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**FINLAND'S FIFTH PROGRESS REPORT UNDER
ARTICLE 22 OF DIRECTIVE 2009/28/EC**

24 January 2020

1. Sectoral and overall shares and actual consumption of energy from renewable sources in the preceding two years (n-1 and n-2, e.g. 2010 and 2009) (Article 22(1)(a) of Directive 2009/28/EC).

Table 1: The sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources¹

	2017	2018
RES-H&C ² (%)	54.6	54.6
RES-E ³ (%)	35.2	36.7
RES-T ⁴ (%)	18.8	14.7
Overall RES share ⁵ (%)	40.9	41.1
<i>Of which from cooperation mechanism⁶ (%)</i>	0	0
<i>Surplus for cooperation mechanism⁷ (%)</i>	0	0

Table 1a: Calculation table for the renewable energy contribution of each sector to final energy consumption (ktoe)⁸

	2017	2018
(A) Gross final consumption of RES for heating and cooling	7767	7904
(B) Gross final consumption of electricity from RES ⁹	2641	2827
(C) Gross final consumption of energy from RES in transport	412	390
(D) Gross total RES consumption ¹⁰	10 821	11 122
(E) Transfer of RES to other Member States	0	0
(F) Transfer of RES from other Member States and third countries	0	0
(G) RES consumption adjusted for target (D)-(E)+(F)	10 821	11 122

¹ Facilitates comparison with Table 3 and Table 4a of the NREAPs.

² Share of renewable energy in heating and cooling: gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5(1)(b) and 5(4) of Directive 2009/28/EC) divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of NREAPs applies.

³ Share of renewable energy in electricity: gross final consumption of energy from renewable sources for electricity (as defined in Articles 5(1)(a) and 5(3) of Directive 2009/28/EC) divided by total gross final consumption of electricity. The same methodology as in Table 3 of NREAPs applies.

⁴ Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Articles 5(1)(c) and 5(5) of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol, 2) diesel, 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of NREAPs applies.

⁵ Share of renewable energy in gross final energy consumption. The same methodology as in Table 3 of NREAPs applies.

⁶ In percentage point of overall RES share.

⁷ In percentage point of overall RES share.

⁸ Facilitates comparison with Table 4a of the NREAPs.

⁹ Electricity produced for the transport sector is included in C (Gross final consumption of energy from RES in transport).

¹⁰ According to Article 5(1) of Directive 2009/28/EC, gas, electricity and hydrogen from renewable energy sources shall only be considered once. No double counting is allowed.

Table 1b: Total actual contribution (installed capacity, gross electricity generation) from each renewable energy technology in [Member State] to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity¹¹

	2017		2018	
	MW	GWh	MW	GWh
Hydro ¹² :	3272	14 516	3286	14 759
non-pumped ¹³	3272	14 516	3286	14 759
< 1 MW	40	171	40	173
1 MW - 10 MW	258	939	258	951
> 10 MW	2974	13 434	2988	13 663
pumped	0	0	0	0
mixed ¹⁴	0	0	0	0
Geothermal	0	0	0	0
Solar:	82	48	140	90
photovoltaic	82	48	140	90
concentrated solar power	0	0	0	0
Tide, wave, ocean	0	0	0	0
Wind ¹⁵ (normalised)	2044	4543	2041	5397
onshore (not normalised)	1971	4693	1968	5601
offshore (not normalised)	73	102	73	237
Biomass ¹⁶ :	1966	11 311	1966	12 258
solid biomass	1966	10 890	1966	11 821
biogas	0	421	0	436
bioliquids	0	0	0	0
TOTAL	7364	30 419	7433	32 504
of which in CHP	1966	10 154	1966	10 583

Table 1c: Total actual contribution (final energy consumption¹⁷) from each renewable energy technology in [Member State] to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling (ktoe)¹⁸

¹¹ Facilitates comparison with Table 10a of the NREAPs.

¹² Normalised in accordance with Directive 2009/28/EC and Eurostat methodology.

¹³ Hydropower production has not been reported by capacity in the SHARES tool since 2017.

¹⁴ In accordance with new Eurostat methodology.

¹⁵ Wind power is reported as in the SHARES tool (the onshore and offshore subcategories are not normalised).

¹⁶ Take into account only those complying with applicable sustainability criteria, cf. Article 5(1) of Directive 2009/28/EC last subparagraph.

¹⁷ Direct use and district heat as defined in Article 5(4) of Directive 2009/28/EC.

¹⁸ Facilitates comparison with Table 11 of the NREAPs.

	2017	2018
Geothermal (excluding low temperature geothermal heat in heat pump applications)	0	0
Solar	2	2
Biomass ¹⁹ :	7109	7222
<i>solid biomass</i>	7012	7115
<i>biogas</i>	96	107
<i>bioliquids</i>	0	0
Renewable energy from heat pumps:	439	463
- of which aerothermal	273	288
- of which geothermal	165	175
- of which hydrothermal	0	0
TOTAL	7550	7688
<i>Of which DH²⁰</i>	1102	1092
<i>Of which biomass in households²¹</i>	1273	1251

Table 1d: Total actual contribution from each renewable energy technology in [Member State] to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector (ktoe)^{22,23}

	2017	2018
Bioethanol/bio-ETBE	81	84
<i>Of which biofuels²⁴ (Article 21(2))</i>	n/a	n/a
<i>Of which imported²⁵</i>	n/a	n/a
Biodiesel	310	281
<i>Of which biofuels²⁶ (Article 21(2))</i>	n/a	n/a
<i>Of which imported²⁷</i>	n/a	n/a
Hydrogen from renewables	0	0
Renewable electricity	21.6	23.9
<i>Of which road transport</i>	0.6	1.3
<i>Of which non-road transport</i>	21	23
Others (as biogas, vegetable oils, etc.) – please specify	Biogas 2.6	Biogas 4.7
<i>Of which biofuels²⁸ (Article 21(2))</i>	n/a	n/a
TOTAL	415	394

¹⁹ Take into account only those complying with applicable sustainability criteria, cf. Article 5(1) of Directive 2009/28/EC last subparagraph.

²⁰ District heating and / or cooling from total renewable heating and cooling consumption (RES-DH).

²¹ From the total renewable heating and cooling consumption.

²² For biofuels take into account only those compliant with the sustainability criteria, cf. Article 5(1) of Directive 2009/28/EC last subparagraph.

²³ Facilitates comparison with Table 12 of the NREAPs.

²⁴ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

²⁵ From the whole amount of bioethanol/bio-ETBE.

²⁶ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

²⁷ From the whole amount of biodiesel.

²⁸ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

2. Measures taken in the preceding two years and/or planned at national level to promote growth of energy from renewable sources taking into account the indicative trajectory for achieving the national RES targets as outlined in your National Renewable Energy Action Plan. (Article 22(1)(a) of Directive 2009/28/EC)

Table 2: Overview of all policies and measures

Name and reference of the measure	Type of measure*	Expected result**	Targeted group and/or activity***	Existing or planned****	Start and end dates of the measure
Must-carry status for biofuels (Act on the Promotion of Biofuels in Transport; 446/2007)	Regulatory	Share of biofuels corresponding to the requirement	Use of biofuels in transport	Existing	Legislative amendment 1420/2010 effective as of 1 January 2011; legislative amendment 394/2013 effective as of 1 July 2013; legislative amendment 387/2017 effective as of 3 July 2017
Sustainability criteria for biofuels and bioliquids (Act on Biofuels and Bioliquids; 393/2013)	Regulatory	Verification of compliance with the sustainability criteria for biofuels and bioliquids	Producers and distributors of biofuels and bioliquids; bio-based fuels and fluids	Existing	Law effective as of 1 July 2013; legislative amendment 388/2017 effective as of 3 July 2017; legislative amendment 171/2017 effective as of 16 March 2018; legislative amendment 952/2018 effective as of 1 January 2019
Act on the Reduction of Life-cycle Greenhouse Gas Emissions from Certain Fuels (170/2018)	Regulatory	Average life-cycle greenhouse gas emissions from fuels per unit of energy cut by at least 6% from the 2010 fossil fuel baseline level by 2020	Fuels supplied for consumption in motor vehicles, heavy machinery, agricultural and forestry tractors, as well as inland waterway vessels and pleasure boats in Finland Fuel suppliers who supply more than one million litres or the equivalent energy content in gaseous fuels for consumption	Existing	Law effective as of 16 March 2018
Support for wind power production (Act on Support for Electricity Production from Renewable Energy Sources; 1396/2010)	Financial	2500 MVA and 6 TWh in 2020	Energy producers; wind power	Existing; not available to new plants	Wind power plants were accepted into the scheme from 25 March 2011 to 1 November 2017. Payments continue until 2030.
Support for biogas production (Act on Support for Electricity Production from Renewable Energy Sources; 1396/2010)	Financial	19 MVA and 0.7 TWh in 2020	Energy producers; electricity from biogas	Existing; not available to new plants	Biogas plants were accepted into the scheme from 25 March 2011 to 1 January 2019.

Support for small-scale CHP production (Act on Support for Electricity Production from Renewable Energy Sources; 1396/2010)	Financial	160–210 MVA and 1–1.5 TWh in 2020	Energy producers; wood fuels	Existing; not available to new plants	Small-scale CHP plants were accepted into the scheme from 25 March 2011 to 1 January 2019.
Support for wood chip production (Act on Support for Electricity Production from Renewable Energy Sources; 1396/2010)	Financial	5.3 TWh in 2020	Energy producers; electricity from wood chips from forestry and CHP heating indirectly from wood chips from forestry	Existing	Scheme effective as of 25 March 2011; legislative amendment 261/2015 effective as of 29 February 2016
Technology-neutral renewable energy tendering (Act on Support for Electricity Production from Renewable Energy Sources; 1396/2010)	Financial	1.4 TWh per year	Energy producers	Existing	Legislative amendment 1396/2010 effective as of 25 June 2018; legislative amendment 1397/2010 effective as of 10 September 2018. Tenders invited from 15 November to 31 December 2018
Support for electric transport infrastructure and the use of biogas in the transport sector from 2018 to 2021 (Government Decree 498/2018)	Financial	An increase in the use of electric vehicles and biogas in road transport by supporting successful tenderers' investments in charging and gas station networks	Local authorities, businesses and other organisations	Existing	Tenders invited from 1 to 31 October 2018 (first round of tendering)
Energy assistance scheme (Government Decree on General Eligibility Criteria for Energy Assistance; 1063/2012)	Financial		Energy producers and consumers; all measures that promote the production and consumption of renewable energy	Existing	Scheme revised as of 1 January 2013
Regional wind power compensation scheme (Act on Wind Power Compensation Areas; 490/2013)	Financial	Harmonisation of territorial surveillance and wind power construction in designated areas	Energy producers; wind power	Existing	Law effective as of 1 July 2013
Guarantee of origin for electricity (Act on Verification and Notification of Origin of Electricity; 1129/2003)	Soft and regulatory		Electricity producers; measures to promote the market access of electricity from renewable energy sources	Existing	Legislative amendment 445/2013 effective as of 1 July 2013
Motiva Oy's advisory and educational services	Soft	A higher degree of energy efficiency and public awareness about renewable energy and heating technologies	Consumers, local authorities, businesses, installers, builders, investors, public administration	Existing	Continuous
Regional energy advice services	Soft	A higher degree of energy efficiency and public awareness about renewable energy and heating technologies	Consumers, local authorities and SMEs	Existing	Advisory services piloted from May 2018 to April 2019; contracts awarded for the period from May 2019 to April 2023 on the basis of tendering
Energy agencies	Soft		Businesses and organisations; energy projects, e.g., to promote the use of renewable energy	Existing	Continuous

Rural Development Programme for Mainland Finland 2014–2020	Financial	1. An increase in know-how, communication, innovation and cooperation in rural areas 2. Mitigation of and adaptation to climate change • Community-based environmental actions, renewable energy • Production and supply of renewable energy, biogas • Solid fuels, such as pellets and biocoal • Wood chipping and drying as well as firewood	Rural microenterprises and SMEs, organisations, residents of rural areas	Existing	2014–2020
Support for agricultural investments (related to the Rural Development Programme for Mainland Finland 2014–2020)	Financial	Improved energy efficiency, investments in renewable energy production	Farms	Existing	2014–2020
Assistance granted on the basis of the Temporary Act on the Financing of Sustainable Forestry (34/2015)	Financial	An increase in economically, ecologically and socially sustainable forest management and exploitation practices	Forest owners	Existing	2015–2020
Regional wood fuel advice services	Soft	An increase in the use of wood fuels among heat entrepreneurs	Businesses, organisations and consumers; advice on forest energy harvesting and utilisation	Existing	Rural Development Programme for Mainland Finland 2014–2020
Reform of the Land Use and Building Act (132/1999)	Regulatory	Incorporation of provisions on the taking of wind power into account in land use planning, including a special procedure to allow for the construction of wind power plants in industrial estates and ports	Wind power construction	Existing	Legislative amendment 989/2013 effective as of 1 January 2014
A new government decree concerning the numerical values of factors for different forms of energy used in buildings issued on the basis of the Land Use and Building Act and a new decree of the Ministry of the Environment concerning the energy efficiency of buildings	Regulatory	An increase in the use of renewable energy sources	Builders and contractors	Completed	2013–2017
Installer certification scheme	Regulatory and soft	Positive experiences resulting from higher-quality installations, leading to an increase in the use of renewable energy; a higher standard of education thanks to certified trainers	Installers as well as consumers, local authorities and businesses that use installers' services	Existing	Scheme launched in 2013; Act on the Certification of Trainers of Certain Renewable Energy System Installers (38/2015)

Reform of the Act on Environmental Impact Assessment Procedure (amendment 252/2017) and the Government Decree on Environmental Impact Assessment Procedure (amendment 277/2017)	Regulatory	Transposition of the new EIA Directive into Finnish law and simplification of the EIA procedure; introduction of, e.g., the possibility of coordinating land use planning and EIA in connection with projects	Projects that require, or might require, an EIA	Completed (new legislation in effect)	2015–2017
Act Amending Annex I to the Act on Environmental Impact Assessment Procedure (126/2019)	Regulatory	Revision of the list of projects to account for technological progress	Projects that require, or might require, an EIA	Completed (new legislation in effect)	2019
Act of Excise Duty on Liquid Fuels (1472/1994)	Financial	An increase in the use of biofuels	Energy producers and end users	Existing	Legislative amendment 1176/2016 (up-to-date excise duty table) effective as of 1 January 2017; legislative amendment 1179/2016 effective as of 1 January 2017; legislative amendment 972/2017 (up-to-date excise duty table) effective as of 1 January 2018; legislative amendment 341/2018 effective as of 1 July 2018; legislative amendment 994/2018 effective as of 1 January 2019; legislative amendment 1225/2018 effective as of 1 January 2019
Sustainable Growth and Jobs 2014–2020 – Finland’s Structural Funds Programme	Financial	New renewable energy and energy efficiency solutions; improvement in the energy performance of SMEs	SMEs, local authorities, research and educational organisations	Existing	2014–2022
Witty City (a Business Finland programme)	Financial; research and development	New, innovative solutions for urban built environments, energy systems and transport	Towns and cities as well as suppliers of new, innovative energy solutions	Completed	2013–2017
New Energy Academy Programme (Academy of Finland)	Research and education	New knowledge and smart energy technologies; methods to resolve complex issues related to the great energy transition	Production of sustainable energy	Existing	2015–2018
Projects funded by the Strategic Research Council (Academy of Finland)	Financial; research and development	Scientific studies of a high standard aimed at finding effective solutions to socially relevant issues, such as the digital transformation of the energy industry	Parties affected by the digital transformation of the energy industry	Existing	Three-year cycles since 2015

VTT Technical Research Centre of Finland's Smart Otaniemi network	Financial; research and development	An innovation ecosystem in which renewable energy solutions are developed as part of a smart energy system	Public- and private-sector operators as well as consumers	Existing	Planned in 2018
Smart Energy Finland (a Business Finland innovation programme)	Financial; research and development	Support for growth-orientated suppliers of renewable energy and smart energy solutions with international growth potential	Businesses, research centres	Existing	2017–2021

* Indicate if the measure is (predominantly) regulatory, financial or soft (i.e. information campaign).

** Is the expected result behavioural change, installed capacity (MW; t/year), energy generated (ktoe)?

*** Who are the targeted persons: investors, end users, public administration, planners, architects, installers, etc.? Or what is the targeted activity/sector: biofuel production, energetic use of animal manure, etc.?

**** Does this measure replace or complement measures contained in Table 5 of the NREAP?

2.a Please describe the progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of renewable energy. (Article 22(1)(e) of Directive 2009/28/EC)

Wind power construction

Procedures relating to wind power construction were simplified in 2012 and 2013 as a working group set up by the Finnish Ministry of Economic Affairs and Employment to promote wind power finished its work. Barriers and restrictions were removed in respect of several government departments. The working group's report described a number of mechanisms that could be used to reduce barriers and restrictions associated with wind power construction and to reconcile activities falling within the mandates of various ministries.

The Finnish Ministry of the Environment published an updated version of its 2012 guideline on planning wind farm construction ('Tuulivoimarakentamisen suunnittelu') in December 2016. The guideline now reflects the latest lessons learned about the effects of wind power construction as well as legislative reforms. The most important objective of the guideline is to promote consistent application of the law on the coordination of wind power construction projects. The guideline is primarily designed for coordinating industrial-scale wind power plant construction projects.

The Finnish Environment Institute completed a project in 2016, which was aimed at formulating a proposal concerning the monitoring of wind power construction and design from the perspective of land use planning.

Finland is preparing to make considerably more extensive use of wind power. The country currently has more than 700 wind turbines, which produce more than 6% of the electricity consumed in Finland. The majority of the turbines are located on the mainland.

The current practice, which is to identify the areas most suited to wind power construction on the basis of functional and needs-based land use plans, has proven effective in preventing the harmful impacts of wind power plants on the environment and people. The issue of wind power has been raised in all regional councils in the last 10 years. Regional land use plans now identify areas suitable for constructing wind power plants. The plans do not specify the number of plants, but most of the areas are large enough to accommodate at least 10 wind turbines. There are already numerous functional zoning plans and planning permits in place that directly regulate the construction of onshore wind power plants. According to the Finnish Wind Power Association, Finland could more than triple its wind power capacity if all the confirmed partial zoning plans and existing wind power permits were to be executed. However, many of

the plans and permits are for smaller wind power plants than those that are being constructed at the moment. Finland has considerable offshore wind power potential, but very few wind power plants have been constructed offshore despite regional land use plans allocating sea areas for wind power plants and several such projects having been in the pipeline.

The Finnish Ministry of the Environment has been sponsoring a nationwide advisory service for the coordination of wind power construction projects since 2015. The service provides advice on procedural and conceptual questions relating to wind power construction for local authorities, regional councils, Centres for Economic Development, Transport and the Environment, businesses and members of the public.

Finnish Land Use and Building Act

The Finnish Land Use and Building Act was amended in 2014 so that wind power construction in an area designated as an industrial estate or a port is no longer regarded as having a significant impact in terms of town planning and so that a derogation from the town planning regulations can be granted for the building of a wind power plant as long as the other applicable conditions are satisfied.

An amendment introduced to the Land Use and Building Act as of 1 May 2017 relaxed regulations on the installation of solar panels and solar thermal collectors, and action permits are now only needed for installing or building solar panels or solar thermal collectors that could significantly alter the cityscape or the environment. Legislative reforms continued during the reporting period.

Transport and wind power

The procedures for separating wind power plants from transport infrastructure have been simplified, and many restrictions have been eased considerably. Under the latest guidelines, wind power plants can now be constructed within 300 m of national roads instead of the former 500 m and for the most part within 0.5–1.5 km of shipping channels. The minimum distance between wind power plants and railway lines has also been reduced.

The new Finnish Aviation Act that entered into force in November 2014 simplified the planning permission procedure relating to wind power plants. Builders of wind power plants can now deal directly with the Finnish Transport Safety Agency (Trafi), and planning permission applications no longer need to have the backing of Finland's national airport operator Finavia. Trafi also published more detailed guidance on marking and illuminating wind power plants on 1 February 2013.

A new aviation regulation providing an exemption from the obligation to seek permission to erect an obstacle on a flight path, AGA M3-14 ('Vapauttaminen velvoitteesta hakea lentoesteelle lupa'), was drafted by Trafi in 2016 and published in the spring of 2017. The exemption applies to obstacles that do not affect aviation safety. Wind power contractors need to liaise with ANS Finland (Finavia Corporation's air navigation service, which is now a separate limited company) in order to determine whether their wind power plant will or will not affect aviation safety. If it will not, no permission need be sought from Trafi to construct the power plant under the regulation. If a proposed power plant is found to affect aviation safety, permission from Trafi is still required. The regulation has simplified and sped up the permit procedures relating to obstacles on flight paths and lowered the associated costs.

Noise associated with wind turbines

The noise levels permitted for wind turbines in Finland are regulated by a Government Decree on guide values for the outdoor noise level of wind turbines (1107/2015), which entered into force on 1 September 2015. The guide values laid down in the Decree need to be observed in connection with all land use planning and construction governed by the Finnish Land Use and Building Act as well as all permit

procedures and environmental monitoring carried out pursuant to the Land Use and Building Act and the Finnish Environmental Protection Act. The guide value for noise from wind turbines in the vicinity of housing, holiday homes, care homes and campsites is 45 dB during the day and 40 dB at night. A daytime guide value of 45 dB applies in the vicinity of educational establishments and recreational areas. National parks are subject to a guide value of 40 dB both in the daytime and at night. Finland also has guidelines for modelling and measuring noise levels from wind power plants that were published by the Finnish Ministry of the Environment in 2014 ('Tuulivoimaloiden melutason mittaaminen altistuvassa kohteessa').

The Finnish Ministry of Economic Affairs and Employment decided to commission an impartial and comprehensive study on the health hazards and environmental risks associated with wind power in connection with the adoption of Finland's national energy and climate strategy, which covers the period until 2030, in November 2016, before the drafting of the law on supporting electricity production from renewable sources. The study was completed in the spring of 2017, and the report shows, among other things, that the infrasound levels measured in the vicinity of wind power plants are similar to those found in urban environments. The researchers were unanimous in their conclusion that the long-term effects of infrasound on health have not been studied enough and that further research is warranted. The Finnish Ministry of Social Affairs and Health commissioned a study on the potentially harmful psychological and physiological effects of noise generated by wind power plants on human health ('Tuulivoimaloiden ääni, sen fysiologiset vaikutukset, häiritsevyyys ja yhteys sairauksiin') in the autumn of 2018. The report is expected in the spring of 2020.

A project called AJONANSSI (2016–2019) involved studying how environmental noise should be measured so that the result would represent the perceived annoyance from wind power noise. The project focused on residential areas. The project was financed by Business Finland, Turku University of Applied Sciences, the Finnish Ministry of the Environment, the Finnish Ministry of Social Affairs and Health as well as business-sector partners.

Environmental impact assessments

The Ministry of the Environment established a working group on 4 March 2015, which was tasked with 1) drafting amendments to the Act on Environmental Impact Assessment Procedure, the Government Decree on Environmental Impact Assessment Procedure and other laws in order to transpose the amending EIA Directive (2014/52/EU) into Finnish law and 2) drafting proposals on the coordination of the EIA procedure with land use planning and environmental permit procedures. The new Finnish Act on Environmental Impact Assessment Procedure (252/2017) and Government Decree on Environmental Impact Assessment Procedure (277/2017) entered into force on 16 May 2017. The legislative reform brought with it, among other things, the possibility of integrating land use planning relating to a project and the project's EIA procedure, more detailed provisions on the taking of EIA into account in permits and a provision on advance negotiations.

An amendment to Annex I to the Act on Environmental Impact Assessment Procedure (126/2019) was also drafted during 2018. The list of projects provided in Annex I to the Act now also includes, among other things, energy production. The amended Annex I to the Act on Environmental Impact Assessment Procedure entered into force in 2019, raising the ceiling for the total output of wind power plants from 30 MW to 45 MW. The minimum number of individual turbines in a wind power plant remained unchanged (at least 10).

The objective of the Act on Environmental Impact Assessment Procedure is to promote EIA and the taking of EIA into account in planning and decision-making processes as well as to raise awareness and increase public participation. An environmental impact assessment (EIA) is required for all projects and modifications that are likely to have significant environmental impacts, and the EIA procedure involves identifying, evaluating and describing any potentially significant environmental impacts of projects that are likely to have significant environmental impacts and consulting the authorities and any parties whose

circumstances or interests may be affected by the project as well as any corporations and foundations whose field of activity may be affected by the project.

The Finnish Wind Power Association and Finnish Energy have instructed wind power builders to sign land use agreements with any landowners who have properties within a distance equivalent to five times the diameter of the rotors in their wind turbines.

Impact of wind power projects on radar and other activities of the Finnish Defence Forces

Finland currently has some areas with favourable wind conditions where wind power construction has been prevented by the impact of wind turbines on radar in particular. The impact of wind power projects on surveillance sensors (radar) must always be investigated before a project can go ahead. This is done in connection with the Finnish Defence Forces' evaluation of a project's impacts on its other activities.

Wind power construction can have significant, wide-ranging impacts from the perspective of the Finnish Defence Forces, and any such impacts must be identified and taken into consideration at as early a stage as possible in order to avoid unnecessary problems and costs. The most common types of impact that wind power construction has are on the capability of the Finnish Defence Forces' surveillance and weaponry systems (= air and sea surveillance radar) and on the training and deployment of troops and systems in garrisons, depots, exercise areas and firing ranges.

The impact of a wind power project on the activities of the Finnish Defence Forces need not, however, be investigated if the wind turbines are located within a designated wind power zone in the Bothnian Bay. Wind power construction in the zone is regulated by the Finnish Act on Wind Power Compensation Areas, which entered into force on 1 July 2013. Under the Act, the construction and commissioning of wind turbines in designated wind power compensation areas no longer requires the Finnish Defence Forces to separately investigate their impacts on Finland's regional surveillance systems, the Finnish Defence Forces' regional operating conditions or military aviation. Wind power construction in the Bothnian Bay is now possible even if the Finnish Defence Forces have previously objected to the plans. A wind power fee is collected from wind power enterprises for each turbine erected within the zone. The first payment decisions were issued in 2014, but the first fees were not collected until 2015.

Small-scale electricity production

Information campaigns and simpler procedures have helped to make small-scale production easier to source, license and connect to the national grid. There have also been tax reforms that raised the lower taxation limit for self-produced and self-consumed electricity considerably and simplified taxation procedures.

The Finnish Energy Authority launched a redesign of its electricity price comparison site in 2018, and the new site went live in 2019. Small-scale producers can use the site to easily find electricity companies that buy electricity from small-scale producers. The site also contains contact details for a national energy advice service for consumers and tips on how to become a small-scale producer. Motiva (a state-owned sustainable development company) ran its first campaign promoting solar panels for homeowners ('Aurinkosähköä kotiin') in 2018, which involved photovoltaic system suppliers providing provisional quotes on two differently scaled systems (3–6 kW and 10–20 kW) online. Consumers, housing companies and SMEs can use the website to request a more detailed quote on a system tailored to their needs.

The increase in small-scale production also creates demand for better statistics. System operators report on the small-scale electricity production capacity linked to their networks per production technology each year. Finland's grid operator Fingrid has developed tools for estimating photovoltaic output at any given moment and publishes these estimates through its real-time power grid tracking system.

Statistics Finland and Natural Resources Institute Finland conducted a joint survey to collect information about homeowners' heating systems in 2017 and 2018. In addition to the survey coordinators, the project received funding from the Finnish Ministry of Agriculture and Forestry, the Finnish Ministry of the Environment, the Finnish Ministry of Economic Affairs and Employment and the Finnish Energy Authority. According to the responses given to the survey, 1 in 10 holiday homes is equipped with solar panels. The figure for people's regular homes is 1 in 100. After wood, the most popular source of additional heating is an air source heat pump.

System suppliers' marketplaces and products have been developed to make it increasingly easy for small-scale operators to make their resources available to Fingrid. In addition to lowering the minimum capacity that can be sold, it is now also possible to sell capacity based on multiple small resources.

The Finnish Ministry of Economic Affairs and Employment established a broad-based working group to investigate the possibility of promoting demand-side management by giving customers more choice in 2016. There are a wide range of opportunities relating to small-scale production and electricity storage by both individual customers and energy corporations, but many questions also still remain open. The working group published its recommendations in the autumn of 2018, and the implementation of the recommendations has now begun.

2.b Please describe the measures in ensuring the transmission and distribution of electricity produced from renewable energy sources and in improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements. (Article 22(1)(f) of Directive 2009/28/EC)

The Finnish Electricity Market Act obligates transmission and distribution system operators to develop the electricity system by maintaining, using and developing their systems and connections to other systems in accordance with their customers' reasonable needs and by securing, for their part, the supply of high-standard electricity to their customers. In addition, one grid operator is charged with ensuring the technical functionality and operational reliability of the entire electricity system. The grid operator with overall responsibility for the system must maintain and develop its activities and services and maintain, operate and develop its electricity system and other equipment needed for ensuring the performance of the system and connections to other systems so that the prerequisites for an efficiently functioning electricity market can be ensured. The terms of system services and the criteria according to which they are determined must be equitable and non-discriminatory to all system users. Exceptions can only be made on special grounds.

Finnish laws provide for guaranteed access to the electricity system. The same rules apply to all electricity producers that are connected to the grid. Under the Finnish Electricity Market Act, all parties that join the system must be treated equally. There are no priority connection rights or reserved connection capacities.

System operators must, on request and in return for reasonable compensation, connect all electricity consumption points and all electricity producers that satisfy the technical requirements within their operating area to their system. The conditions and technical requirements imposed by system operators for connecting to the system must be equitable and non-discriminatory. One of the obligations of system operators is to ensure that the fees charged for their services are reasonable and that the volume of energy supplied is appropriately metered.

System operators also have an obligation to develop their systems by increasing the transmission capacity if necessary to enable any producers who make a reasonable request to connect to the system to do so.

Any expenses arising from system development are covered by transmission fees, and any costs incurred from grid expansion and reinforcement are covered by connection fees. With regard to connections to

the grid, system operators prepare written terms and conditions concerning connection pricing methods and principles for their own use. These principles must be in line with the procedures confirmed by the Finnish Energy Authority for determining connection prices, which were communicated to each system operator in 2011. The Energy Authority's procedures are essentially the same for all electricity system operators, and they must be observed, for example, when determining capacity reservation fees and the fees to be collected for connecting consumption points.

The prices of system services must not include any arbitrary elements or be subject to any terms that are liable to restrict competition in the electricity market. However, they must provide for the security of supply and the efficiency of the electricity system as well as the costs and benefits of connecting power plants to the system.

Distribution system operators collect connection fees pursuant to the terms and conditions applicable to connections to the system within their respective distribution areas. These terms and conditions also determine the rules concerning the bearing and sharing of costs incurred from any technical adaptations of the grid. No new terms or conditions can be introduced until they have been approved by the Finnish Energy Authority, which also carries out checks to ensure that all terms and conditions are equitable and non-discriminatory. General criteria for transmission and connection fees are laid down in the Finnish Electricity Market Act.

The connection fee for power plants of no more than two megavolt amperes must be based on the direct costs incurred from expanding the distribution system to the connection point in question. Under the Finnish Electricity Market Act, fees charged for connecting power plants of no more than two megavolt amperes to the electricity system may not include any grid reinforcement costs. System operators can, however, include any system protection costs incurred from individual connections in their connection fees.

3. Please describe the support schemes and other measures currently in place that are applied to promote energy from renewable sources and report on any developments in the measures used with respect to those set out in your National Renewable Energy Action Plan. (Article 22(1)(b) of Directive 2009/28/EC)

The Commission reminds Member States that all national support schemes must respect the state aid rules as foreseen in Articles 107 and 108 of the Treaty on the Functioning of the EU. The notification of the report in accordance with Article 22 of Directive 2009/28/EC does not replace a state aid notification in accordance with Articles 107 and 108 of the Treaty on the Functioning of the EU.

*It is suggested that **Table 3** is used to provide more detailed information on the support schemes in place and the support levels applied to various renewable energy technologies. Member States are encouraged to provide information on the methodology used to determine the level and design of support schemes for renewable energy.*

Table 3: Support schemes for renewable energy

RES support schemes year n (e.g. 2011)		Per unit support	Total (M€)*
Instrument (provide data as relevant)	Obligation/quota for biofuels (%) 6% in 2011 -> 20% in 2020	indeterminable	-
	Penalty / Buy-out option / Buy-out price (€/unit)	-	-
	Average certificate price	-	-
	Tax exemption/refund	-	-
	Investment subsidies (capital grants or loans) (€/unit) incl. energy spearhead aid + energy assistance		€66.99 m (2017); €53.81 m (2018)
	Production incentives Support for the production of wind power, electricity from biogas and small-scale CHP as a sliding premium feed-in tariff from wood; for wood chips, a premium feed-in tariff according to the ability to pay for wood, emission allowances, peat price and taxes (the scheme was launched in 2011)	A target price of €83.5/MWh (a target price of €105.3/MWh for wind power until the end of 2015); a premium of €50/MWh for heating systems based on electricity from biogas and €20/MWh for small-scale CHP; assistance amounting to €18/MWh in 2017 and to €5.72–18/MWh in 2018 for electricity from wood chips	€226 m (2017); €250 m (2018)
	Feed-in premiums	-	-
Tendering Technology-neutral renewable energy tendering (in the autumn of 2018) Support for electric transport infrastructure and the use of biogas in the transport sector (tendering in 2018)		€0–41 m (2020–2034) €3.0 m (2018)	
Total annual estimated support in the electricity sector (the feed-in tariff is designed for electricity production but it also indirectly promotes renewable heat production)			€238.55 m (2017) €259 m (2018)
Total annual estimated support in the heating sector			€4.72 m (2017) €6.94 m (2018)
Total annual estimated support in the transport sector			€10 m (2017) €20.12 m (2018)

Use of biomass in the production of electricity and heat

The strong performance of the forestry market has improved the availability of biomass for electricity and heat generation as well. Investments in the pulp industry increased the use of forest industry waste liquor in particular in 2017 and 2018, but the use of other forestry by-products has also increased. A new law was drafted in Finland in 2018, which will ban the use of coal as of 2029. The law will accelerate the demise of coal, and many bioheat and bio-based power plant projects have been launched in order to reduce greenhouse gas emissions.

The use of biomass in the production of electricity and heat has continued to increase at a faster pace than that forecast in the National Renewable Energy Action Plan (NREAP). The targets set in the NREAP were for electricity production from biomass to amount to 11 550 GWh and heating and cooling to 6250 ktoe in 2018, and the actual figures were 12 258 GWh for electricity production and 7222 ktoe for heating and cooling.

Approximately 20% of the energy assistance (support for renewable energy investments) granted in 2015 and 2016 benefited wood-burning power plants, in addition to which some assistance was given to biogas plants. Both the number of these kinds of projects and the amount of assistance decreased in 2017 and 2018.

Finland's temporary aid scheme for sustainable forestry continues to incentivise private forest owners to

better manage their forests. Small-diameter trees can also be harvested from some young forests in connection with management works. The amount of area-based assistance paid towards the management of young forests currently stands at €230 per hectare. If small trees are also harvested in connection with management works, an additional €200 per hectare can be paid, bringing the total amount of assistance paid towards the management of young forests to €430 per hectare. The area of seedling stands tended and young forests managed with assistance from the sustainable forestry fund in 2017 and 2018 was similar to the previous years (147 000 hectares), but the area across which small trees were harvested increased from 23 000 hectares to 33 000 hectares. However, the assistance is not tied to the energy use of wood. In addition to private forests, small-diameter trees are also harvested from state-owned forests.

Rising emission allowance prices began to impact on the variable rate of support payable towards the production of electricity from wood chips in 2018. The amount of the assistance dropped from €18/MWh at the beginning of 2018 to €5.72/MWh by the end of the year, and no more assistance has been paid as of 2019. The variable rate of support for the production of electricity from wood chips is tied to the price of emission allowances and the tax on peat in order to match the cost of fossil fuels. The popularity of wood chips was not affected by the drop in assistance in 2018, and they are now a well-established fuel.

Wind power

The support scheme for wind power production (a feed-in tariff) introduced in March 2011 has bred a number of projects. The feed-in tariff scheme was capped at a wind power capacity of 2500 MVA. Power plants were accepted into the scheme until 1 November 2017. The total capacity of the wind power plants accepted into the scheme was 2303 MVA.

The Finnish Act on Support for Electricity Production from Renewable Energy Sources (1396/2010) was amended as of 25 June 2018. The amended Act now provides for a premium scheme based on technology-neutral renewable energy tendering. An amendment introduced to the Government Decree on Support for Electricity Production from Renewable Energy Sources (1397/2010), which entered into force on 10 September 2018, complemented the Act by laying down more detailed provisions. The aim of the premium scheme is to increase the capacity of electricity production from renewable energy sources at minimal cost. The goal is pursued by paying assistance to electricity producers. The assistance is added to the market price of electricity, and the amount is determined on the basis of tendering. The Finnish Energy Authority published a technology-neutral invitation to tender for renewable energy in 2018. Tenders could be submitted from 15 November to 31 December 2018. The contract was for the production of 1.4 TWh of electricity per year. Electricity producers were asked to specify the premiums they would charge and the volume of electricity they were prepared to produce. A total of seven different projects of six electricity producers were accepted into the scheme, whose combined annual electricity production capacity is 1.36 TWh.

Biofuels and bioliquids

Must-carry status

The most important measure for promoting biofuels in transport is their must-carry status, which has been in force since 2008. The volume that must be carried is determined as the energy content of biofuels as a proportion of the total energy from petrol, diesel and biofuels supplied to the market. The annual must-carry requirements are as follows:

Year	Requirement
2011–2014	6%
2015	8%
2016	10%
2017	12%
2018	15%
2019	18%
2020-	20%

Double counting was used to determine the 2017 must-carry requirement in respect of biofuels made from wastes, residues, non-food cellulosic material and ligno-cellulosic material. Only biofuels produced from feedstocks the sustainability of which can be demonstrated count towards meeting the must-carry requirements.

The provisions on satisfying the must-carry requirements were revised after the implementation of the ILUC Directive by a legislative amendment (387/2017) that entered into force on 3 July 2017. The principles of double counting were also revised at that time. As of 2018, double counting has only been used in respect of biofuels produced from the feedstocks listed in Annex IX to the ILUC Directive as opposed to previous years, when all wastes, residues, non-food cellulosic material and ligno-cellulosic material that satisfied the criteria of the Finnish Act on Biofuels and Bioliqids were classified as double-countable feedstocks. The legislative amendment also introduced a ceiling of seven percentage points for biofuels produced from feedstocks grown in field conditions and a minimum target of 0.5 percentage points for certain feedstocks, both of which apply to biofuels supplied as of 2020.

Sustainability criteria

The Finnish Act on Biofuels and Bioliqids (393/2013) entered into force on 1 July 2013 and transposed the sustainability criteria for biofuels and bioliqids set out in Directive 2009/28/EC into Finnish law. The Act lays down the requirements that apply to the sustainability assessments of transport biofuels and of bioliqids produced for energy uses other than transport. The Act also provides for the procedures to be followed to demonstrate compliance with the sustainability criteria. The obligation to demonstrate the sustainability of biofuels and bioliqids is based on other laws by way of support schemes within the meaning of Directive 2009/28/EC.

Pursuant to the Act on Biofuels and Bioliqids, the key element in demonstrating the sustainability of biofuels and bioliqids is the operator's sustainability system. Operators need to first seek the Finnish Energy Authority's approval for their sustainability system and then issue a sustainability certificate as proof of their biofuels or bioliqids satisfying the sustainability criteria. Operators' sustainability systems are approved for five years at a time. The Act on Biofuels and Bioliqids was revised in 2017 (legislative amendment 388/2017) in order to transpose the ILUC Directive into Finnish law. The amendment meant tightening a requirement concerning the reduction of greenhouse gas emissions so that the reduction must be at least 60% in the future and at least 50% in respect of old plants commissioned no later than 5 October 2015. The scope of application of the Act on Biofuels and Bioliqids was revised in 2018 (legislative amendment 171/2018) to include a reference to the Finnish Act on the Reduction of Life-cycle Greenhouse Gas Emissions from Certain Fuels (170/2018).

Act on the Reduction of Life-cycle Greenhouse Gas Emissions from Certain Fuels

The Finnish Act on the Reduction of Life-cycle Greenhouse Gas Emissions from Certain Fuels (170/2018) entered into force on 16 March 2018. The Act transposed Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels as well as the requirements of Council Directive (EU) 2015/652 of 20 April 2015 laying down

calculation methods and reporting requirements concerning the reduction of greenhouse gas emissions into Finnish law. The Act compels fuel suppliers to cut the greenhouse gas emissions per unit of energy from the fuels they supply for consumption by at least six per cent from the average life-cycle gas emissions per unit of energy from fossil fuels in the European Union in 2010 by the end of 2020.

The Act applies to fuels supplied for consumption in motor vehicles, heavy machinery, agricultural and forestry tractors, as well as inland waterway vessels and pleasure boats by operators that supply more than one million litres of liquid fuels or the equivalent energy content in gaseous fuels per calendar year. The Act also applies to aviation biofuels and electricity used in road transport in some circumstances. The Act on the Reduction of Life-cycle Greenhouse Gas Emissions from Certain Fuels has some overlaps with the Finnish Act on the Promotion of the Use of Biofuels, which is why the 6% target is mostly being pursued by the same means as the 2020 must-carry requirement.

Fuel suppliers must be able to demonstrate that any biofuels they supply for consumption satisfy the relevant sustainability criteria. If a biofuel's compliance with the sustainability criteria cannot be demonstrated, its life-cycle greenhouse gas intensity is calculated on the basis of the default value for the equivalent fossil fuel. The greenhouse gas intensity of biofuels is calculated in accordance with Article 7d of Directive 98/70/EC, which also provides for the calculation of life-cycle greenhouse gas emissions from biofuels. The method of calculating life-cycle greenhouse gas emissions corresponds to the method provided for the calculation of life-cycle greenhouse gas emissions from biofuels and bioliquids in Directive 2009/28/EC.

Fuel taxation

The Finnish energy tax system was reformed as of the beginning of 2011. The biggest change is that the taxation of all fuels, including transport fuels, is now based on their energy content, carbon dioxide emissions and strategic stockpile fee. The tax was increased for the first time at the start of 2012 and for the second time at the start of 2014. The taxation of heating fuels was tightened every year between 2015 and 2019. Most of the tax increases were targeted at the carbon dioxide tax on heating fuels, which makes renewable energy more competitive against fossil fuels.

Taking carbon dioxide emissions into account puts biofuels at an advantage. The carbon dioxide tax on biofuels is based on their life-cycle carbon dioxide emissions compared with their fossil counterparts. Unsustainable biofuels are subject to the same carbon dioxide tax as fossil fuels, sustainable biofuels are charged 50% of the carbon dioxide tax on the equivalent fossil fuel, and no carbon dioxide tax is payable on biofuels made from wastes, residues, non-food cellulosic material and ligno-cellulosic material within the meaning of the Finnish Act on Biofuels and Bioliquids. The amount of carbon dioxide tax has been €58/tCO₂ since 2014. The Finnish energy content tax is based on the calorific values of fuels, which is why any increases to the tax mostly serve to promote lower energy consumption and higher energy efficiency.

The excise duty on liquid fuels was raised by a legislative amendment (1176/2016) that entered into force on 1 January 2017. The carbon dioxide tax on liquid transport fuels was €62 in 2017 and 2018 as opposed to the previous €58. An almost identical increase was introduced to the energy content tax. The same legislative amendment also raised the energy content and carbon dioxide taxes on heating fuels and fuels used in heavy machinery. The amount of carbon dioxide tax was raised from €54/tCO₂ to €58/tCO₂. The energy content tax was raised by €0.4/MWh.

The excise duty on liquid heating fuels and liquid fuels used in heavy machinery was raised by a legislative amendment (972/2017) that entered into force on 1 January 2018. The amount of carbon dioxide tax was raised from €58/tCO₂ to €62/tCO₂, which brought the tax on heating fuels and fuels used in heavy machinery into line with the tax on transport fuels. The energy content tax was also raised, by €0.45/MWh.

Other measures

The expansion of Finland's electric car charging and gas station networks is being promoted, for example, by supporting electric transport infrastructure investments and the use of biogas in the transport sector pursuant to a special scheme from 2018 to 2021 (Government Decree 498/2018). The Finnish Energy Authority's first round of tendering began on 1 October 2018, and tenders could be submitted until 31 October 2018. The tendered investments were rated, and a score was calculated for each tenderer. The projects with the lowest scores in their respective groups were the most successful. The invitation was for tenders relating to gas stations, local public transport charging systems, high-power vehicle charging systems and basic vehicle charging systems. A total of €3 million in assistance was available, and only a portion of the investment costs of each project could be covered. The second round of tendering was scheduled for September 2019 and the third round is due in 2020.

The climate policy targets for the year 2030 laid down in the Finnish Government Programme are being pursued by means of the national energy and climate strategy, which was updated towards the end of 2016, and a medium-term climate policy plan published in 2017.

The medium-term plan sets a target for reducing greenhouse gas emissions by 2030 and identifies the measures that will hopefully ensure that the target is met and that it is compatible with the long-term climate target. The medium-term plan complements and provides more detail to the measures set out in the energy and climate strategy concerning the reduction of emissions. Links between different sectors and horizontal themes, such as the significance of consumption and local climate action, are also explored in the plan. The plan takes into account Finland's strategic energy policy actions that have implications on the development of emission levels. The plan is founded on a baseline scenario formulated in the summer of 2016, which also provided the basis for the energy and climate strategy.

3.1. Please provide the information on how supported electricity is allocated to final customers for purposes of Article 3(6) of Directive 2003/54/EC. (Article 22(1)(b) of Directive 2009/28/EC)

Finland has a deregulated electricity market, and electricity produced from renewable energy sources enjoys no special status in the market. The viability of RES production (wind power, and electricity from wood chips, biogas and wood fuels) is being promoted through various support schemes. Electricity from renewable energy sources is also sold on electricity exchanges, to electricity resellers, or directly to end users.

Since 2005, electricity suppliers in Finland have had to provide their customers with a breakdown of the origins of each form of electricity that they supply in their customers' electricity bills at least once a year. Environmental information concerning the origin of electricity (CO₂ emissions and radioactive waste) also has to be made available to customers via public information sources such as electricity suppliers' websites. Since 2014, only electricity with a guarantee of origin can be reported as electricity produced from renewable energy sources. Most electricity suppliers have their own brand under which they sell electricity produced from renewable energy sources.

No data have been compiled concerning the allocation of supported electricity to end users. In 2018, supported renewable electricity accounted for 8.6% of total consumption in Finland and for 11.1% of domestic production.

4. Please provide information on how, where applicable, the support schemes have been structured to take into account RES applications that give additional benefits, but may also have higher costs, including biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material. (Article 22(1)(c) of Directive 2009/28/EC)

As was explained under point 3, efforts have been made to promote the introduction of more advanced but more expensive biofuels by means of double counting under Directive 2009/28/EC as well as

restructuring of the fuel taxation system. More advanced biofuels have also been prioritised in the allocation of support towards investments in biofuel production.

Development projects relating to renewable energy can be supported through the Rural Development Programme for Mainland Finland. Increasing the popularity of biogas from agricultural residues in particular requires efforts to make it more competitively priced.

In order to learn more about wind power construction, the Finnish Ministry of Economic Affairs and Employment awarded a contract for a pilot offshore wind farm to be constructed in Tahkoluoto, Pori by Suomen Hyötytuuli Oy, which was one of nine operators that submitted tenders. In November 2014, the Ministry granted €20 million in investment aid for the implementation of the project. The aid may not, however, cover more than 18.5% of the actual approved costs of the project. The project is also eligible for support based on the amount of electricity produced for a period of 12 years. The Tahkoluoto offshore wind farm (42 MW in total) was commissioned in 2017.

The Finnish Government earmarked €60.5 million for investments in renewable energy and next-generation energy technology in 2017 and 2018. The assistance was split between projects promoting the use of biogas in the transport sector (approximately €30.3 m), projects promoting smart energy systems and energy efficiency (€27.4 m) as well as other renewable energy projects (€2.7 m). Support is available for investments in businesses', local authorities' or other organisations' fixed assets that amount to more than €5 million in eligible costs and relate to the production of advanced transport biofuels or experimental energy technology.

5. Please provide information on the functioning of the system of guarantees of origin for electricity and heating and cooling from RES, and the measures taken to ensure reliability and protection against fraud of the system. (Article 22(1)(d) of Directive 2009/28/EC)

The guarantee-of-origin scheme in Finland applies to guarantees of origin for electricity produced from renewable energy sources and using efficient CHP technology. The Finnish Act on Verification and Notification of Origin of Electricity was reformed as of 1 July 2013. The amendments introduced to the Act entered into force in stages by 1 March 2014. Since 1 January 2014, guarantees of origin have been the only way of verifying that electricity is produced from renewable energy sources.

Guarantees of origin in Finland are issued by the grid operator Fingrid Oyj. Fingrid Oyj has hived off this task to its wholly-owned subsidiary Finextra Oy. Finextra is also responsible for transferring, revoking and cancelling guarantees of origin. Guarantees of origin are issued on the basis of evidence of the production method and energy sources used at power plants as well as metering of the amount of electricity produced. Every year, the Finnish Energy Authority calculates the national residual mix, and electricity suppliers report on their own energy mixes on the basis of the national residual mix within two months of its publication.

Electricity producers wishing to add their power plant to the guarantee-of-origin scheme for electricity must provide evidence of the production method and energy sources used at the plant and apply to the scheme administrator for their plant to join the scheme. Before any guarantees of origin can be issued for electricity produced at the power plant, the production method and the energy sources used at the plant must be verified by an approved assessment body. Verification certificates issued by assessment bodies are valid for a period of up to five years. Alternatively, verification can be sought through the scheme administrator in accordance with the European Energy Certificate System (EECS). Authorisation under the Finnish Act on Support for Electricity Production from Renewable Energy Sources (1396/2010) also carries the same weight as a verification certificate issued by an assessment body.

To be issued a guarantee of origin, power plant operators must provide the scheme administrator (Finextra Oy) with details about the quantity of electricity for which the guarantee is being sought and the calendar month and year during which the electricity was produced. The scheme administrator issues

the guarantee of origin based on the quantity of energy produced on a monthly basis. The electricity supplier must notify the scheme administrator as soon as the guarantee is used to verify the origin of the electricity sold. The scheme administrator must cancel a guarantee of origin as soon as it learns that it has been used. The scheme administrator must revoke a guarantee of origin if it has not been used within 12 months of the last production date of the electrical energy unit in question.

According to current laws, satisfying the obligation to verify the origin of electricity requires cancelling any guarantees of origin for the previous year by 31 March of the following year. The scheme administrator must report to the Finnish Energy Authority on all guarantees issued and cancelled during the previous year and the numbers of guarantees of origin transferred to and from Finland in order for the Energy Authority to be able to calculate the residual mix.

Finextra has been a member of the Association of Issuing Bodies (AIB) since the beginning of 2015, and the guarantees of origin issued in Finland comply with the EECS rules. Finextra deployed an electronic guarantee-of-origin database on 1 January 2015. Guarantees of origin were also issued electronically in Finland in 2013 and 2014, and could be transferred electronically to other Member States of the AIB.

The Finnish Energy Authority monitors compliance with the Act on Support for Electricity Production from Renewable Energy Sources and supervises assessment bodies and the scheme administrator. The Energy Authority also approves assessment bodies within the meaning of the Act on Verification and Notification of Origin of Electricity. In order to enable the Energy Authority to attend to its supervisory duties, it has the right to obtain information from power plant operators, the scheme administrator, assessment bodies and electricity suppliers. Spot checks are carried out at regular intervals.

The Energy Authority calculates and publishes the national residual mix that electricity suppliers must use as the basis for reporting on their unverified renewable electricity production and any electricity of unknown origin. The Energy Authority also confirms the terms and pricing of Fingrid's guarantee-of-origin services and monitors the prices it charges for issuing and transferring guarantees of origin. The scheme administrator's services must be reasonably priced and also enable small-scale producers to benefit from the guarantee-of-origin scheme.

Electricity suppliers are required to provide their customers with an annual breakdown of the origins of the electricity that they supplied to them during the previous calendar year. Suppliers must disclose information about their energy mix in their customers' electricity bills and advertising, and keep it available to all consumers of electricity. At least the following energy sources must be identified:

- • fossil fuels and peat
- • renewable energy sources
- • nuclear power.

In addition to the total mix, individual consumers can be given information about the origins of the products supplied to them. Electricity from renewables of unverifiable origin and electricity of unknown origin are reported on the basis of the national residual mix published by the Finnish Energy Authority. The origin of electricity produced from non-renewable energy sources can also be reported in accordance with the actual production method used as well as the residual mix.

Approximately one quarter of the 85 TWh of electricity consumed in Finland in 2017 was covered by guarantees of origin, and the guarantees verified the origin of approximately 85% of all electricity produced from renewable energy sources.

6. Please describe the developments in the preceding two years in the availability and use of biomass resources for energy purposes. (Article 22(1)(g) of Directive 2009/28/EC)

It is suggested that Tables 4 and 4a be used to provide more detailed information on the biomass supply.

Table 4: Biomass supply for energy use

	Amount of domestic raw material (*)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU (*)		Primary energy in imported raw material from EU (ktoe)		Amount of imported raw material from non-EU (*)		Primary energy in imported raw material from non-EU (ktoe)	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Biomass supply for heating and electricity:												
Direct supply of wood biomass from forests and other wooded land energy generation (fellings, etc.)**	113 200 TJ	113 800 TJ	n/a	n/a	13 TJ	1 TJ	n/a	n/a	14 TJ	34 TJ	n/a	n/a
Indirect supply of wood biomass (residues and co-products from wood industry, etc.)**	249 619 TJ	260 906 TJ	n/a	n/a	164 TJ	335 TJ	n/a	n/a	2316 TJ	2408 TJ	n/a	n/a
Energy crops (grasses, etc.) and short rotation trees (please specify)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Agricultural by-products / processed residues and fishery by-products**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Biomass from waste (municipal, industrial, etc.)**	13 684 TJ	14 606 TJ	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Others (please specify)												
Biomass supply for transport:												
Common arable crops for biofuels (please specify main types)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Energy crops	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
(grasses, etc.) and short rotation trees for biofuels (please specify main types)												
Others (please specify)												

* Amount of raw material if possible in m³ for biomass from forestry and in tonnes for biomass from agriculture and fishery and biomass from waste.

** The definition of this biomass category should be understood in line with Table 7 of part 4.6.1 of Commission Decision C (2009) 5174 final establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC.

Table 4a: Current domestic agricultural land use for production of crops dedicated to energy production (ha)

Land use	Surface (ha)	
	Year 2017	Year 2018
1. Land used for common arable crops (wheat, sugar beet, etc.) and oilseeds (rapeseed, sunflower, etc.) (please specify main types)	n/a	n/a
2. Land used for short rotation trees (willows, poplars) (please specify main types)	34	29
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum (please specify main types)	965	829

7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding two years associated with increased use of biomass and other forms of energy from renewable sources. Please provide where available references to relevant documentation on these impacts in your country. (Article 22(1)(h) of Directive 2009/28/EC).

The use of wood chips in heating and power plants stabilised at just over seven million cubic metres in 2017–2018. A total of 7.4 million cubic metres of wood chips were used in heating and power plants in 2018 and, combined with wood chips used as fuel by homeowners (0.6 million m³), the total consumption of wood chips amounted to 8.0 million cubic metres. The highest consumption figure so far, 8.7 million cubic metres, was recorded in 2013. Wood chips accounted for just over one third of all solid wood fuels used in heating and power plants in 2018, as the total consumption of solid wood fuels in heating and power plants amounted to 20.1 million cubic metres in 2018 and the majority of these were by-products of the wood processing industry, such as bark, sawdust and industrial wood residue chips.

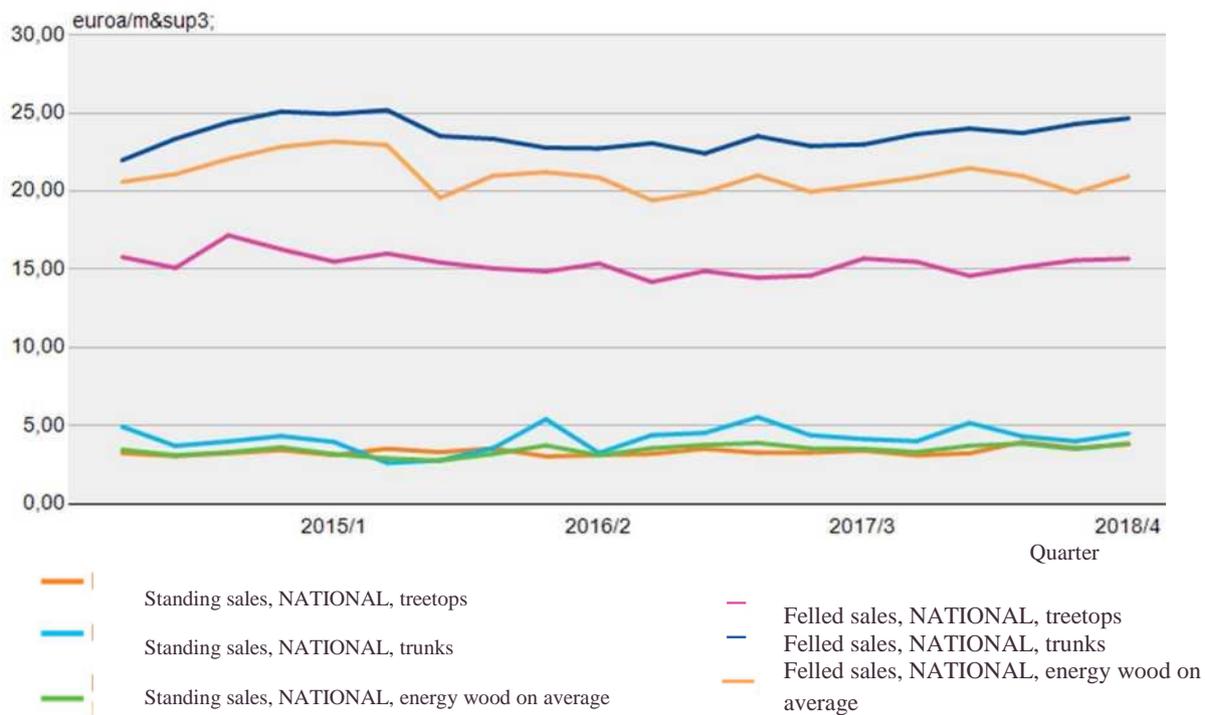
The energy use of wood chips from forestry does not appear to have had an impact on the prices of, or the market for, pulpwood or logs. The prices of and market for pulpwood and logs mostly depend on the status of the forestry market.

Field biomass is little used in Finland, and the use of renewable energy sources has consequently not affected the prices of food and feed crops.

Changes in land use, such as the felling of forests to make way for housing, infrastructure or farming, do not increase the volume of renewable energy, as both the forest biomass and the field biomass used for energy are harvested from Finland's existing forests and fields. (Source: Finnish Ministry of Agriculture and Forestry)

In 2018, an average of €3.8 per cubic metre was paid for felling rights for energy wood sold standing, and felled timber was bought at €22.7 per cubic metre (Figure 1). There was still great regional fluctuation in both the mean and category-specific prices of energy wood in 2018. Treetops accounted for half of all sales recorded in statistics for the year 2018 and delimbed trunks for 37%. Whole trees only accounted for nine and stumps for four per cent. The energy wood market was vibrant, and a total of 4.3 million cubic metres were bought in 2018 according to statistics. The average standing sales price for delimbed trunks was €4.3 per cubic metre, and felled delimbed trunks sold for an average of €22.7 per cubic metre. The average price paid for felling rights for treetops of standing trees was €3.2 per cubic metre (-5%), and the corresponding figure for stumps was €1.5 per cubic metre (+54%). (Source: Natural Resources Institute Finland)

Energy wood prices by sales model and category between 2014 and 2018



Source: Natural Resources Institute Finland / Energy wood sales

Figure 1: Real standing sales prices paid for energy wood expressed in financial terms for the most recent quarter between January 2014 and December 2018 (deflation: wholesale price index)

A total of 0.2 million cubic metres of wood pellets and briquettes were consumed in Finland in 2018. The price index for wood pellets initially fell in 2017–2018 but recovered towards the end of the period in respect of both industrial customers (Figure 2) and consumers (Figure 3).

PIX Pellet Nordic index

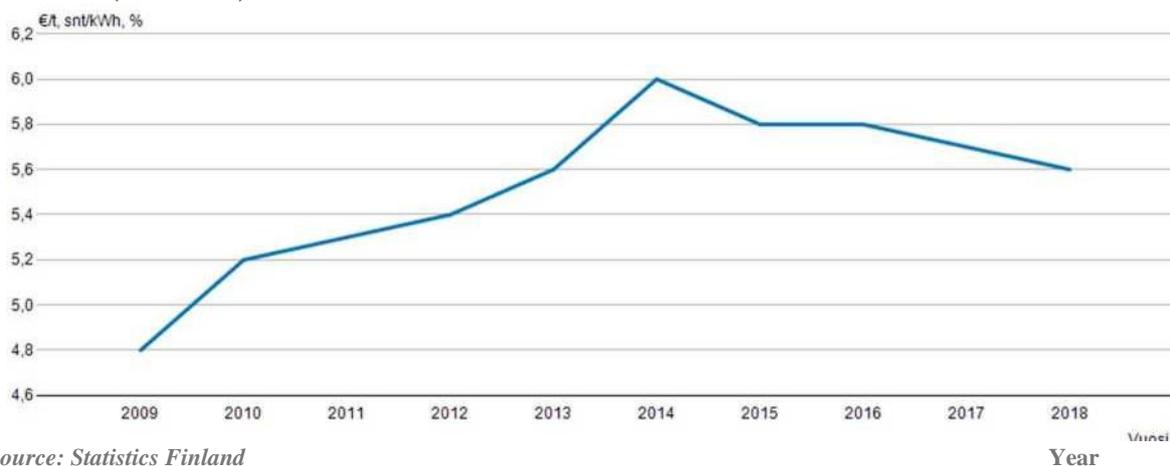


Industrial pellet sales in Nordic countries, €/MWh

Source: Metsälehti, FOEX

Figure 2: Pellet prices between September 2014 and September 2019, €/MWh

Consumer prices of wood pellets sold for heat production in February between 2009 and 2018, cent/kWh (incl. VAT)



Source: Statistics Finland

Figure 3: Consumer prices of wood pellets sold for heat production and index (incl. VAT)

The stumpage price trend and the forest price trend have been diverging for the last just under a decade. Nominal stumpage prices have remained unchanged, and real prices have dropped. Despite this, the price of forest has continued to increase especially in the southern and central parts of Finland (Figure 4). This may be due to, among other reasons, buyers' having begun to appreciate forests for more than their timber capacity, an increase in the availability of more forested lots, the value given to forests as solid investments and speculative expectations of the price of forest increasing. The increased use of wind power and bioenergy may have had a slight impact on the price of forest in areas that are suitable for wind power and bioenergy production, but there are no detailed statistics available. (Source: National Land Survey of Finland)

Average price, €/ha

Index

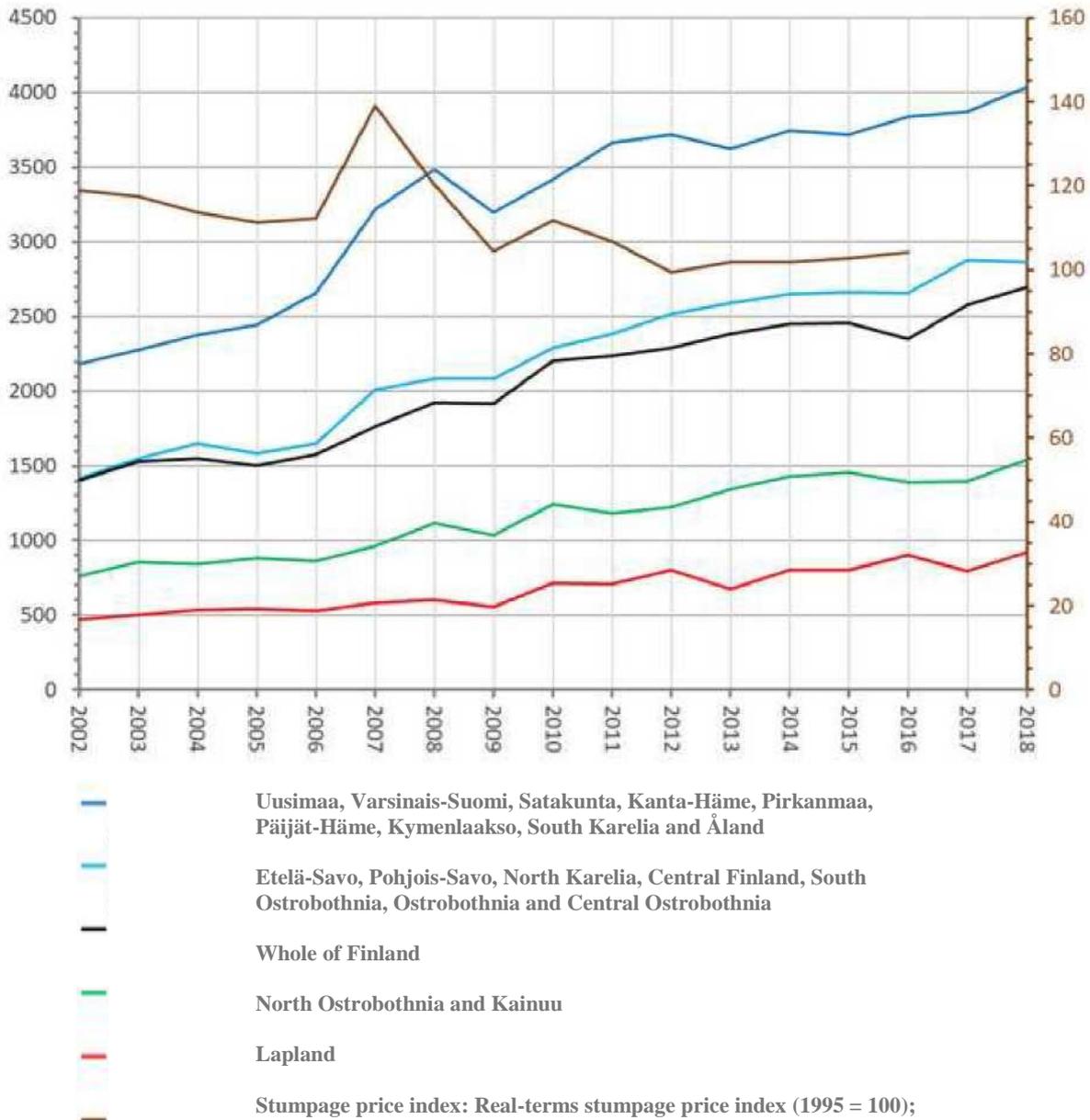


Figure 4: Nominal prices of forests of more than 10 hectares per region between 2002 and 2018 (Source: National Land Survey of Finland / Price of forest in Finland in 2015–2016)

Field prices per region are categorised by production conditions as well as price levels. The price of arable land has increased in some areas and decreased in others. The relatively low number of sales and therefore the effect of individual sales on the median price must be taken into account. There are few sales of properties consisting exclusively of arable land between non-related individuals in Finland each year, and differences between annual figures per region may consequently be considerable. (Figure 5)

Median price of arable land in Finland per region between 1990 and 2018, €/ha

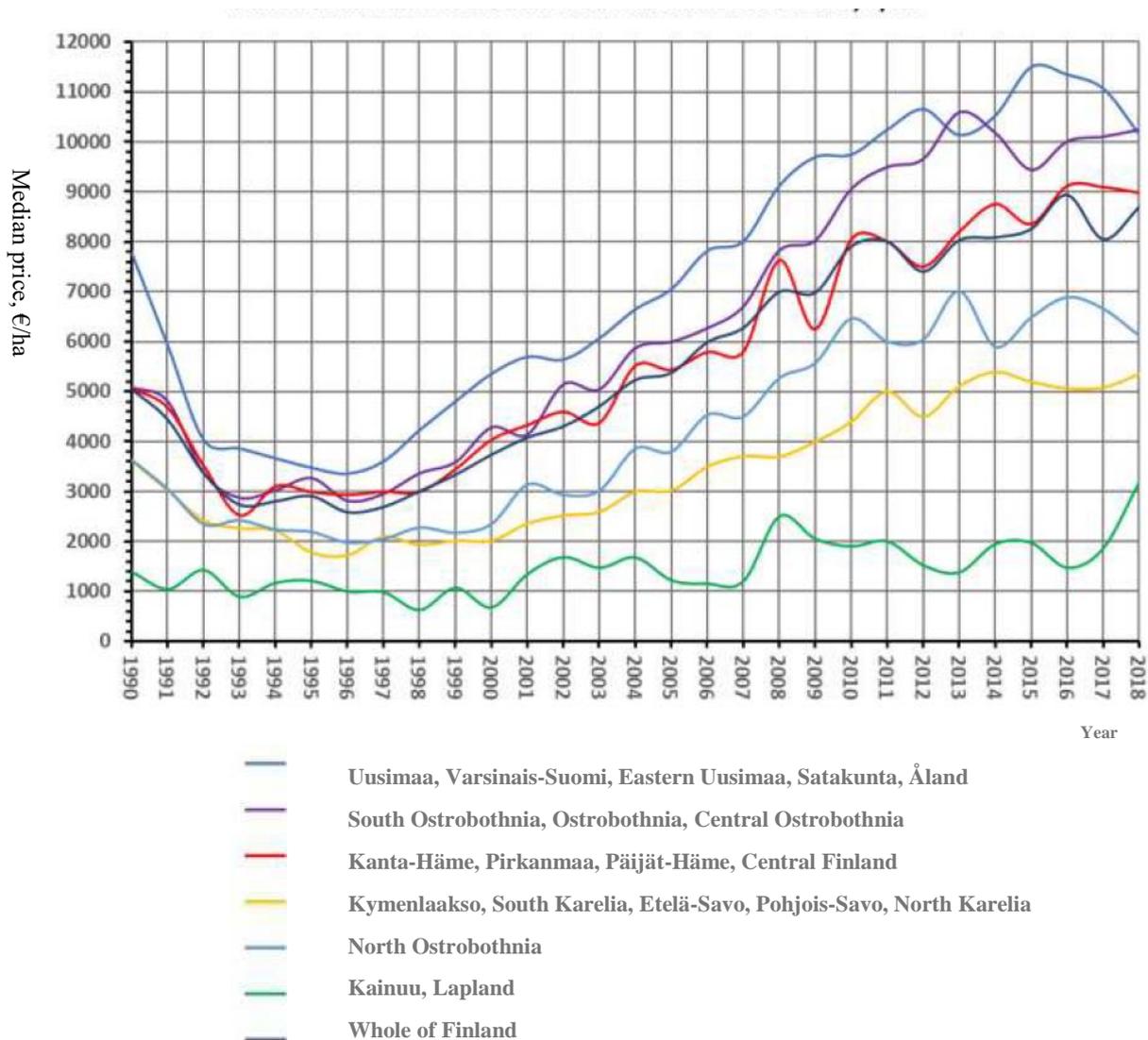


Figure 5: Sales of properties of more than 2 ha consisting exclusively of arable land (not built on and not including sales between relatives) by type of region between 1990 and 2018 (Source: National Land Survey of Finland)

Most wind farms in Finland are built on leased land in forested areas. The area of land that needs to be cleared for a single wind power plant and the roads, ditches, transformers, power lines and turbines that need to be constructed or repaired as a result is estimated (by Metsähallitus) to be approximately 1.5 hectares per plant. The 698 wind power plants that had been built by the end of 2018 have therefore made approximately 1050 hectares of forest, i.e. approximately 10.5 cubic kilometres, unavailable for other economic use.

Land lease revenues fluctuate between €5000 and €15 000 per year per plant. Land lease prices and any one-off compensation paid are trade secrets between the wind power enterprise and the landowner, and there are no statistics available on these. It has, however, been estimated that leasing an area for a wind power plant is a more viable option for forest owners than engaging in forestry.

These areas cannot be used to grow trees, but the landowner receives a set amount of rental income. Other restrictions on land use depend on laws and planning rules, but these kinds of restrictions are few. There are generally no restrictions on access other than in the immediate vicinity of power plants. Roads that are repaired or built to provide access to power plants also benefit timber lorries and other activity in the area and can therefore actually improve the area's economic potential.

8. Please describe the development and share of biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material. (Article 22(1)(i) of Directive 2009/28/EC)

The sustainability criteria for biofuels and bioliquids set out in Directive 2009/28/EC have been transposed into Finnish law by the Act on Biofuels and Bioliquids, which entered into force on 1 July 2013. Similarly to previous years, operators in this sector in Finland prioritised the development of biofuels made from wastes, residues, non-food cellulosic material and ligno-cellulosic material in 2017 and 2018. The consumption of biofuels produced from these feedstocks has increased. Table 5 shows sustainable biofuels made from wastes, residues, non-food cellulosic material and ligno-cellulosic material in 2017 and 2018. Double counting was used for biofuels made from these feedstocks in 2017 in accordance with the must-carry laws in force during that year. The double counting rules of the Finnish Act on the Promotion of the Use of Biofuels were revised in connection with the legislative amendment (387/2017) introduced in order to transpose the ILUC Directive into national law. This is why Table 5 also shows the corresponding shares of biofuels made from the feedstocks listed in Annex IX to Directive 2009/28/EC in respect of the year 2018. No information on the total consumption of biofuels made from the feedstocks listed in Annex IX was collected in 2017, as the double counting rules set out in the ILUC Directive were not used for biofuels made from the feedstocks listed in Annex IX until the year 2018.

Table 5: Production and consumption of Article 21(2) biofuels (ktoe) and consumption of Article 22(1)(i) biofuels (ktoe)

Article 21(2) biofuels²⁹ (2017 and 2018) and Article 22(1)(i) biofuels³⁰ (2018)	Year 2017	Year 2018
Production – Fuel type X (please specify)	n/a	n/a
Consumption – Fuel type X (please specify)	n/a	n/a
Total production of Article 21(2) biofuels	n/a	n/a
Total consumption of Article 21(2) biofuels	332	310
% share of Article 21(2) fuels from total RES-T	81%	79%
Total consumption of Article 22(1)(i) biofuels	n/a	193
% share of Article 22(1)(i) fuels from total RES-T	n/a	49%

9. Please provide information on the estimated impacts of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within your country in the preceding two years. Please provide information on how these impacts were assessed, with references to relevant documentation on these impacts within your country. (Article 22 (1)(j) of Directive 2009/28/EC).

The production of biofuels and bioliquids in Finland is currently mostly based on domestic and imported wastes and residues. Controls are carried out within the framework of the national sustainability scheme to ensure that biofuels and bioliquids are produced sustainably and that they do not have a harmful impact on, for example, biodiversity. It therefore appears that the production of biofuels has not had an impact

²⁹ Biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material.

³⁰ Biofuels made from the feedstocks listed in Annex IX to Directive 2009/28/EC.

on any of the aforementioned factors in Finland.

10. Please estimate the net greenhouse gas emission savings due to the use of energy from renewable sources. (Article 22(1)(k) of Directive 2009/28/EC).

The estimate of net greenhouse gas emission savings presented below is theoretical. Electricity and heat production in the forest industry is based on biomass created as a by-product of industrial processes. It is essentially erroneous to assume, particularly with regard to the forest industry, that the electricity and heat required for industrial processes is produced using fossil fuels. If it were not possible to use biomass to produce the electricity and heat needed to power forestry processes, there would be no forest industry in Finland.

Finland's estimate of net greenhouse gas emission savings achieved due to the use of renewable energy is based on the following assumptions:

- Biofuels: as per Article 22(2) of Directive 2009/28/EC
- With regard to separate electricity production (hydropower, wind power, photovoltaics and separate electricity production from bioenergy), net savings have been estimated using an emission factor of 0.095 Mt CO₂/PJ. The emission factor corresponds to the mean emission factor for separate condensate production based on fossil fuels in Finland. With regard to hydropower, wind power and photovoltaics, the assumption is that one unit of energy corresponds to 2.4 units of fossil fuel. The fuel consumption ratio used for bioenergy in the calculations was 1:1. Biomass emissions have been taken into account when assessing the reduction in emissions attributable to bioenergy in accordance with Annex II to the Commission's report.
- Heat pump energy and solar thermal power are substituted for separate fossil-powered heat production in the calculations. The net savings have been estimated using an emission factor of 0.075 Mt CO₂/PJ. The emission factor corresponds to the mean emission factor for separate heat production based on fossil fuels in Finland. With regard to separate heat production based on bioenergy, the net savings have been estimated using an emission factor of 0.074 Mt CO₂/PJ. The emission factor takes into account the reduction in net savings so that biomass emissions are assumed to have a value of 0.001 Mt CO₂/PJ in accordance with Annex II to the Commission's report.
- With regard to combined heat and power (CHP) production, the net savings have been estimated using an emission factor of 0.082 Mt CO₂/PJ. The emission factor corresponds to the mean emission factor for combined heat and power production based on fossil fuels in Finland, minus biomass emissions, in accordance with Annex II to the Commission's report.

Table 6: Estimated GHG emission savings from the use of renewable energy (Mt CO₂eq)

Environmental aspects	2017	2018
Total estimated net GHG emission saving from using renewable energy ³¹		
- Estimated net GHG saving from the use of renewable electricity	19.86 Mt	21.56 Mt
- Estimated net GHG saving from the use of renewable energy in heating and cooling	28.56 Mt	29.05 Mt
- Estimated net GHG saving from the use of renewable energy in transport	0.76 Mt	0.72 Mt

11. Please report on (for the preceding two years) and estimate (for the following years up to

³¹ The contribution of gas, electricity and hydrogen from renewable energy sources should be reported depending on the final use (electricity, heating and cooling, or transport) and only be counted once towards the total estimated net GHG savings.

2020) the excess/deficit production of energy from renewable sources compared to the indicative trajectory which could be transferred to / imported from other Member States and/or third countries, as well as estimated potential for joint projects until 2020. (Article 22(1)(l) and (m) of Directive 2009/28/EC).

The increase in the share of renewable energy was investigated and analysed in connection with the latest revision of the national energy and climate strategy. Finland is still following the trajectory set out in Directive 2009/28/EC and is likely to exceed the 2020 target by a considerable margin.

Table 7: Actual and estimated excess and/or deficit (-) production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States and/or third countries in [Member State] (ktoe)³²³³

	Year n-2 (2009)	Year n-1 (2010)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual/estimated excess or deficit production (please distinguish per type of renewable energy and per origin/destination of import/export) ³⁴	0	0	0	0	0	0	0	0	1179	1420	~1420	~1420

11.1. Please provide details of statistical transfers, joint projects and joint support scheme decision rules.

Finland made no statistical transfers and had no joint projects or joint support schemes with other countries in 2017–2018. Finland has also not made any such arrangements for the coming years.

12. Please provide information on how the share for biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates. (Article 22(1)(n) of Directive 2009/28/EC).

The share for biodegradable waste in waste used for producing energy has been estimated to be 50%. The estimate is based on sampling. A national recommendation on composition analyses was issued to improve the quality of sampling in 2014, and the volume of sampling has increased. A composition database has been set up to record the data with the aim of collating and processing the results of qualitative testing and composition analyses for various types of waste.

³² Please use actual figures to report on the excess production in the two years preceding submission of the report, and estimates for the following years up to 2020. In each report Member State may correct the data of the previous reports.

³³ When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. -x ktoe).

³⁴ Reported as the surplus or deficit in respect of gross final consumption compared to the minimum development target.