medium-Term Climate Change Policy Plan, specifically evaluating the relationship between measures for climate mitigation and air pollution. In addition to climate change and air pollution, the National Climate and Energy Strategy and the Medium-Term Climate Change Policy Plan affect biodiversity and waters, natural resources use, and people's health and living conditions.

If the current climate targets are accomplished, they will have both positive and negative impacts on the environment and society. Positive impacts entail consequences that promote the achievement of the set societal objectives, whereas negative impacts entail consequences that hamper the achievement of objectives other than the climate targets in the previously mentioned sectors.

The most significant environmental impacts concern air pollution, biodiversity, forest carbon sinks and waterbodies. These environmental impacts are linked to people's health, comfort, and wellbeing, and they can also be influenced by the policies or economic instruments used to implement them, such as taxes and charges. These impacts are also closely linked to the overall acceptability of measures, perceived social fairness, and overall sustainability as part of the transition to a carbon neutral society. Some of these impacts will also be felt outside Finnish borders.

As a rule, the achievement of climate targets is expected to have positive environmental impacts when climate change mitigation is successful in preventing the extensive, partly irreversible, and unpredictable impacts of climate change on the environment and society. However, many measures also come with adverse effects such as the significant amounts of natural resources required for new infrastructure.

The amount of air pollution is expected to decrease. However, the risks for health caused by air pollution remain significant. At present, the emissions from power plants have only a small effect on air quality.

The largest domestic emissions sources are small-scale burning of firewood and street dust, to which current climate measures are not significantly connected. In addition to methane and black carbon, which contribute to global warming, small particles with negative health impacts are also released from small-scale wood burning. Small-scale wood burning does not cause notable changes to the present state, and it is possible to affect the emissions by technical standards, innovations, and information guidance. In the scenarios modelled in connection with the Climate and Energy Strategy, small-scale burning is expected to decline from 2020 levels in both the base (about five per cent) and policy scenario (about 20 per cent by 2040).

Exhaust emissions from transport have already significantly decreased and will continue to decrease as engine technology develops. Therefore, future changes in the driving power of vehicles will not have a significant impact on particulate matter emissions from exhaust gases. However, nitrogen oxide emissions will decrease as the use of electric cars replaces petrol and diesel cars, especially in passenger car transport. The impact of transport-related air pollution on the air quality of cities and the exposure of humans to air pollution will ultimately depend on the development of vehicle performance, regional distribution, and community structure.

The current policies point to increasing the use of biofuels in transport, buildings, and machinery through distribution obligations. The scale of the impacts of biofuel production will greatly depend on the raw materials used and the total resources needed for the production of biofuels, such as energy, materials, and productive land area. The main domestic feedstocks in the future biofuel production in Finland are expected to be e.g. biodegradable wastes, forest industry residues such as sawdust, other industrial residues, and logging residues. By using biofuels made from domestic raw materials, Finland can reduce its dependence on crude oil.

However, the growing share of renewables results in greater demand for forest-based bioenergy, even though most of the wood-based energy use comes in the form of by-products and sidestreams from the forest industry. This adds to the pressure to increase felling and collect logging residues, which can reduce the carbon sink of forests and add to the risk of biodiversity loss and harmful impacts on waterbodies. These impacts will strongly depend on the extent to which the felling and harvesting of stumps and felling residues will increase because of increased wood use. Felling, fertilisation and ditch reconditioning are some of the key factors among measures on agricultural lands in causing stress to water systems. Key measures for preventing biodiversity loss include saving more dead trees in felling, promoting the conservation of old-growth forests and sites of high natural value, avoiding harvesting on valuable natural sites, leaving more large live trees standing in regeneration felling and burning for environmental management purposes.

4.9. Minimising the adverse effects of policies and measures in other countries

Finland has provided information on the minimisation of adverse impacts in accordance with Article 3, paragraph 14 in previous national inventory reports and national communications in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol (Decision 15/CMP.1, Section I. H. and in paragraph 36 in Section II. G.). The main principles of minimising adverse impacts have not changed since the previous National Communication. The information provided in Finland's 7th National Communication and the previous inventory are incorporated in this communication.

Finland strives to implement its commitments under the Kyoto Protocol so that social, environmental and economic impacts on other countries, and especially developing countries, are minimised. Applicable notification requirements under international trade conventions are also followed. Finland takes knowledge and understanding of the possible adverse impacts of its measures into account, based on the available information received from other Parties.

All major policies and activities undergo environmental impact assessments, including impacts on other countries. Environmental impact assessments have been performed for Finland's national energy and climate strategies. The assessments have qualitatively identified the kind of impact the measures may have. A life cycle analysis of fuel import takes impacts arising beyond Finnish borders into account. Finland has also participated in the work on developing sustainability criteria for biofuels through scientific studies. In line with the most recent energy and climate strategy, the identified potential adverse environmental impacts due to the increased use of bioenergy are addressed as early as possible.

Finland's development policy includes both climate change mitigation and adaptation in developing countries (see Chapter 7 of Finland's 8th National Communication for more details). Climate financing is part of Finland's development cooperation funding, and disaster risk management is also covered by our development cooperation.

The overall aim of Finland's development policy is to reduce poverty and inequality in the context of sustainable development. With its development policy, Finland supports the realisation of human rights, the rules-based multilateral system and the Sustainable Development Goals (SDGs) adopted by the UN. Finland's international cooperation and actions are grounded in the UNFCCC, the Kyoto Protocol and the Paris Agreement on Climate Change and the goals of the 2030 Agenda for Sustainable Development. The cross-cutting objectives that Finland promotes through its development policy include gender equality, non-discrimination, climate resilience and low emission development, as well as protection of the environment, with an emphasis on safeguarding biodiversity. The integration of climate change has been one of the cross-cutting objectives of Finland's development policy and development cooperation since 2012. Overall, Finland's development cooperation aims to strengthen developing countries' own capacities and resilience.

Finland supports developing countries by helping them build their capacities and develop their economic infrastructure, thereby helping them diversify their economies and improve energy efficiency and renewable energy production. Economic diversification and private sector development are particularly important targets in various Finnish bilateral programmes and Finnish-supported multilateral programmes in developing countries. A regional programme that promotes the role of the private sector in providing energy services is being funded in Sub-Saharan Africa. Through funding to the Partnership for Market Implementation, a multi-donor fund managed by the World Bank, Finland supports carbon pricing in developing countries, thus steering companies and societies on a low-emission path.

As one of its core objectives, Finland's development policy seeks to diversify the economies of developing countries, including developing countries that are highly dependent on the export and consumption of fossil fuels. Finland

supports the business environment of developing countries through legal and regulatory reforms, as well as economic infrastructure. Finland also provides direct support to companies active in developing countries. Recently, the direct support instruments that strengthen private sector financing, capacity, and global technology and trade networks have especially been developed further and have received additional financing.

Finland and the International Finance Corporation (IFC) have developed the Finland-IFC Blended Finance for Climate Program (EUR 114 million) to spur private sector financing for climate change solutions in low-income countries. Furthermore, Finland has joined Asian Development Bank's Ventures Investment Fund in 2020 by investing EUR 20 million in the fund. The fund provides financing to early-stage and growth companies applying technology-enabled climate mitigation solutions in Asia. The Finnish government-owned financial institution, Finnfund, also makes investments in renewable energy, sustainable forestry, and other sectors in developing countries that help reduce greenhouse gas emissions.

Among the actions listed in the Annex to Decision 15/CMP.1, Part I.H, "Minimisation of adverse impacts in accordance with Article 3, paragraph 14", Finland especially prioritises the following actions:

- Action (a): Finland has addressed the progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions, and subsidies in all greenhouse-gas-emitting sectors
  - Domestically, with a major revision of energy taxation (2011), after which fuels are taxed broadly and explicitly based on their energy and fossil carbon content and emissions over the whole lifecycle. The revised energy tax structure takes the sustainability of biofuels directly into account and does not include energy tax rate differentiation between business and non-business use. However, certain sectoral exceptions remain. Energy tax rates in Finland are among the highest in the world.
  - In its development policy, by including in the support provided to developing countries through multinational development banks criteria that are targeted at removing subsidies for fossil fuels and ending financing to new coal power plants, while promoting the achievement of climate neutrality by 2050. Additionally, Finland supported the work of the Partnership for Market Readiness, a multi-donor trust fund, between 2012 and 2020 and has supported the successor programme (Partnership for Market Implementation) since 2021. Both support developing countries' design and deployment of carbon pricing and carbon. Market instruments facilitate the reduction of emissions. The revenue from carbon pricing can be used to minimise potential adverse impacts from response measures.

- Action (f): Finland has assisted developing country parties that are highly dependent on the export and consumption of fossil fuels in diversifying their economies in several projects:
  - Through the Energy and Environment Partnership (EEP) Trust Fund, Finland supports early-stage companies in developing, delivering, and scaling up appropriate and affordable renewable energy and energy efficiency technologies for improved energy access and local employment. A Finnish-supported EEP programme is being implemented in Southern and Eastern Africa.
  - Through Finnfund and the Finland-IFC Blended Finance for Climate Programme, private sector financing for climate change solutions is incentivised in low-income countries. In addition, through the Asian Development Bank's Ventures Investment Fund, Finland provides funding for early-stage and growth companies in seeking new climate mitigation solutions in Asia.
  - Through the Global Environment Fund (GEF) and the Green Climate Fund (GCF) (the Operating Entities of the UNFCCC Financial Mechanism), Finland supports developing countries' efforts to improve energy efficiency, transition to cleaner sources of energy, introduce more sustainable transport, and preserve and restore carbon sinks.

More details on the actions Finland is taking to minimise the adverse impact of response measures in developing countries are provided in Table 4.14 below.

Finland promotes policy coherence for sustainable development at the national, EU, and global levels. Policy Coherence and global partnership are among the key policy principles in the Government Report[104] submitted to Parliament in 2020 on the implementation of Agenda 2030. Finland's Development Policy is largely based on Agenda 2030. Policy coherence on themes such as food security, trade and development, tax and development, and security and development have been strengthened both nationally and internationally.

Finland has consistently and in the long term worked to reform harmful fossil fuel subsidies for both climate and wider environmental, social, and economic reasons. We are part of the Friends of Fossil Fuel Subsidy Reform (FFFSR), playing an active role in all relevant policy arenas on behalf of reform. The latest achievement in which the FFFSR has played a key role is a ministerial statement on fossil fuel subsidies reform launched among 37 WTO members in December 2021. The European Union, and Finland as its Member State, co-sponsors the ministerial statement. This statement will help anchor and guide FFFSR-related work in the WTO.

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Table 4.14
Summary of specific actions to minimise the adverse impact of response measures in developing countries

Action	Implementation in Finnish policy
(a) The progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse-gas-emitting sectors, taking the need for energy price reforms to reflect market prices and externalities into account.	These factors are considered for all greenhouse gas emitting sectors, with consideration of national preferences and circumstances and the need for economic efficiency and feasibility. Various methodologies, including economic modelling, are used in the planning of economic instruments.
	Starting in January 2011 Finland made a major revision in energy taxation according to which all fuels are taxed based on their energy and fossil carbon content.
	Finnish development policy guidelines for support to developing countries through multinational development banks include criteria that target the removal of fossil fuels subsidies and the phasing out the support to fossil-fuel-fired investment by 2050. Finland is a member for the Friends of Fossil Fuel Subsidy Reform group. Support for PMR (2012 to 2020) and PMI (2021 onwards).
	Finland is committed to ending financing for new unabated thermal coal power projects overseas.
(b) Removing subsidies associated with the use of environmentally unsound and unsafe technologies.	Finland has no support activities in this field.
(c) Cooperating in the technological development of non-energy uses of fossil fuels and supporting developing country Parties to this end.	Finland has no support activities in this field.
(d) Cooperating in the development, diffusion, and transfer of less-greenhouse-gas-emitting advanced fossil fuel technologies, and/or technologies, related to fossil fuels, that capture and store greenhouse gases, and encouraging their wider use; and facilitating the participation of the least developed countries and other non-Annex I Parties in this effort.	Finland has no any support activities in this field.
(e) Strengthening the capacity of developing country Parties identified in Article 4, paragraphs 8 and 9, of the Convention for improving efficiency in upstream and downstream activities related to fossil fuels, considering the need to improve the environmental efficiency of these activities.	Finland has no any support activities in this field.

Action	Implementation in Finnish policy
(f) Assisting developing country Parties that are highly dependent on the export and consumption of fossil fuels in diversifying their economies.	Action has been undertaken both through support by international organisations such as UNCTAD (United Nations Conference on Trade and Development) and through bilateral and multilateral partnerships. For example, the Green Climate Fund, to which Finland contributes, reduces risks for investors in developing countries to attract global financial flows and to shift private investment to renewable energy-based power systems. The GEF, on the other hand, contributes to mainstreaming mitigation concerns in sustainable development strategies and promoting innovation and technology transfer for sustainable energy breakthroughs.
	Finland is supporting early-stage companies to provide access to renewable energy through the Energy and Environment Partnership (EEP) Trust Fund in Southern and Eastern Africa. Similar programmes in the Mekong Region, Central America, the Andean Region and Indonesia have been successfully completed.
	Finland is also supporting early-stage and growth companies in reducing greenhouse gas emissions through Asian Development Bank's Ventures Investment Fund. It provides funding for applying technology-enabled climate mitigation solutions in Asia.
	The Finnish government-owned financial institution, Finnfund, invests, among others, in renewable energy, sustainable forestry, and other sectors in developing countries to help reduce greenhouse gas emissions. The Government supports Finnfund financially by providing the financial institution with loans, capital injections, and a special guarantee instrument targeted at high-risk projects.
	The Finland-IFC Blended Finance for Climate Programme (EUR 114 million) has been designed to spur private sector financing for climate change solutions in the least developed countries, other low-income countries, and lower-middle income countries and territories. The projects have thus far focused on climate change mitigation (renewable energy and energy efficiency in buildings)

4.10 Policies and measures no longer in place

Finland reports a total of 114 individual or groups of policies and measures in the tables in Chapter 4. 84 of these are fully or mainly implemented, eight adopted, one has expired, and 21 are planned. Regarding the Seventh National Communication, there are a further 52 measures in this reporting. Some regrouping of measures has been done for this reporting. In some cases, measures that have been implemented since the last reporting have now been merged with previous existing measures of the same type, and some measures have been removed since the last reporting. In some sectors, the impact assessment has developed to enable the emissions reduction impact of measures to be calculated at a more detailed level than in the Seventh National Communication. For road transport, for example, more single measures are reported in the transport sector table now than previously, when they were reported more in groups. Consequently, the number of measures itself gives no indication of the climate policy ambition level.

In the agricultural sector, the Climate Programme for Finnish Agriculture – Steps towards Climate Friendly Food is no longer valid. The programme has been replaced partly by the new CAP strategic plan, the Medium-Term Climate Change Policy Plan, and the Climate-Friendly Food Programme, which is currently under preparation.

The Decree of the Ministry of the Environment on the energy efficiency of new buildings 1010/2017 entered into force on January 1, 2018. The building regulations that preceded the new regulation (2003, 2008, 2010, 2012) have expired. Although the building regulations in force in 2003, 2010, 2008, and 2012 are no longer valid, their effects continue as long as the buildings affected remain in use.

Other expired measures are the car scrapping premium campaigns that took place in 2020 and 2021. The campaigns were reported in the Fourth Biennal Report but not yet in the Seventh National Communication. A new car scrapping premium campaign is included in the WAM projection of this reporting.

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