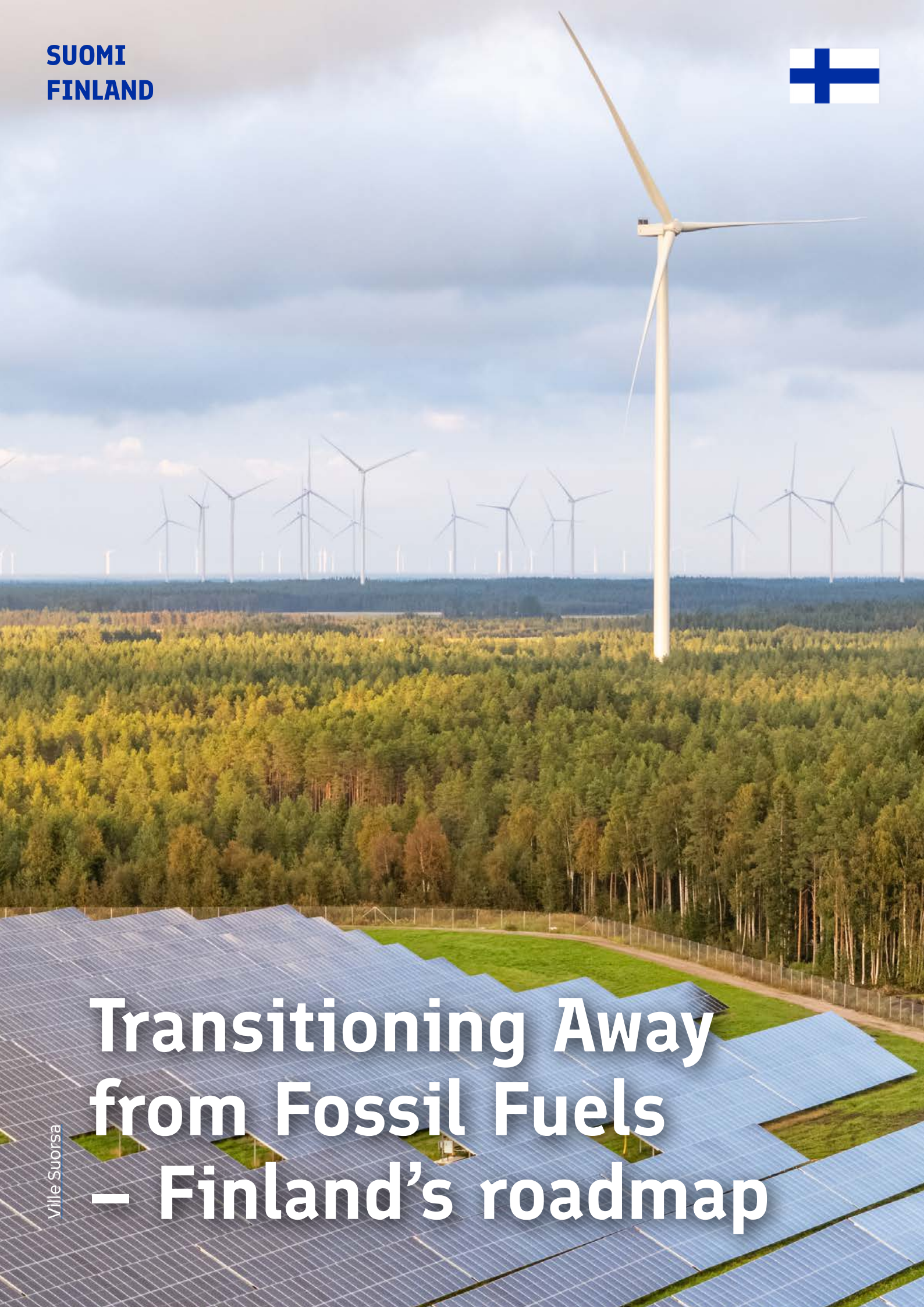
SUOMI
FINLAND



Transitioning Away from Fossil Fuels – Finland's roadmap

Ville Suorsa

Preword

This paper outlines the main targets, policies and measures central to the phase-out of fossil fuels in Finland. The paper is intended as Finland's contribution to the commitment of Parties at COP28 to 'a just transition away from fossil fuels in the energy systems in a just, equitable and orderly manner, accelerating action in this critical decade, so as to achieve net-zero by 2050 in keeping with science'. It specifically contributes to the Santa Marta process on Transition away from fossil fuels (TAFF) initiated by Colombia and Netherlands as a follow-up to COP30 in Belém, which recommends that participating countries present their national TAFF roadmaps as part of the process. Finland looks forward to further sharing experiences and best practices as well as identifying challenges and barriers to the transition away from fossil fuels at the international fora, to accelerate the transition globally. Finland stresses that accelerating this transition globally is crucial for achieving the goals of the Paris Agreement.

Finland highlights that transitioning away from fossil fuels strengthens energy security by replacing centralized, imported fossil fuels with decentralized, clean, domestic sources. This in turn supports national security and decreases the impacts of price volatility. Furthermore, the clean transition creates new business opportunities. Finland's almost carbon free electricity is also amongst the most affordable in the European Union. Many Finnish companies are developing clean technologies, services and low-carbon materials that are needed for the transition globally, thus increasing our positive handprint.

In Finland, climate and energy policies and measures are embedded across a range of government programmes and strategies that are regularly updated. The most relevant are the Energy and Climate Strategy[1], the Medium-term Climate Policy Plan[2] and the Climate Plan for the Land Use Sector[3]. All policies and measures described here are based on the current government strategy documents. This paper does not describe all Finnish policies and measures but highlights some of them. This paper may be updated as these strategies and plans are further developed.

November 2026, Helsinki

1 https://julkaisut.valtioneuvosto.fi/items/3381Ocf1-882b-4839-9a19-296ead798126
2 https://julkaisut.valtioneuvosto.fi/items/2baa1a4e-c06b-4d58-828f-24efba85d893
3 https://julkaisut.valtioneuvosto.fi/items/232154e2-d8ae-44a2-9bf2-f06bfbc4d2b3

Ambitious climate policy both in the European Union and nationally

Being a Member State of the European Union (EU), Finland's energy and climate policies are based on both EU and national targets and legislation. **The European Union's joint climate & energy targets and legislation** play a central role, and they are accompanied by national targets and legislation.

The EU has agreed a net emission reduction target of 55% for 2030 compared to 1990, and 90% for 2040. In addition, the EU has set a target of climate neutrality by 2050. These targets are supported by a comprehensive legislative package covering key sectors, with carbon pricing and the Emissions Trading System (ETS) as its cornerstone. The revised legislation needed for the implementation of the EU's 2040 target is currently being negotiated. The EU's domestic climate targets are also the basis for the EU's joint Nationally Determined Contribution to the Paris Agreement.4 https://climate.ec.europa.eu/areas-action/climate-strategies-targets_en

In addition to the EU targets, **Finland aims to achieve carbon neutrality in 2035**, one of the most ambitious targets in the world. Both the EU and national targets are enshrined in our Climate Act that originates from 2015. They are being put into practice by government programmes and strategies that are regularly updated: the Energy and Climate Strategy, the Medium-term Climate Policy Plan, and the Climate Plan for the Land Use Sector.5

The Finnish Climate Change Panel was established formally in 2015 to bring science closer to policymaking, and it compiles scientific knowledge and provides recommendations to the government to support climate policy planning and implementation. The Panel assesses policy progress on reaching Finland's climate targets and advices on potential policies and measures to close the gap.

Major changes in Finland's energy supply in recent years

Finland does not have domestic fossil fuel resources, and all supplies of crude oil, natural gas and coal are imported. The energy intensity of the economy and energy consumption per capita are both very high due to the country's relatively large **heavy industry sector, long distances,** and the **high heating demand due to its cold climate**.

Finland has seen a notable **shift in the mix of its energy supply during the last 15 years (**Figure 1). In 2025 the largest individual energy source, wood fuels, accounted for 28%, nuclear energy 27% and fossil oil 18% as sources for the total energy consumption. The main domestic energy sources currently are wood-based fuels, hydropower, wind power, solar power, waste, peat, and heat pumps.

From 2010 to 2025, the share in total energy consumption declined for all fossil fuels: fossil oil (24% to 18%), natural gas (10% to 3%), and coal (13% to 4%). The share of peat in total energy consumption also declined substantially, from 7% to 1%.

4 https://climate.ec.europa.eu/areas-action/climate-strategies-targets_en
5 https://ym.fi/en/climate-change-legislation

Until the 1960s, Finland's energy supply relied on electricity produced by hydropower stations and the extensive use of wood. After this, the use of fossil fuels began to increase. The rapid increase in fossil fuel use levelled off after the energy crises in the 1970s and with the advent of nuclear power. In 2010, the total consumption of fossil fuels was 192 TWh, equaling 47% of all energy consumption. In 2025, fossil fuels covered only 26% of Finland's total energy consumption, absolute amounts being 91 TWh.

Clear, predictable and stable legislative frameworks are crucial for the transition

Finland is a global leader in decarbonizing the electricity supply, with currently **over 96% of its power generated from non-fossil sources.** In district heating, the share of non-fossils is 87% and still rising due to ongoing investments in waste heat recovery and electric boilers. Through major investments in fossil-free technologies, Finland aims to be nearly emissions free in electricity and district heating by the 2030s.

Finland's economy is rapidly electrifying thanks to the strategic reduction of greenhouse gas emissions within the energy sector and industrial processes. This involves shifting industry, transport and heating systems away from fossil fuels towards clean, electricity-based alternatives such as electric boilers and motors, heat pumps, and electricity-based industrial processes. Electrification of existing activities, combined with entirely new demand for electricity such as data centers, is expected to significantly increase the need for electricity, potentially even doubling electricity consumption by 2050. This requires investing in new electricity generation capacity and grids, encouraging flexible consumption and storage technologies, developing hydrogen infrastructure, and not least well-functioning energy markets.

Credible climate targets and predictable climate and energy policy are important for taking electrification forward, as they create stable conditions and investment certainty for

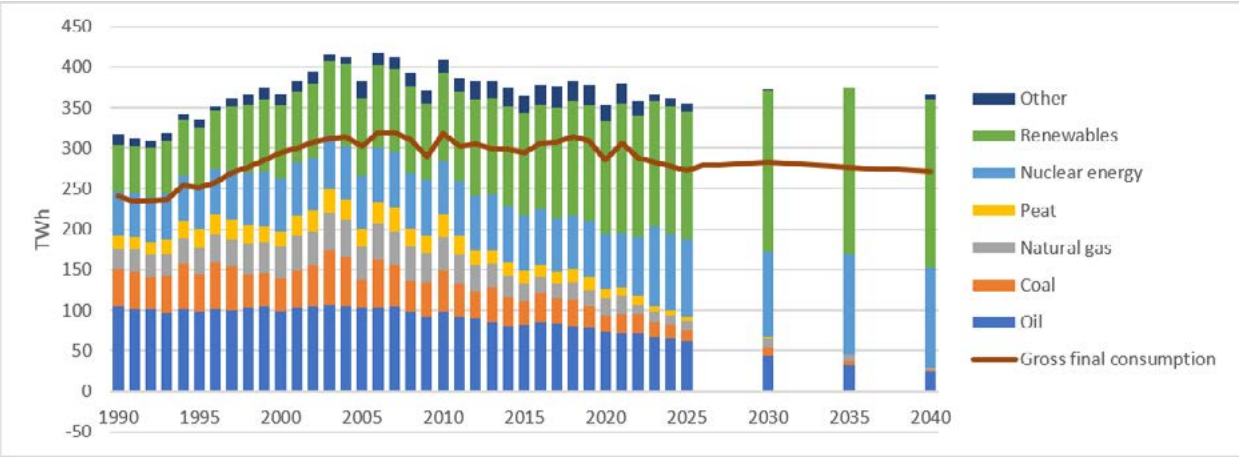


Figure 1. Historical development (1990 to 2025) and With Measures -projection (until 2040) of the primary energy supply by energy source and gross final energy consumption (solid line), TWh.

companies. This enables the implementation of emission reduction measures, as well as the development of new solutions, which society needs to achieve the targets and maintain economic competitiveness. However, recently **uncertainty has increased**, especially because of the aggressive war initiated by Russia and the current situation in the Strait of Hormuz, which have contributed to slowing down investment decisions needed for the energy transition, for example in the field of the hydrogen economy. However, Finland's electricity price levels continue to remain amongst the lowest in the European Union. In addition, the resulting energy market disruptions underline the necessity of reducing dependence on imported fossil energy, the importance of security of supply, and the added value of domestic energy production.

A major step for Finland towards a more self-sufficient and fossil-free energy system was our 2019 legislation **to ban the use of hard coal in energy production**.[6] While the deadline set in law was 2029, it was met already last year.[7] To accelerate the coal phase-out, a special incentive package to support replacement investments was introduced for those energy utilities that undertook the phase-out of coal already by 2025.[8] Nowadays, coal has been virtually phased out.

While this paper describes fossil fuel phase-out in Finland, it should be noted that there are major uncertainties in the greenhouse gas inventory in the land use sector as well as challenges in meeting EU targets in this area.

Carbon pricing

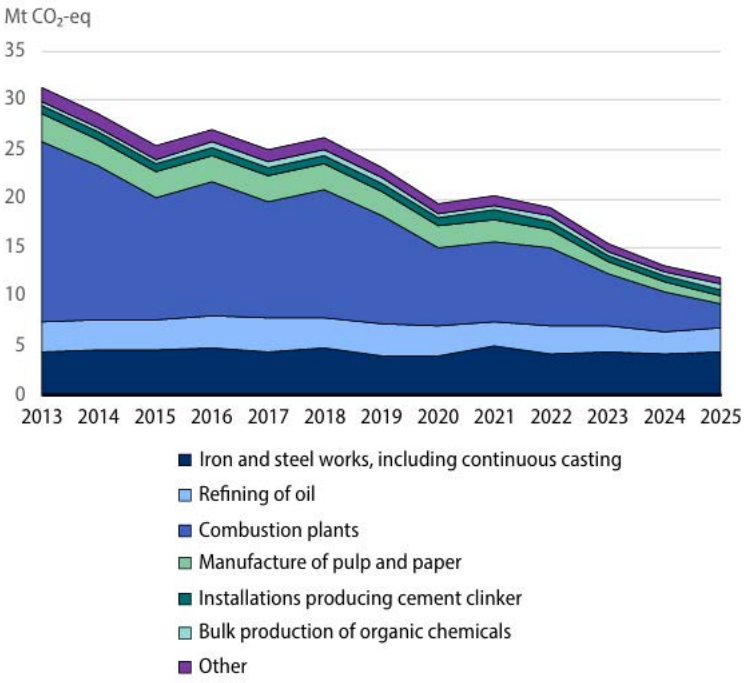
Carbon pricing is the main driver for decarbonization and the transition away from fossil fuels in the European Union and in Finland. **The EU's Emissions Trading System (ETS)** is the main instrument in pricing carbon and creates the incentive for industry to decarbonize. Strong carbon pricing instruments provide predictability and a uniform price signal to invest away from fossil fuels. Emissions in the EU ETS sector have fallen sharply over the years. For example, verified emissions from the Finnish installations under the EU ETS were 11.9 million tons in 2025 and reported emissions fell by 10.5 % from the previous year. (Figure 2) Revenues from carbon pricing also offer new public income and thus a possibility for investing in decarbonization efforts as well as supporting the just transition especially for vulnerable groups.

In addition to the main ETS legislation which covers power and heat generation, energy-intensive industry as well as aviation and maritime transport, a separate EU wide carbon pricing system will apply to fuel combustion in road transport and buildings and small-emitting sectors (ETS2) with a 42 per cent emission reduction target by 2030 compared to 2005 across the sectors covered. The new ETS2 is an upstream system where the entity

6 https://valtioneuvosto.fi/en/-/1410877/kivihiilen-energiakayton-vuonna-2029-kieltava-laki-voimaan-huhtikuun-alussa
7 https://valtioneuvosto.fi/en/-/1410877/energy-use-of-coal-to-end-in-finland-during-spring
8 https://valtioneuvosto.fi/en/-/1410877/investment-incentives-to-promote-rapid-phase-out-of-coal-in-energy-production

that releases fossil fuels for consumption must hold an emission permit and surrender the allowances covering the CO_2 emissions from the amount of fuel released yearly from 2028 onwards. The emission allowances are auctioned. For the final consumer of fossil fuel, the ETS2 system will mean higher fuel prices.

Figure 2. Development of emissions in the EU ETS sector by industry from 2013 to 2025. Source: Energy Authority.



Energy taxation is a key instrument in Finland's climate and energy policy. Energy taxes are levied on electricity, coal, natural gas, peat, tall oil and liquid fuels. The energy taxation of fuels is based on the energy content, life cycle carbon dioxide emissions and local emissions of fuels. The CO_2 component is based on the lifetime CO_2 emissions of the fuel in question, and biofuels are subject to a reduction ranging from partial relief to a full exemption depending on the fuel category provided that they meet the European Union's sustainability criteria, which encourages substitution of fossil fuels. [9]

The electricity tax is divided into two categories, of which the lower (category II) is applied to industry and heat pumps in district heat production. This has proved to be one important measure driving low-carbon technology investments in the manufacturing industry and district heating.

Technology neutrality as a key principle

Finland advocates a technology-neutral approach to energy and climate policy including nuclear power as part of the energy mix. **Market-based mechanisms, cost-efficiency and technology neutrality are key principles in the fossil fuel phase-out at all levels and forums.**

Due to technological advancements, high EU ETS prices and high energy taxes for fossil fuels, new investments particularly in renewables are nowadays, in most cases, more competitive than investments in new fossil fuel plants. For example, the majority of all new electricity generation capacity is currently wind power, which is being built in Finland without state aid. Therefore, Finland has been able to phase out operating aid schemes and is not

9 https://www.vero.fi/en/businesses-and-corporations/taxes-and-charges/excise-taxation/sahkovero/Tax-rates-on-electricity-and-certain-fuels/

planning for new state aid auctions or other operating aid schemes for wind power.

Nuclear energy has a central role in transition away from fossil fuels in Finland. Finland is also a pioneer in nuclear waste management

Nuclear energy plays a central role in reducing Finland's dependence on fossil fuels.

Approximately 40% (39% in 2024) of the electricity produced in Finland comes from nuclear energy. The inherent risks in the use of nuclear energy require comprehensive and intensive regulation and supervision. The aim is to ensure that the use of nuclear power is safe for people and the environment, and that nuclear waste is managed and disposed of appropriately. International supervision also ensures the peaceful use of nuclear energy and prevents the possibility of manufacturing nuclear weapons. Supervision is based on nuclear energy legislation and its underlying principle of ensuring that the use of nuclear energy is safe and in line with the overall benefit of society.

At present, there are five nuclear reactors in Finland: two in the nuclear power plant in Loviisa and three in the Olkiluoto plant. The fifth reactor (Olkiluoto 3) was taken into use in 2023. The research reactor FiR 1 in Otaniemi, Espoo, owned by VTT Technical Research Centre of Finland, was the first nuclear reactor in Finland. It was decommissioned in 2015.

Finland is also a global leader in nuclear waste management and disposal. Already since the 1990s, plant sites have taken care of the low and intermediate level waste from their operations as well as the final disposal of waste. The final disposal facilities are deep in the bedrock and with structures that ensure long-term safety.

Spent fuel (i.e. high-level radioactive nuclear waste) is stored temporarily on plant sites. The safety of the final disposal of spent fuel is ensured by depositing it into the bedrock sufficiently deep and with sufficient structures. On 22 October 2026, the Finnish Government granted Posiva Oy a licence to operate an encapsulation plant and final disposal facility for spent nuclear fuel in Olkiluoto, Eurajoki until the end of 2070. This is the first final disposal facility for spent nuclear fuel in the world to receive an operating licence.[10]

In addition, Finland seeks a new role for nuclear energy, especially SMRs (small modular reactors), and for production of district heating and process heat.

New technology needs a hand

Finland has policy measures for the commercialization of new technology. One measure driving low-carbon technology investments in the manufacturing industry is funding new technology investments. Renewable energy and energy efficiency investments are promoted through the Energy Aid Scheme which also is an investment subsidy. The objective is that the aid for a given technology will be phased out as technology develops, the costs decrease,

10 https://valtioneuvosto.fi/en/-/1410877/government-grants-operating-licence-for-posiva-s-spent-nuclear-fuel-encapsulation-and-final-disposal-facility

and competitiveness improves.[11]

Phasing out fossil fuels in transport

Fossil fuels are the most common fuels used in the transport sector in Finland and consist of fossil petrol, diesel, light and heavy fuel oil and aviation kerosene. Fossil fuels in road transport, i.e. petrol and diesel, are gradually being replaced with renewable alternatives in Finland since 2008 when Finland adopted the Act on the distribution obligation. According to the Act, the distributor of fuels must supply a certain minimum share of renewable fuels for consumption. In 2026, this share will be 19.5% and in 2030 34%. In its current form, the Act applies to both liquid and gaseous fuels and publicly distributed transport electricity.[12]

In addition to the use of renewable fuels, the electrification of transport will also reduce the consumption of fossil fuels in road transport. The pace of electrification of passenger car traffic in Finland is now fairly good. The share of electric cars in new cars was around 57 per cent in 2025 (approx. 37% of fully electric cars, approx. 20% of rechargeable hybrids). At the end of 2025, electric cars accounted for about 13% of all passenger cars used in traffic in Finland. In heavy vehicles, the share of electric vehicles is still small. The share of electric lorries in new lorries was approx. 3% and that of buses was approx. 35%. Electric lorries accounted for about 0.3% of all lorries in traffic use and electric buses for about 10%.

In addition to electric vehicles, some methane-powered vehicles are in use in Finland. Methane has become more common as a power source, especially in lorries. All methane used in road transport in Finland is currently biomethane. There are hardly any hydrogen-powered vehicles in use in Finland.

The use of fossil petrol in road transport has decreased by around 39% from 2005 to 2025, while the use of fossil diesel has decreased by around 19%. In 2025, some 20% of all energy consumption in transport was covered by different alternative fuels. Ethanol, renewable diesel and other liquid biofuels accounted for 16% of total energy consumption in transport. Biomethane accounted for 1% and electricity for 3%.

As a Member State of the European Union, Finland has EU-level objectives and measures to reduce transport emissions. At the EU level, the key measures to promote fossil-free road transport have CO_2 emission performance standards for vehicle manufacturers, which have a strong impact on the availability and price of electric vehicles. The CO_2 standard for new passenger cars and vans will be tightened by 2035 so that emissions must be reduced by about 90% (as proposed by the Commission in December 2025). In heavy-duty vehicles, the aim is to also achieve a 90% reduction in the emissions of new cars by 2040. The reduction in emissions from new buses in urban transport will be 100% already in 2035.

In addition to the Act on the distribution obligation, measures implemented at the national level have included various procurement and distribution infrastructure subsidies for electric, methane and hydrogen powered vehicles. The use of electric cars has also been promoted

11 https://tem.fi/en/energy-aid
12 https://energiavirasto.fi/en/sustainability-criteria

through tax measures. The basic vehicle tax paid annually on passenger cars and vans and the tax paid in connection with the purchase of a car are staggered according to the CO2 emissions of the vehicle. The tax on the purchase of fully electric cars was abolished in 2021, and a person choosing a company car with zero emissions will receive a significant tax advantage.[13] Electricity has a lower taxation in Finland than petrol or diesel, and as a rule it is fairly inexpensive compared to other EU countries. In Finland, the taxation of transport fuels also includes a CO_2 tax component.

The price of different fuels and the competitiveness of fossil fuels will also be affected by the emissions trading of EU fuel distributors (ETSI 2). If emissions trading is carried out in accordance with current legislation, emission allowances for fossil fuels will end in the 2040s.

The transition away from the use of fossil fuels in road transport has several challenges. These include, inter alia, the effect on lower-income households of rising fuel prices resulting from the emissions trading system for fuel distributors and the progressively increasing fuel distribution obligation, as well as the currently limited availability of second-hand electric vehicles. Low-income households that are unable to afford investing in a new vehicle may face significant difficulties in transitioning away from fossil fuels. In the freight transport sector, small businesses may likewise encounter considerable challenges as fuel prices increase, given that electric vehicles remain more expensive to purchase up front and smaller businesses may lack the financial capacity to invest in them. Regarding heavy-duty vehicles, the insufficient availability of charging infrastructure often constitutes an additional barrier to the uptake of electric mobility.

In the maritime and aviation sectors, the transition away from fossil fuels is being promoted through measures adopted at both the EU and international levels.

Cross-administrative approach to energy and climate policy

In the coordination of energy and climate policy, Finland has opted for a cross-administrative approach. Government's Energy and Climate Policy Network has convened successfully since 2003 and assists in the coordination of energy and climate policy preparation between administrative sectors at the civil servant level. All ministries central to energy and climate policy are involved in the network's operations, which are led by the Energy Department of the Ministry of Economic Affairs and Employment based on the Government's decision-in-principle on the organization of climate policy authority activities in state administration.

Basic and fundamental rights in Finnish climate and energy policy

In Finland, the preparation of climate and energy policy is grounded in fundamental and human rights. These rights are legally binding and must be considered by public authorities and provide the framework within which all policy measures must be designed. Climate policy is therefore developed with consideration for individual rights, equality, public health,

13 https://traficom.fi/en/drivers-and-vehicles/vehicle-taxation/vehicle-tax-amount

gender equality, sustainable development, and the interests of different groups in society, including future generations. The government has a positive obligation not only to respect but also to actively promote these rights in policymaking.

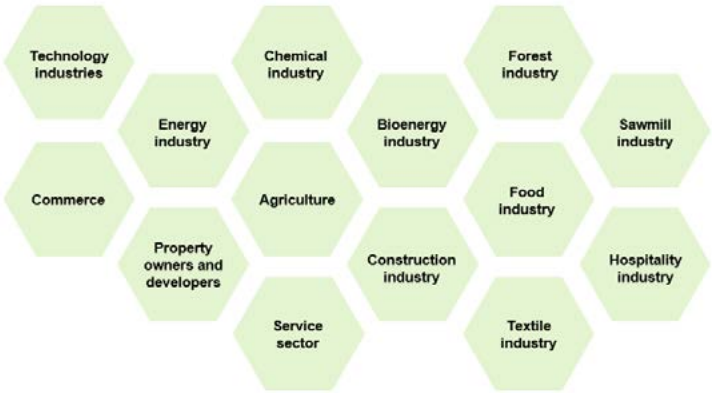
Particular attention is paid to the rights of the Sámi, the Indigenous People of Finland. The Constitution guarantees the Sámi the right to maintain and develop their language, culture, and traditional livelihoods. For example, during the preparation of Finland's energy and climate strategy, efforts have been made to ensure that proposed policy measures do not undermine these rights or the continuity of traditional Sámi livelihoods. The Sámi Parliament has been consulted, and participation rights have been safeguarded through statutory consultation procedures.

Finland's climate policy also considers the principles of a just transition. This includes assessing how the benefits and burdens of climate mitigation and adaptation measures are distributed across different population groups, regions, and generations, and ensuring opportunities for participation in decision-making. While climate and energy policies cannot resolve all existing inequalities, they are expected to promote fairness and avoid creating or deepening injustices.

Voluntary measures – stakeholders taking action

Voluntary Energy Efficiency Agreements [14] have played a central role since 1997 in increasing energy efficiency in Finnish society and in implementing the EU's energy efficiency obligations. The Agreements cover industries, private services, and municipalities as well as oil-heated buildings. In total this covers over 60 per cent of the energy consumption in Finland.

One important decarbonization tool that has also gained a lot of interest internationally are the **sectoral low-carbon roadmaps.**[15] They have been drawn up by industries and organizations to provide a sector-based approach on how to contribute to the national carbon neutrality target in 2035.[16] They include a comprehensive description of the current situation, an evaluation of emissions reducing technologies and measures, and an estimate of achievable reductions. Road maps were prepared for the following 14 sectors:



Having separate roadmaps for each sector helps to ensure that businesses consider them relevant

14 https://energiatehokkuussopimukset.fi/en/
15 https://julkaisut.valtioneuvosto.fi/items/d663f6e3-32e2-4b97-bec5-694f7d9486c1
16 https://tem.fi/en/low-carbon-roadmaps-2035

and easy to commit to. The low-carbon roadmaps provide the government estimates of anticipated sectoral developments and thus support policy preparation. These may include greenhouse gas emissions and energy consumption projections, as well as timelines for the deployment of new technologies. These estimates are utilized in the preparation of national strategies and policies. The Ministry of Economic Affairs and Employment coordinates the work and recently (2024) an update of the roadmaps by the sectors was carried out . An essential aspect of the process is that sectors retain ownership of their roadmaps to ensure that the results are effectively implemented.

Participation in international initiatives and international cooperation

Finland has actively been supporting the transition away from fossil fuels in the EU and international fora as well as international cooperation in this field. Finland has long been a member of several international initiatives advancing the transition, notably Powering Past Coal Alliance (PCCA), Beyond Oil and Gas Alliance (BOGA, with a Friend status), Global Methane Initiative and the Coalition of Phasing Out Fossil Fuel Subsidies (COFFIS) as well as Climate Club which is an intergovernmental forum for exchange on industry decarbonization. Finland has also been participating in various international initiatives supporting the development of global carbon markets.

Finland supports developing countries in their efforts to transition away from fossil fuels with international climate finance through multiple channels. Multilateral development banks and vertical funds such as the Green Climate Fund play a crucial role in ensuring this transformative shift. However, it is crucial to ensure that public finance mainly serves to leverage much larger financing flows from the private sector.

In addition, initiatives such as the Clean Energy Ministerial are important platforms to advance clean energy at a global level.[17]

As member of regional development banks and funds, including the African development fund and Asian development fund and the EIB, Finland contributes to climate action globally, particularly in Africa as the MDBs' climate finance reporting demonstrates.

In addition to core financing for multilateral development banks and vertical funds, the Ministry for Foreign Affairs of Finland has invested over 240 million euros in multilateral and bilateral blended climate funds managed by MDBs. These funds finance projects that support the transition to a low-carbon economy such as the production of renewable energy, battery energy storage systems, and the electrification of transport. All of these funds use blended finance to attract private financing to these projects.

17 https://www.cleanenergyministerial.org/

Annex: Finnish solutions

In addition to national efforts, Finnish innovations continue to provide positive climate solutions and thus help reduce the emissions at global level. Finnish companies excel in particular clean energy, electrification and energy efficiency as well as resiliency in both energy generation and transmission. Some examples include the following:

Cactos Oy – a vertically integrated energy company built on battery storage

Cactos is a Finnish energy company that designs, manufactures and operates battery energy storage systems (BESS). The company covers the whole value chain: its own LFP battery hardware made in Finland, the proprietary Spine energy management platform, and trading of the batteries' capacity in electricity and grid balancing markets. Cactos operates its batteries as fleets that work as virtual power plants. These provide flexibility and stability to the grid, support the integration of variable renewable electricity, and help electrify applications that previously ran on oil and gas. Cactos operates in Finland, Sweden, Norway, Denmark, Estonia, the Netherlands and Ukraine. Finnvera's Digitalisation and Innovation Loan has supported the company's international growth.

Calefa – Heat Pump Plant Using Ambient Energy

Calefa's versatile, modular AmbiHeat® heat pump plant produces energy for district heating networks and industrial needs from different ambient energy sources, with good efficiency and completely without CO2 emissions. The all-inclusive plant in standard sizes from 360 kW up to 30 MW is delivered to the site as a ready-made unit. The heat source can be generated from various resources, such as industrial waste heat, outdoor air, geothermal energy or heat from solar collectors or water bodies.

Coolbrook – Replacing Fossil Fuels with Clean Electricity in Heavy Industry

Finnish technology company Coolbrook is developing electric heating technology designed to replace fossil fuels in some of the world's most energy-intensive industrial processes. Its technology generates extremely high process temperatures using electricity instead of burning coal, natural gas, oil or other fossil fuels.

A key application is in industries such as steel, cement, chemicals and petrochemicals, where fossil fuels are traditionally used both as an energy source and as a source of high-temperature heat. By electrifying these processes, Coolbrook aims to eliminate the need for combustion-based heating and enable the use of renewable electricity instead.

SUOMI
FINLAND

Fortum – Transforming District Heating Beyond Fossil Fuels

Fortum is reducing the use of fossil fuels in heat production in the Espoo district heating network through its Espoo Clean Heat programme. Fortum has phased out coal and is transitioning to electricity-based solutions, such as waste heat recovery, large-scale heat pumps, electric boilers, and heat storage. In 2025, already 83 % of the production was based on non-fossil energy sources. A key part of the transition will be the utilization of waste heat from Microsoft's data centres in Espoo and Kirkkonummi, starting in 2027. Once fully operational, recovered waste heat is expected to cover around 40 % of annual district heating demand in the network serving approximately 250,000 residents, businesses and public buildings.

Helen – Ending the Coal Era in Helsinki

Helen has transformed Helsinki's heating system by phasing out coal and replacing it with a diversified portfolio of cleaner solutions, including large-scale heat pumps, waste and environmental heat recovery, electric boilers, energy storage and sustainably sourced bioenergy. The transformation has been carried out on market terms, with investments driven by competitiveness and energy system flexibility. In April 2025, Helen closed the Salmisaari coal-fired power plant, completing the phase-out of coal in its energy production. By 2025, Helen's direct greenhouse gas emissions had fallen by 84 % from 1990 levels. Helen's transition is increasingly based on electrified heating and waste and environmental heat, supported by mainly wind, nuclear, hydro and solar power. Helen is also advancing plans for small modular reactors (SMRs) as a potential part of its pathway towards entirely combustion-free energy production by 2040.

Kemira – Reducing Fossil Energy Use Through Clean Energy and Renewable Raw Materials

Finnish chemical company Kemira is reducing its reliance on fossil fuels through a combination of renewable energy, energy-efficiency improvements, and increased use of renewable and recycled raw materials. The company has set science-based climate targets and aims to achieve carbon neutrality in its own operations (Scopes 1 and 2) by 2045. A major focus is replacing fossil-based energy with low-carbon and emission-free energy sources. Kemira has invested in renewable energy, energy-efficiency programs, heat and process improvements, and new technologies to reduce energy consumption across its manufacturing sites. In 2025, 78% of the company's energy use came from low-carbon or emission-free sources.

The company is also reducing the use of fossil-based raw materials by building a leading portfolio of renewable solutions. In 2025, 55% of Kemira's raw materials were renewable or recycled, helping reduce dependence on virgin fossil-based feedstocks. Kemira's products also help customers reduce resource consumption in water treatment, paper production and industrial processes by improving water efficiency, recycling, and resource productivity.

SUOMI
FINLAND

Kempower – Accelerating the electric mobility transition

Kempower helps reduce transport emissions by manufacturing DC fast-charging solutions for electric vehicles. The company's business model is built around accelerating the adoption of electric mobility by providing reliable and scalable DC fast charging infrastructure for passenger cars, commercial vehicles, buses and off-highway equipment. By expanding charging networks, Kempower enables the replacement of internal combustion engine vehicles with electric vehicles. In its own operations, Kempower is pursuing carbon neutrality by 2035, increasing the use of fossil-free electricity, reducing operational emissions and designing highly recyclable DC charging technology.

KONE – Reducing Emissions Through Energy-Efficient Building Solutions

KONE reduces emissions both in its own operations and through the energy-efficient elevators, escalators and digital building solutions it provides. The company was the first in its industry to set science-based climate targets and has committed to reducing emissions from its own operations by 50% and emissions from product materials and lifetime energy use by 40% per product ordered by 2030, compared with a 2018 baseline. A major contribution comes from product energy efficiency. KONE's solutions include energy-efficient motors, regenerative drive systems that recover braking energy, smart standby modes and lightweight technologies such as KONE Eco-Rope®, which reduce electricity consumption over the lifetime of elevators. Many of its elevator and escalator models achieve the highest energy-efficiency ratings in the industry.

The company has also reduced emissions from its own operations by switching to renewable electricity, improving energy efficiency, reducing emissions in logistics and manufacturing, and working with suppliers to lower material-related emissions. In 2023, KONE became the first company in its industry to achieve carbon-neutral manufacturing at all of its ten production units globally.

Merus Power – Enabling More Renewable Energy in the Power Grid

Merus Power helps reduce emissions by enabling the integration of renewable energy into electricity systems. The company develops battery energy storage systems, power conversion systems, and grid stability solutions that make it easier to connect wind and solar power to the grid while maintaining reliable electricity supply. Merus Power's battery storage systems help balance electricity production and consumption, allowing larger shares of intermittent renewable energy to replace fossil fuel-based power generation. The company's grid-forming energy storage technology also strengthens grid stability and supports further growth of renewable electricity. In industry, Merus Power's power quality solutions improve energy efficiency, reduce electricity losses, and support the electrification of industrial processes. The company also provides solutions for hydrogen production facilities and EV charging infrastructure, which are important enablers of the clean energy transition.

SUOMI
FINLAND

Mäkelä Alu – Low-Carbon Aluminium Through Recycling and Electrification

Finnish company Mäkelä Alu has reduced the use of fossil-intensive raw materials by increasing the use of recycled aluminium in its aluminium profile production. Through its AluPlanet® product family, the company manufactures low-carbon aluminium profiles from recycled aluminium sourced from its own production scrap as well as aluminium returned by customers and downstream processing companies. The recycled material is remelted and reused in new products, supporting a circular economy. A key advantage of recycled aluminium is that it has a substantially lower carbon footprint than primary aluminium. The company has also reduced emissions in its own production by improving energy efficiency and replacing LPG with emission-free energy sources. Carbon dioxide emissions per tonne of aluminium produced have fallen by 51 % since 2005, and it has achieved carbon neutrality in its own production and internal logistics through emission reductions and the offsetting of remaining emissions.

Neste – Turning Waste into Renewable Fuels

Neste has transformed itself from a traditional oil refiner into a global leader in renewable fuels. The company produces renewable diesel and sustainable aviation fuel from waste and residue-based raw materials, helping to replace fossil fuels in road transport, aviation, and other hard-to-abate sectors. Neste's renewable fuels can be used with existing engines and infrastructure, enabling emissions reductions without major investments in new equipment. By converting waste and residues into high-quality fuels, Neste reduces the demand for crude oil and helps accelerate the transition away from fossil energy sources in Finland and globally. In Finland, biofuels have been a major driver in reducing fossil fuel use and emissions in the transport sector, achieving approximately 10–15% emission reductions in the transport sector.

Outokumpu – Accelerating the Transition Through Circular Stainless Steel

Outokumpu is helping reduce dependence on virgin raw materials by producing stainless steel with approximately 95% recycled content. By maximizing the use of scrap, the company has achieved 75% lower carbon footprint than industry average. As part of its science-based climate target aligned with 1.5 degrees, Outokumpu is developing bio-based alternatives to fossil carbon sources in ferrochrome production and exploring low-carbon energy solutions across its operations. Through circular production and continuous innovation, Outokumpu

is reducing the carbon footprint of stainless steel while supporting the transition to a more resource-efficient and fossil-free economy.

Valmet – Technologies That Replace Fossil Fuels with Biomass and Circular Raw Materials

Valmet helps reduce the use of fossil fuels primarily through the technologies it supplies to the energy, pulp, paper and process industries. Its solutions enable customers to replace coal, oil and natural gas with biomass, waste-based fuels, and other renewable feedstocks. A key area is biomass-based energy production. Valmet provides boilers, gasifiers and power plant solutions that can utilize wood residues, forestry by-products, and other biofuels instead of fossil fuels. Its gasification technologies enable large-scale replacement of fossil fuels with biomass while reducing CO_2 emissions. Valmet enables its customers to reduce fossil fuel consumption by switching to renewable fuels, improving energy efficiency, and producing renewable fuels and chemicals from biomass and waste streams. Many of the world's largest biomass power plants operate using Valmet technologies.

Valmet also develops technologies for producing renewable transport fuels and biochemicals from forest residues, sawdust and other lignocellulosic biomass. Its technology converts biomass into bio-oils that can be refined into renewable diesel, aviation fuels, and chemicals, replacing fossil raw materials. In addition, the company invests heavily in technologies that improve resource efficiency, increase the use of renewable and recyclable raw materials, and reduce energy consumption in industrial production.

WE Tech Solutions – reducing fuel consumption in shipping

WE Tech Solutions improves the energy efficiency of ships through permanent-magnet and variable-speed drive technology. Its shaft-generator solution produces electricity while the vessel is at sea, allowing auxiliary engines to be switched off and reducing fuel consumption. The company's stated vision is to reduce oil consumption in global shipping by one third.

Wärtsilä – Enabling the Transition Away from Fossil Fuels in Shipping and Energy

Finnish technology company Wärtsilä helps reduce the use of fossil fuels by developing technologies that enable shipping and power systems to operate with low-carbon and renewable fuels. Its engines are designed to be fuel-flexible and can run on fuels such as LNG, bio-LNG, methanol, ammonia and, in the future, other sustainable fuels.

In the maritime sector, Wärtsilä supports decarbonization through energy-efficiency technologies, hybrid and electric propulsion systems, digital optimization tools, and emissions-reduction solutions. These technologies help ship operators reduce fuel consumption and transition away from conventional fossil bunker fuels. In the energy sector, Wärtsilä provides energy storage systems, flexible power plants, and optimization software that enable higher shares of variable renewable electricity such as wind and solar power

in electricity systems. This reduces reliance on coal- and gas-fired power generation. The company invests heavily in research and development at its Sustainable Technology Hub in Vaasa, where it develops engines and technologies compatible with future sustainable fuels and supports the shipping industry’s pathway to net-zero emissions.