TEM/236/08.10.02/2018

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

31 January 2018

1. Sectoral and overall shares and actual consumption of energy from renewable sources <u>in the preceding two years</u> (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 sources[1]**

	2015	2016
RES-H&C[2] (%)	52.5	53.7
RES-E[3] (%)	32.5	32.9
RES-T[4] (%)	22.0	8.4
Overall RES share[5] (%)	39.2	38.7
Of which from cooperation mechanism[6] (%)	0	0
Surplus for cooperation mechanism[7] (%)	0	0

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

	2015	2016
(A) Gross final consumption of RES for heating and cooling	7 069	7 582
(B) Gross final consumption of electricity from RES	2 352	2 464
(C) Gross final consumption of energy from RES in transport	515	197
(D) Gross total RES consumption[9]	9 936	10 244
(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)	9 936	10 244

[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 electricity 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 consumption from renewable sources 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] 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 <u>in electricity</u>[10]**

	2015		2016	
	MW	***GWh***	***MW***	***GWh***
Hydro[11]:	3 249	14 148	3 250	14 228
non-pumped	3 249	14 166	3 250	14 244
< 1 MW	33	141	34	146
1 MW – 10 MW	273	974	273	975
> 10 MW	2 943	13 051	2 943	13 124
pumped	0	0	0	0
mixed[12]	0	0	0	0
Geothermal	0	0	0	0
Solar:	15	10	35	18
solar photovoltaic	15	10	35	18
concentrated solar power	0	0	0	0
Tide, wave, ocean	0	0	0	0
Wind:	1 005	1 985	1 565	3 103
onshore	1 001	N/A	1 561	N/A
offshore	4	N/A	4	N/A
Biomass[13]:	1 752	10 960	1 748	11 012
solid biomass	1 752	10 589	1 748	10 630
biogas	0	372	0	410
bioliquids	0	0	0	0
TOTAL	6 021	27 103	6 598	28 361
of which in CHP	1 752	9 527	1 748	9 776

***Table 1c:* Total actual contribution (final energy consumption[14]) 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 <u>in heating and cooling</u> (ktoe)[15]**

	2015	2016
Geothermal (excluding low temperature geothermal heat in heat pump applications)	0	0
Solar	2	2
Biomass[16]:	6 470	6 937
solid biomass	6 432	6 897
biogas	38	40
bioliquids	0	0
Renewable energy from heat pumps, of	408	426

[10] Facilitates comparison with Table 10a of the NREAPs.
[11] Normalised in accordance with Directive 2009/28/EC and Eurostat methodology.
[12] In accordance with new Eurostat methodology.
[13] Take into account only those complying with applicable sustainability criteria; cf. Article 5(1) last subparagraph of Directive 2009/28/EC.
[14] Direct use and district heat as defined in Article 5(4) of Directive 2009/28/EC.
[15] Facilitates comparison with Table 11 of the NREAPs.
[16] Take into account only those complying with applicable sustainability criteria; cf. Article 5(1) last subparagraph of Directive 2009/28/EC.

which:		
- aerothermal	263	269
- geothermal	146	156
- hydrothermal	0	0
TOTAL	6 880	7 364
of which DH[17]	966	1 046
of which biomass in households[18]	1 195	1 300

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)[19],[20]**

	2013	**2014**
Bioethanol/bio-ETBE	66	68
of which biofuels[21] *(Article 21(2))*	N/A	N/A
of which imported[22]	N/A	N/A
Biodiesels	432	109
of which biofuels[23] *(Article 21(2))*	N/A	N/A
of which imported[24]	N/A	N/A
Hydrogen from renewables	0	0
Renewable electricity	19.1	19.2
of which road transport	0.1	0.2
of which non-road transport	19	19
Others (as biogas, vegetable oils, etc.) – please specify	biogas 2.0	biogas 1.9
of which biofuels[25] *(Article 21(2))*	N/A	N/A
TOTAL	519	198

2. Measures taken in the preceding two years and/or planned at national level to promote the 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 measure**
Must-carry status for biofuel (Act on Promoting the Use of Biofuels in Transport;	Regulatory	Share of biofuels corresponding to the requirement	Use of biofuels in transport	Ongoing	Legislative amendment 1420/2010 entered into force on

[17] District heating and/or cooling from total renewable heating and cooling consumption (RES-DH).
[18] Share of total renewable heating and cooling consumption used for heating and cooling.
[19] For biofuels take into account only those compliant with the sustainability criteria; cf. Article 5(1) last subparagraph of Directive 2009/28/EC.
[20] Facilitates comparison with Table 12 of the NREAPs.
[21] Biofuels that are included in Article 21(2) of Directive 2009/28/EC.
[22] From the whole amount of bioethanol/bio-ETBE.
[23] Biofuels that are included in Article 21(2) of Directive 2009/28/EC.
[24] From the whole amount of biodiesel.
[25] Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

446/2007)					1 January 2011; legislative amendment 394/2013 entered into force on 1 July 2013; legislative amendment 387/2017 entered into force on 3 July 2017
Sustainability criteria for biofuels and bioliquids (Act on Biofuels and Bioliquids; 393/2013)	Regulatory	There have been indications that the sustainability criteria for biofuels and bioliquids have been met	Producers and distributors of biofuels and bioliquids, bio-based fuels and fluids	Ongoing	Act entered into force on 1 July 2013; legislative amendment 388/2017 entered into force on 3 July 2017
Production aid for wind power (Act on Production Aid for Electricity from Renewable Energy Sources; 1396/2010)	Economic	2500 MVA and 6 TWh in 2020	Energy producers, wind power	Ongoing	System entered into force on 25 March 2011
Production aid for biogas (Act on Production Aid for Electricity from Renewable Energy Sources; 1396/2010)	Economic	19 MVA and 0.7 TWh in 2020	Energy producers, biogas electricity	Ongoing	System entered into force on 25 March 2011
Production aid for small CHP plants (Act on Production Aid for Electricity from Renewable Energy Sources; 1396/2010)	Economic	160–210 MVA and 1–1.5 TWh in 2020	Energy producers, wood fuels	Ongoing	System entered into force on 25 March 2011
Production aid for wood chips from forestry (Act on Production Aid for Electricity from Renewable Energy Sources; 1396/2010)	Economic	5.3 TWh in 2020	Energy producers, electricity from wood chips from forestry and CHP heating indirectly from wood chips from forestry	Ongoing	System entered into force on 25 March 2011; legislative amendment 261/2015 entered into force on 29 February 2016
Energy subsidy (Government Decree on the General Conditions for Granting Energy Subsidy; 1063/2012)	Economic		Energy producers and users, all measures to increase the generation and use of renewable energy	Ongoing	System reformed as of 1 January 2013
Wind-power compensation regions (Act on Wind-Power Compensation Regions; 490/2013)	Economic	Harmonisation of area monitoring and wind-power construction in designated areas	Energy producers, wind power	Ongoing	Act entered into force on 1 July 2013
Electricity origin guarantee (Act on	Informative and regulatory		Electricity producers,	Ongoing	Legislative amendment

Ensuring and Reporting Electricity Origin; 1129/2003)			promoting market access for electricity of renewable origin		445/2013 entered into force on 1 July 2013
Motiva Oy's communication activities	Informative	Promoting the efficiency of energy and materials and dissemination of information about renewable energy	Investors, end-users, public administration, planners, architects, fitters, citizens, etc.	Ongoing	Ongoing activity
Energy offices	Informative		Enterprises and communities, energy projects to promote the use of renewable energy, etc.	Ongoing	ongoing activity
Consumer energy advice projects	Informative	Promoting energy efficiency and dissemination of information about renewable energy and heating methods	Consumers	Ongoing	Ongoing activity
Farm energy programme (item 30.01.40, Government Decree on Subsidy for Farm Energy Plans; 1000/2009)	Economic and informative	Promoting energy efficiency and the generation and use of renewable energy on farms through energy-efficiency agreements and energy plans	Farms	The programme started to undergo a transitional phase at the start of 2015 when the Rural Development Programme started.	2010–2016
Rural Development Programme for Mainland Finland 2014–2020	Economic	1. Increased expertise, information dissemination, innovation and collaboration in rural areas 2. Climate change mitigation and adaptation • community-based environmental measures, renewable energy • Generation and distribution of renewable energy, biogas • Solid fuels such as pellets and biochar • Chipping and drying of wood chips as well as firewood	Rural micro-enterprises and SMEs, associations and rural residents	Ongoing	2014–2020
Rural investment aid (related to the preceding entry)	Economic	Improving energy efficiency; investments in the renewable energy generation	Farms	Ongoing	2014–2020
Subsidies under the Act on Fixed-Term Financing	Economic	Promoting economically, ecologically and	Forest owners	Ongoing	2015–2020

for Sustainable Forestry (34/2015)		socially sustainable forestry management and use.			
Regional wood-energy advisers	Informative	Increasing the use of wood energy among heat entrepreneurs	Enterprises, communities and consumers; advice relating to the harvesting and use of forest-based energy	Ongoing	Rural Development Programme for Mainland Finland 2014–2020
Amending the Act on Land Use and Building (132/1999)	Regulatory	Taking account of wind power in the context of town planning, including the construction of wind-power plants by means of a derogation procedure for industrial and port areas	Wind-power construction	Ongoing	Legislative amendment 989/2013 entered into force on 1 January 2014
Amending the Act on Land Use and Building (132/1999)	Regulatory	Taking account of wind power in the context of town planning, including the construction of wind-power plants by means of a derogation procedure in industrial zones and port areas	Wind-power construction	Ongoing	Legislative amendment 989/2013 entered into force on 1 January 2014
Government Decree issued under the Land Use and Building Act on the numerical values of the coefficients of energy forms employed in buildings and Decree of the Ministry of the Environment on the energy performance of buildings	Regulatory	Promotion of renewable energy sources	Anyone undertaking a construction project	Completed	2013–2017
Fitters' certification scheme	Regulatory, and information/guidance	Positive experiences as a result of higher-quality installation, which contributes to the increased use of renewable energy. Certification of training institutions improves training quality.	Fitters; other target groups are consumers and enterprises that order installation work	Ongoing	The scheme was launched in 2013. The Act on the Approval of Trainers for Fitters under Certain Energy Schemes Using Renewable Energy (38/2015) has been issued.
Revision of the Act and	Regulatory	In addition to the implementation of	Projects that are, or that may be	Finished (new legislation in	2015–2017

Government Decree on Environmental Impact Assessment Procedure (252/2017 and 277/2017, respectively)		the revised EIA Directive, streamlining of the environmental impact assessment (EIA) procedure, including an option to co-ordinate the land-use planning of a project and the EIA procedure	subject to the EIA procedure	force)	
Provision of information and advice	Information/guidance		End-users, public administration, planners, architects, fitters, citizens, etc.	Ongoing	Ongoing activity
Act on Excise Duty on Liquid Fuels (1472/1994), and consideration for lifecycle greenhouse gas emissions for the purposes of carbon-dioxide-based taxation of petrol and diesel oil	Economic	Increasing the rate of carbon-dioxide tax of fossil fuels and encouraging the use of biofuels	Energy producers and end-users	ongoing	From 1 July 2012
Act on Excise Duty on Liquid Fuels; increasing carbon-dioxide tax on petrol and diesel oil by 10 %	Economic	Encouraging the use of biofuels	Energy producers and end-users	ongoing	Implemented in two stages, starting on 1 January 2012 and 1 January 2014
Act on Excise Duty on Liquid Fuels; increasing carbon-dioxide tax on heating and machinery fuels from EUR 30 to EUR 35 per tonne of carbon dioxide	Economic	Encouraging the use of biofuels	Energy producers and end-users	ongoing	From 1 January 2013
Sustainable growth and work – Finland's Structural Fund Programme 2014–2020	Economic	New solutions for renewable energy and energy efficiency; improving the energy efficiency of SMEs	SMEs, municipalities, research and training organisations	ongoing	2014–2022
Sustainable bioenergy solutions for the future – BEST (a programme by Cleen Oy and FIBIC Oy)	Economic; research and development	New knowledge or innovation	Future business opportunities in bioenergy	Ongoing	2013–2016
Intelligent Towns (Tekes programme)	Economic; research and development	New, innovative solutions for built urban environments, energy systems and transport	Towns, cities and enterprises offering new, innovative energy solutions	Ongoing	2013–2017

Green Growth – The Road Towards a Sustainable Economy (Tekes programme)	Economic; research and development	The aim is to identify new, potential sustainable economy business growth areas based on materially reduced energy use and the sustainable use of natural resources.	The target group is enterprises and joint projects with growth potential in resource-efficient areas of the sustainable economy	Ended	2011–2015
New energy academy programme (the Academy of Finland programme)	Research and expertise development	New knowledge; intelligent energy technologies. The aim is to find solutions for managing major future change in the energy sector.	Generation of sustainable energy	Ongoing	2015–2018
Projects financed by the Strategic Research Council of the Academy of Finland	Financial, research and development	Financing for high-quality science with societal relevance and impact in order to solve, for example, issues related to the technological transformation of the energy sector.	Various parties affected by the technological transformation of the energy sector	Ongoing	began in 2015 in three-year periods
ForestEnergy2020 (research and innovation by VTT and Metla)	Economic; research and development		Solutions covering the entire forest-energy generation and usage chain	Ongoing	2012–2016
Refurbishment of VTT's renewable energy research infrastructure ("RES-infra")	Economic; research and development		Accelerating the commercialisation of R&D results in renewable energy together with the industry	Ended	2012–2015
Cleantech strategic programme	Policy programme	Growth in cleantech business	Improving the conditions for business activity in renewable energy	Ended	2012–2015
Sitra's Resource-Wise Regions	Informative	Creating a network of exemplary towns and cities in terms of renewable energy and resource efficiency		Ended	2012–2015

* 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), or energy generated (ktoe)?
*** Who are the targeted persons: investors, end-users, public administration, planners, architects, fitters, etc.? What is the targeted activity/sector: biofuel production, energy 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

The application of procedures relating to wind-power construction became clearer in 2012 and 2013 when the working group on promoting wind power that was appointed by the Ministry of Employment and the Economy finished its work. Barriers and restrictions were removed from various administrative areas. The working group examined mechanisms that could be used to reduce the barriers and restrictions associated with wind-power construction and to reconcile activities falling within the jurisdiction of various ministries.

In December 2016, the Ministry of the Environment published an updated version of its guidebook *Tuulivoimarakentamisen suunnittelu* ('Planning of wind-power construction projects'), originally published in 2012. The guidebook was updated to reflect the increased information on the impact of wind-power construction and the partially amended legislation on the subject. A key objective of the guidebook is to promote the highest possible degree of uniformity when applying legislation to manage wind-power construction projects. The guidebook is to be applied mainly when managing the construction of industrial-scale wind-power plants.

In addition, the project *Tuulivoimarakentamisen ja -suunnittelun seurannan kehittäminen; Ehdotus seurannan järjestämiseksi* ('Development of the monitoring of wind-power construction and planning; A proposal for the organisation of monitoring') by the Finnish Environment Institute (SYKE), underway in 2016, aimed at drafting a proposal for organising the monitoring of wind-power construction and planning from the perspective of land use.

The Land Use and Building Act

As stated earlier, the potential of land-use planning is excellent for wind-power construction.

The Land Use and Building Act was amended in 2014 so that wind-power construction in an area designated as an industrial or port area is not regarded as having a significant impact in terms of town planning, and therefore a derogation from the town-planning regulations may be granted for wind-power construction if other conditions are fulfilled.

An amendment to the Land Use and Building Act that entered into force on 1 May 2017 facilitated the installation of solar panels and solar thermal collectors by requiring a permit only for the installation or construction of solar panels or solar thermal collectors that have a significant impact on the townscape or the environment. The amendment was under preparation during the reporting period.

Traffic and wind power

The procedures for situating wind power in relation to traffic have become clearer, and restrictions have been eased considerably. The guideline distance of wind power from national roads is 300 m instead of the former 500 m, and generally 0.5–1.5 km from sea lanes. The distance requirements have also been reduced along railway lines.

The Aviation Act that entered into force in November 2014 simplified the permit practices for wind-power plants. In the future, builders of wind-power plants will deal directly with the Finnish Transport Safety Agency (Trafi), and a statement from Finavia will no longer need to be enclosed when applying for a permit. Trafi also published detailed guidelines on markings and illumination for wind-power plants on 1 February 2013.

In spring 2017, the Finnish Transport Safety Agency (Trafi) published aviation regulation AGA M3-14 *Vapautuminen velvoitteesta hakea lentoesteelle lupa* ('Exemption from the obligation to apply for a permit for an obstacle') that it had prepared in 2016. According to the regulation, if an obstacle does not affect aviation safety, the erector of the obstacle has no obligation to acquire a permit for it. Windpower constructors must contact ANS Finland (a state-owned air navigation services company separated from Finavia Oyj) to determine whether a wind-power plant would affect aviation safety. If the plant does not affect aviation safety, ANS Finland issues a statement whereby no separate obstacle permit need be applied for from Trafi for erecting the plant. If, on the other hand, it is found that the plant would affect aviation safety, the constructor is instructed to apply for a permit from Trafi. The regulation has helped to decrease permit procedures and costs incurred by the erector of an obstacle and accelerated the permit process.

Noise nuisance from wind power

The noise levels permitted for wind-power plants in Finland are regulated by the Government Decree on Guideline Values for External Noise Levels at Wind-Power Plants (1107/2015), which entered into force on 1 September 2015. The guideline values in the Decree apply to the planning of land use and building in accordance with the Land Use and Building Act and to permit procedures and monitoring in accordance with the Land Use and Building Act and the Environmental Protection Act. The guideline value for noise from wind-power plants in areas of permanent residence, holiday residence, care homes and camp sites is 45 decibels during the day and 40 decibels at night. A daytime guideline value of 45 decibels is laid down for educational establishments and recreational areas. National parks are subject to a guideline value of 40 decibels both during the day and at night. Finland also uses the guidelines on modelling and measuring sound levels at wind-power plants that were published by the Ministry of the Environment in 2014, entitled *Tuulivoiman melutason mittaaminen altistuvassa kohteessa* ('Measuring wind-power noise levels at affected points').

In 2015–2016, the National Institute for Health and Welfare (THL) carried out a survey funded by the Ministry of Social Affairs and Health in nine areas affected by wind power. The purpose of the survey was to determine how common the negative impact caused by wind-power noise is in Finland. From the perspective of health impacts, it is important to assess, in particular, the nuisance caused by wind-power noise indoors and its disturbing effect on sleep. In this data, the noise of wind-power plants was very rarely heard indoors even in the zone that was closest to the plants, and few people reported that wind-power noise disturbed them a great deal when they were staying indoors or sleeping. Outdoors, nuisance from wind-power plants was more often heard and experienced as very disturbing.

In the context of the national energy and climate strategy for 2030, issued in November 2016, the Ministry of Employment and the Economy decided to commission an independent, extensive study on the negative impact of wind power on health and the environment before launching the preparation of an act on production subsidies for renewable electricity. According to the study, completed in spring 2017, the measured infrasound levels are of the

same order near wind-power plants and in an urban environment. In their unanimous conclusions, the researchers state that there are very few studies on the long-term health effects of infrasound and that there is a case for further research on the subject.

Environmental impact assessments

On 4 March 2015, the Ministry of the Environment set up a working group with two tasks: 1) to prepare the changes in the Act and Decree on the Environmental Impact Assessment and other legislation required by the implementation of the Directive (2014/52/EU) amending the EIA Directive and 2) to prepare proposals concerning the coordination of the EIA procedure with land-use planning and environmental permit procedures. The reviewed Act on the Environmental Impact Assessment Procedure (252/2017) and Government Decree on Environmental Impact Assessment Procedure (277/2017) entered into force on 16 May 2017. Among other things, the new regulations provided for the option to combine land-use planning and the EIA procedure for a project in a single procedure and also contained more detailed provisions on the consideration of the EIA in the permit and a provision concerning prior consultation.

The aim of the EIA procedure is to ensure that the environmental impact is clarified with sufficient accuracy when a project is going to have a significant, harmful impact on the environment. Another aim of the EIA procedure is to provide members of the public with greater opportunities for participating in and influencing project planning.

The Finnish Wind Power Association and the Finnish Energy have produced a guide for wind-power builders concerning the fact that the operator concludes a land-use agreement with the landowners in the vicinity of its wind-power plant whose land is at a distance equivalent to five times the diameter of the wind-power plant’s rotor.

Impact of a wind-power project on radar and other activities of the Finnish Defence Forces

Finland currently has some areas with favourable wind conditions where wind-power construction has particularly been prevented by the impact of wind-power plants on radar. Furthermore, the impact of a wind-power project on surveillance sensors (radar) must always be clarified before a project can be implemented. At the same time, the Finnish Defence Forces also assess the impact of the project on its other activities.

Wind-power construction can have a significant, wide-ranging impact from the perspective of the Finnish Defence Forces, and any such impact must be clarified 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 clarified if the wind-power plants are situated in the wind-power area of the Bothnian Bay. Wind-power construction in that area is regulated by the Act on Wind-Power Compensation Areas, which entered into force on 1 July 2013. Under that Act, the construction and commissioning of wind power in wind-power compensation areas no longer

requires the Finnish Defence Forces to clarify separately the impact of the wind-power plant on Finland's regional surveillance, the Finnish Defence Forces' regional operating conditions or military aviation. Construction has been possible in the Bothnian Bay, even if a statement previously issued by the Finnish Defence Forces had been negative. A wind-power fee is collected from the wind-power enterprise in respect of each turbine on a wind-power plant that is built, or is to be built, in that area. Fees have been collected since 2014.

Small-scale electricity generation

There has been significant progress in relation to small-scale generation during the last five years. Provision of information and streamlined procedures have facilitated the acquisition and permit procedure of small-scale generation and its connection to the grid. There have also been tax reforms, such that the lower taxation limit for self-generated and self-used electricity has been raised considerably and taxation practices have been simplified. Today, it is easy for a small-scale generator to find electricity companies that buy electricity generated by small-scale generators by browsing the Energy Market Authority's electricity price comparison site.

To date, it has not been possible to produce accurate statistics for the small-scale generation of electricity and heating. The increase in small-scale generation also creates the need to develop statistics. Statistics Finland has improved the compilation of statistics in co-operation with stakeholders. In 2015–2016, efforts were focused particularly on the statistics on solar electricity. System operators report annually the capacity of small-scale electricity generation connected to their networks, broken down by generation technology. Fingrid has developed methods to assess the momentary volume of solar electricity generation and publishes this assessment as part of its real-time monitoring of the power system.

The marketplaces and products of system services have been developed to enable small-scale operators make their resources better available for Fingrid. In addition to a decreased minimum size of bids, it is now also possible to combine several small resources into one bid.

In 2016, the Ministry of Employment and the Economy established an extensive working group to study the promotion of elasticity of demand by improving the choice for customers. While small-scale generation by individual customers and energy communities as well as the storage of electricity provide a variety of opportunities, there are also many unanswered questions involved. The working group will publish its recommendations in autumn 2018.

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 Electricity Market Act regulates the obligation for transmission and distribution network owners to develop the network. According to that Act, network owners should maintain, use and develop their networks and connections to other networks in accordance with the proportionate needs of their customers and safeguard the procurement of good-quality electricity for customers. Electricity transmission network owners are also responsible for the technical performance and security of use of the entire electricity system (system responsibility). Transmission network owners with system responsibility should maintain and develop the activities and services falling within their respective system responsibilities, as well as other equipment and connections to other networks necessary for fulfilling their

system responsibilities, so that the conditions for electricity markets that operate effectively can be safeguarded. The conditions of sale of network services and the grounds for determining them must be equal and non-discriminatory for all network users. They may only be derogated from for special reasons.

Finland applies a guaranteed network-access procedure. The same, equal rules apply to all electricity-generation facilities connected to the grid. According to the Electricity Market Act, all parties that join the network must be treated equally. There are no primary connection rights or separately ensured connection capacity.

The network owner should, upon request and in return for reasonable compensation, connect electricity-usage points and electricity-generation facilities within its jurisdiction to its network if they satisfy the technical requirements. The conditions and technical requirements imposed by the network owner for connection to the network should be equal and non-discriminatory. One of the network owner's obligations is for the compensation to be paid for the service to be proportionate and for measurement of the electricity supplied to be arranged in an appropriate manner.

The development obligation requires the network owner to increase the transmission capacity of the network where necessary in order to ensure that generation can be connected to the network in accordance with a reasonable request for the same from the customer joining the network.

The costs arising from development of the electricity grid are covered by transmission fees, and the costs arising from grid expansion and associated reinforcement are covered by connection fees. With regard to connection to the network, network owners produce their own written methods and principles for connection pricing. These principles should adhere to the procedures for determining connection prices as ratified by the Energy Authority, which have been submitted by a confirmation decision to each network owner in 2011. The methods ratified by the Energy Authority have consistent content for all electricity-grid owners, and they include things such as the grounds for determining the capacity-reservation fee and the fees to be collected for connecting consumption.

The pricing of system services must not present any unfounded terms obviously limiting competition in electricity trading. However, pricing shall take account of reliability and efficiency of the electricity system as well as the costs and benefits arising from the connection of an electricity generation installation to the system.

Distribution network owners collect a connection fee from parties that join their respective networks in accordance with the grounds for the connection fee (connection conditions) in force for their distribution area. These conditions also define provisions relating to the liability for and division of costs arising from technical adaptation of the network. The connection conditions must be approved by the Energy Authority before they are taken into use, and the Energy Authority also carries out monitoring to ensure that the conditions are equal and non-discriminatory. The general grounds for transmission and connection fees are regulated by the Electricity Market Act.

When determining the amount of a connection fee for a power plant of no more than two megavolt amperes, the pricing is based on the direct costs of expanding the distribution network that are generated by construction of the connection in question. According to the

Electricity Market Act, network reinforcement costs may not include any fee imposed for connection to the electricity grid in relation to electricity generation of less than two megavolt amperes. The network owner may, however, collect the network-protection costs arising from the connection as part of the connection fee.

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** be 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)	Biofuel obligation/quota (%) 6 % 2011 -> 20 % 2020	not quantifiable	-
	Penalty/Buy-out option/Buy-out price (EUR/unit)	-	-
	Average certificate price	-	-
	Tax exemption/refund	-	-
	Investment aid (capital grants or loans) (EUR/unit) Energy aid		EUR 46.48 million (2015) EUR 36.23 million (2016)
	Production incentives Production aid for wind power, biogas electricity and small-scale CHP as a sliding premium feed-in tariff from wood; for wood chips, the premium feed-in tariff according to the wood-paying capability, emissions allowances, peat price and taxes (system launched in 2011)	Target price EUR 83.5/MWh (target price for wind power EUR 105.3/MWh until end of 2015); heat premium for biogas electricity EUR 50/MWh and for small-scale CHP EUR 20/MWh; Subsidy for electricity from forestry wood chips EUR 15.9/MWhe in 2015 and EUR 18/MWhe in 2016	EUR 142 million (2015) EUR 172 million (2016)
	Feed-in premiums	-	-
	Competitive calls	-	-
Total annual estimated support in the electricity sector (the feed-in tariff is aimed at electricity production, but it also indirectly promotes the production of renewable heating)			EUR 173.74 million (2015) EUR 179 million (2016)
Total annual estimated support in the heating sector			EUR 9.98 million (2015) EUR 5.6 million (2016)
Total annual estimated support in the transport sector			EUR 4.8 million (2015) EUR 3.7 million (2016)

Use of biomass in electricity and heat generation

The use of biomass in the generation of electricity and heat has continued to progress more rapidly than predicted in the national action plan (in the 2016 NREAP, biomass-based electricity generation is 10 370 GWh and heating and cooling 5 950 GWh, while the actual values are 11 012 GWh for electricity generation and 6 973 GWh for heating and cooling).

In 2015 and 2016, energy subsidies (investment subsidy for investments in renewable energy) have been provided, in particular, to support heat stations that consume wood-based fuel with the aim to replace oil boilers. About 20% of the energy subsidies for investments in renewable energy was allocated to installations that use wood-based fuel, and a small share was allocated to biogas plants.

A new fixed-term payment scheme for sustainable forestry was launched on 1 June 2015. One of the elements of the scheme is an incentive assistance for private forest owners to manage their forests. In some young forests, it is possible to harvest even small-dimensioned wood in the context of other forestry work. In the second half of 2015 and in 2016, the area payment for the management of young forests was EUR 230 per hectare. If small-dimensioned wood is collected in the context of the management of a young forest, the payment can be increased by EUR 200 per hectare, in which case the total payment is EUR 430 per hectare. In 2016, the total area for which assistance was paid either under the Act on the Financing of Sustainable Forestry (management of seeding stands) or the payment scheme for the management of young forests was 143 000 hectares. This included the 27 000 hectares where small-dimensioned wood was collected. The assistance is not linked to the energy use of the wood. In addition to privately owned forests, small-dimensioned energy wood is harvested even in state-owned forests. The assistance for harvesting energy wood has been EUR 7 per cubic metre everywhere in Finland, in addition to which assistance such as the hectare-based management assistance for young thinning stands has been between EUR 4 and 7 per cubic metre.

In 2015, it was decided that the energy tax for peat would be reduced from EUR 3.4 to EUR 1.9 per megawatt-hour. The reduction took effect on 1 March 2016. At the same time, the variable generation subsidy for electricity generated with woodchips was increased from EUR 15.9 to EUR 18 per megawatt-hour. In the context of the increase of the subsidy, it was decided that the generation subsidy for electricity generated with heavy timber should be limited to 60%, i.e. EUR 10.8 per megawatt-hour. The purpose of this limit is to ensure that the electricity generation subsidy does not distort the timber market, directing processable wood directly to energy use. Due to a transitional period, the limit of the subsidy takes effect on 1 January 2019.

Wind power

Production aid (a feed-in tariff) for wind power was introduced in March 2011, and many projects are pending. Wind power amounting to no more than 2 500 MVA may be approved for the feed-in tariff scheme. At the end of December 2016, some 1 781 MVA of wind-power plants had been approved for the system, and the remainder of the 2 500 MVA quota was reserved for wind-power projects for which part of the quota had been reserved from the scheme.

The discretionary State subsidy for drafting plans to direct wind-power construction, which was in use during the 2011–2014 period, has promoted regional and municipal usage planning for wind-power construction on the part of Regional Councils and local authorities. The discretionary State subsidy has been discontinued.

There is a rather great number of provincial plans and plans drafted by local authorities pending throughout the country to govern wind-power construction directly. The total output enabled by the provincial plans that were pending at the end of 2012 was approximately 14 800 MW, and approximately 4 900 wind-power plants. The general plans directly governing wind-power construction that were pending at the same time reserved areas of land for wind-power construction, corresponding to a total of approximately 5 300 MW and approximately 1 700 wind-power plants, as well as a total of approximately 1 300 MW offshore, with approximately 450 wind-power plants. Furthermore, several Regional Councils have provincial plans with legal force that include areas suitable for wind-power construction. These areas are almost entirely situated offshore and have a total potential capacity of approximately 6 000 MW. This information is based on data collected by the Ministry of the Environment with the help of ELY Centres and the Regional Councils for the purposes of a report by a working group on the promotion of wind power under the guidance of the Ministry of Employment and the Economy (TEM). The information has not been updated since then.

The government that was elected in the spring of 2015 decided to close the feed-in tariff system for wind power. An amendment to the Production Aid Act entered into force on 26 October 2015. The aim of the legislative amendment was the controlled closure of the feed-in tariff scheme. No further applications will be accepted once the wind-power capacity of 2 500 MVA has been reached on the basis of approval and quota decisions. Following the amendment to the Production Aid Act, the total capacity of wind-power plants will no longer be released for re-use. In the future, the approval of a wind-power plant for a total capacity in accordance with the feed-in tariff scheme (2 500 MVA) will require a quota decision, which may be in force until no later than 1 November 2017.

In order to gain experience of constructing offshore wind power, the Ministry of Employment and the Economy selected, on the basis of a tender procedure, the wind farm planned by Suomen Hyötytuuli Oy at Tahkoluoto in Pori as a trial project for offshore wind power, from nine projects on offer. The Ministry of Employment and the Economy (TEM) granted EUR 20 million in investment aid in November 2014 for implementation of the project. The aid may not, however, be more than 18.5 % of the actual approved costs of the project. The project may also receive production aid for 12 years, depending on the amount of electricity generated. The offshore wind farm with a total capacity of 42 MW was commissioned in 2017.

Biofuels and bioliquids

Must-carry status

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

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

Double counting has been applied in 2015 and 2016 to the must-carry status in respect of biofuels generated from waste, residue, cellulose unfit for consumption, and ligno-cellulose material. Only biofuels generated from raw materials in respect of which it can be demonstrated that the sustainability criteria have been met may be approved for must-carry status.

Following the implementation of the ILUC Directive, provisions concerning the must-carry status were amended with legislation that entered into force on 3 July 2017. As a consequence, double calculation is applied to biofuels produced from raw materials referred to in Annex IX of the ILUC Directive as from 2018. In addition, to meet the obligations of a must-carry status, a ceiling of 7 percentage points has been set for the volume of biofuels produced from field-farmed raw materials along with a lower target threshold of 0.5 percentage points for certain raw materials.

Sustainability criteria system

The Act on Biofuels and Bioliquids (393/2013) entered into force on 1 July 2013. That Act transposed the sustainability criteria for biofuels and bioliquids from the RES Directive into Finnish law. The Act regulates the requirements that apply to the sustainability assessments of transport biofuels and of bioliquids produced for energy uses other than transport. The Act also regulates the procedures to be followed when demonstrating that the sustainability criteria have been met.

Pursuant to the Act on Biofuels and Bioliquids, a key element in demonstrating the sustainability of biofuels and bioliquids is the sustainability system of the operator. The operator must apply for approval from the Energy Market Authority for its sustainability system, after which the operator may issue a sustainability certificate for biofuel or bioliquid batches to demonstrate that the batch meets the sustainability criteria. The approval of the sustainability system of an operator is valid for five years at a time. No changes took place with respect to the legislation related to sustainability systems in 2015 or 2016.

Fuel taxation

Energy tax reforms entered into force at the start of 2011. The most important element of these reforms is basing the taxation of all fuels, including transport fuels, on their energy content and carbon-dioxide emissions. The tax was increased for the first time at the start of 2012 and for the second time at the start of 2014. The tax rate of heating fuels was again increased in 2015 and 2016. This time, increases were targeted to the carbon dioxide tax of heating fuels, which improves the competitiveness of renewable energy in relation to fossil fuels.

The consideration of carbon-dioxide emissions also provides a benefit for biofuels. The basis for carbon-dioxide tax on biofuels is the carbon-dioxide emissions during their lifetime in comparison with their fossil equivalents. Unsustainable biofuels are subject to the same carbon-dioxide tax as fossil fuels, sustainable biofuels are subject to 50 % of the carbon-dioxide tax on the equivalent fossil fuel, and double-counted fuels under the RES Directive are not subject to any carbon-dioxide tax. The basis for calculating carbon-dioxide tax has been EUR 58/tCO_2 since 2014.

Other activities

The objectives of the climate policy of the Government Programme are implemented through the national energy and climate strategy updated at the end of 2016 and the medium-term climate policy plan completed in 2017.

The update of the national energy and climate strategy for 2030 began in November 2015 and was completed in November 2016. During the reporting period, the new subsidy mechanism for renewable electricity (tender-based generation subsidy scheme for renewable electricity) has been planned as part of the implementation of the energy and climate strategy.

The medium-term plan sets out a greenhouse gas emission reduction target for 2030 and determines the measures by which the target should be achieved and its consistency with the long-term climate objective ensured. The medium-term plan specifies and complements the measures for reducing emissions determined in the energy and climate strategy. The plan also considers links between sectors and cross-cutting themes, such as the importance of consumption and local climate action. The plan takes into account the energy policy actions of the strategy, which are reflected in emission trends. The plan is based on the baseline scenario completed in summer 2016, which also provided the basis for the preparation of 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*).

The electricity markets have been deregulated, and electricity generated from renewable energy sources does not occupy a special position in electricity trade. The viability of RES production (wind power as well as electricity generated using wood chips from forestry and biogas) is being promoted through subsidy schemes. Electricity from renewable sources is also sold on electricity exchanges, to electricity re-sellers, or directly to end-users.

Since 2005, electricity sellers in Finland have had to provide their customers with information concerning the origin of the electricity that they sell in the customers' electricity bills, at least once a year. The environmental information associated with the origin of the electricity (CO_2 emissions and radioactive waste) must be available to customers via public information sources such as the electricity seller's website. Since 2014, only electricity that is backed by a guarantee of origin may be reported as electricity generated using renewable energy sources. Enterprises generally sell electricity generated using renewable energy sources under their own product branding.

No data has been compiled concerning the distribution of beneficiary electricity generation to end-users. In 2016, renewable electricity accounted for 5.2 % of total consumption in Finland and 6.7 % of domestic generation.

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 has been stated in the response to point 3, efforts have been made to promote the introduction of more highly developed but more expensive biofuels by means of double-counting under the RES Directive and a new structure for fuel taxation. Investment aid for biofuel production has also targeted more highly developed biofuels.

Development projects relating to renewable energy can be supported through the Rural Development Programme for Mainland Finland. Making the use of biogas from agricultural residue more widespread in Finland requires development work to improve its price competitiveness.

The higher costs of offshore wind-power construction were compensated for in the 2014 State budget by reserving EUR 20 million of subsidies for offshore wind-power demonstration projects.

The aid may not, however, be more than 18.5 % of the actual approved costs of the project. One of the aims is to test offshore wind power in practice, including in icy conditions.

In autumn 2015, the Government decided to allocate EUR 100 million for investments in renewable energy and new energy technologies in 2016–2018. Of this sum, EUR 20 million was allocated for the year 2016. Investment aid can be granted to an enterprise, local authority or other community for investment in fixed assets with approved costs in excess of EUR 5 million and relating to the production of highly developed biofuels for transport or trial projects for new 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 generated from renewable energy sources and using efficient overall production. The Act on Ensuring and Reporting Electricity Origin was amended by a legislative amendment that entered into force on 1 July 2013. The amendments to the Act entered into force gradually until 1 March 2014. Since 1 January 2014, as a result of the amendments to the Act, guarantees of origin have been the only way of ensuring that sold electricity is generated using renewable energy sources.

Guarantees of origin in Finland are issued by the transmission system operator Fingrid Oyj. Fingrid Oyj has hived off this task to its fully-owned subsidiary Finextra Oy. The transfer, revocation and cancellation of guarantees of origin are also tasks carried out by Finextra. The

guarantees of origin that are issued are based on confirmation of the generation method used by the power plant and of the energy sources that it uses, as well as measurement of the electricity generated. Every year, the Energy Authority calculates the national residual distribution that electricity sellers should use in their own notifications of origin within no more than two months following publication of the residual distribution.

If an electricity producer wants its power plant to join the guarantee-of-origin scheme for electricity, it should verify the generation method used by the power plant and the energy sources that it uses and apply to the register administrator for the power plant to join the scheme. Before any guarantees of origin can be issued for electricity generated at the power plant, an approved assessment body should verify the generation method used by the power plant and the energy sources that it uses. Verification of the power plant by the assessment body will remain in force for no more than five years from the date of issue of the verification certificate. Alternatively, a power plant may be verified by the register administrator in accordance with the European Energy Certificate System (EECS). An approval decision under the Production Act (1396/2010) is also comparable to a verification certificate issued by an assessment body.

The owner of the power plant notifies the register administrator (Finextra Oy) of the quantity of electricity in respect of which the guarantee of origin is sought and the calendar month and year in which the electricity in question was generated. The register administrator issues the guarantee of origin based on the quantity of energy generated and on a monthly basis. The electricity seller must notify the register administrator immediately when the guarantee of origin is used to verify the origin of the electricity sold. The register administrator must revoke the guarantee of origin immediately once it has been informed that the guarantee has been used. The register administrator must cancel a guarantee of origin if it has not been used within 12 months of the last generation date of the electrical energy to which it relates.

According to current legislation, the requirement to verify the origin of electricity should be fulfilled by revoking any guarantees of origin for the previous year by 31 March of the following year. The register administrator must also notify the Energy Authority of the quantities covered by guarantees of origin that were issued and revoked during the previous year and of the quantities exported from Finland and imported to Finland for the purposes of calculating residual distribution.

Finextra has been a member of the Association of Issuing Bodies (AIB) since the start of 2015, and the guarantees of origin issued in Finland are in accordance with the EECS scheme. Finextra’s electronic guarantee-of-origin register was taken into use on 1 January 2015. Guarantees of origin were also issued electronically in Finland in 2013-2014, and they could be transferred electronically to other Member States of the AIB.

The Energy Authority monitors compliance with the Act on Production Aid for Electricity from Renewable Energy Sources, as well as the activities of assessment bodies and the register administrator. The Authority also approves assessment bodies under the Guarantees of Origin Act. In order to carry out such monitoring, it has the right to obtain information from power-plant owners, the register administrator, assessment bodies and electricity sellers. The Energy Authority carries out random inspections on operators at regular intervals.

The Energy Authority calculates and publishes the national residual distribution that electricity sellers must use as the basis of origin for unverified, renewable electricity and for

electricity of unknown origin. The Authority has the task of confirming the service conditions and pricing methods associated with Fingrid's guarantees of origin, and of monitoring the pricing associated with the issuing and transfer of guarantees of origin. The register administrator's services must be reasonably priced and also enable small-scale producers to benefit from the guarantees-of-origin scheme.

Electricity sellers are required every year to notify their customers of the total distribution of origin of the electricity that they have sold during the previous calendar year. The distribution must be reported in electricity bills and sales-promotion materials, and must be kept available to electricity users. This must be done with at least the following levels of accuracy:

- fossil energy sources and peat;
- renewable energy sources;
- nuclear power.

In addition to the total distribution, consumers may be informed of the distribution of origin of the product that they have purchased. The distribution of electricity generated using renewables of unverifiable origin and of electricity of unknown origin is reported using the residual distribution published by the Energy Authority. The origin of electricity generated using non-renewable energy sources may also be reported in accordance with the actual generation method used, in addition to the residual distribution.

6. Please describe the developments <u>in the preceding two years</u> 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 amount of imported raw material from EU (ktoe)**		**Amount of imported raw material from non EU (*)**		**Primary energy in amount of imported raw material from non EU (ktoe)**	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**
Biomass supply for heating and electricity:												
Direct supply of wood biomass from forests and other wooded land energy generation (fellings, etc.)**	110 648 TJ	115 301 TJ	N/A	N/A	39 TJ	55 TJ	N/A	N/A	158 TJ	199 TJ	N/A	N/A
Indirect supply of wood biomass (residues and co-products from wood	220 291 TJ	233 811 TJ	N/A	N/A	96 TJ	19 TJ	N/A	N/A	909 TJ	825 TJ	N/A	N/A

industry etc.)**												
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.) **	11 420 TJ	12 939 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 (grasses, etc.) and short rotation trees 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
Others (please specify)												

* Amount of raw material if possible **in m^3 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 area (ha)	
	2015	**2016**
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)	23	26
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), and sorghum (Please specify main types)	5 776	5 452

7. Please provide information on any changes in commodity prices and land use <u>in Finland in the preceding two years</u> 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 Finland (*Article 22(1)(h) of Directive 2009/28/EC*).

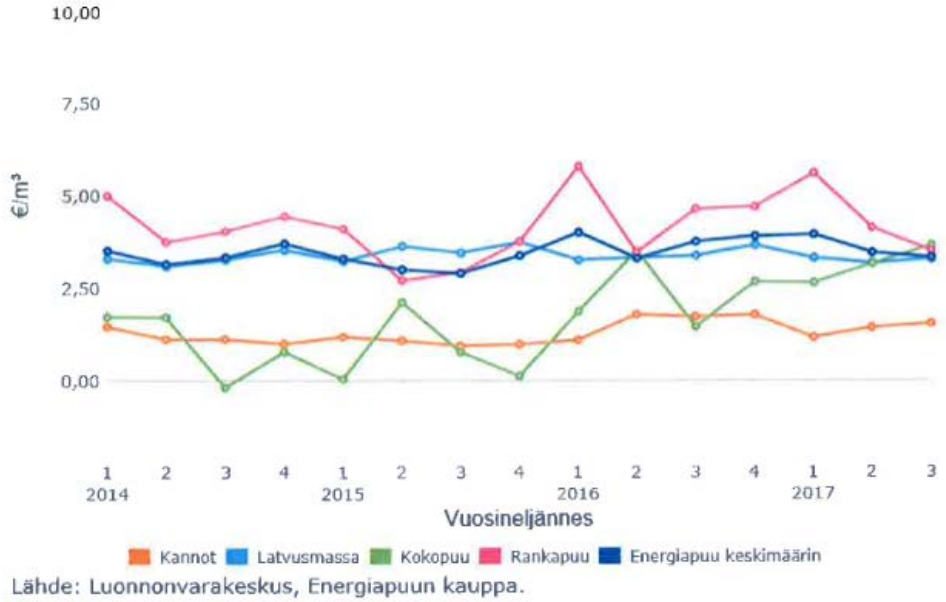
In 2015 and 2016, the use of woodchips decreased in Finland compared to previous years. The energy use of wood chips (in cubic metres) cannot be considered to have affected the price development or markets of pulpwood or logs. The prices and market situation of pulpwood or logs are mainly affected by the market situation of the forestry industry.

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

The changes in land use in Finland, such as permanent removal of forests for construction, infrastructure or arable land, are not linked to an increase in renewable energy, because with respect to both forest biomass and field biomass, energy fractions are produced with the existing areas of forest or arable land. (Source: Ministry of Agriculture and Forestry).

In 2016, an average of EUR 3.5 was paid for felling rights for energy wood in the context of stumpage selling, and felled timber was bought for EUR 20.6 per cubic metre (Figure 1). Regional fluctuation in the prices of energy wood in 2014, both as a mean and for each species of energy wood, continued to be great in 2016. The scope of the data collection for the statistics varies, but excluding that, the volume of timber in sales of timber in the round decreased by one sixth and the volume of timber in sales of felled timber decreased by a little more than one fourth compared to previous year.

The average price per cubic metre of lopped timber was EUR 4.3 in sales of timber in the round and EUR 22.7 in sales of felled timber. In sales of timber in the round, the right to harvest crown masses was sold for the average price of EUR 3.2 (–5%), while the price for stumps was EUR 1.5 (+54%) per cubic metre. (Source: Natural Resources Institute Finland)

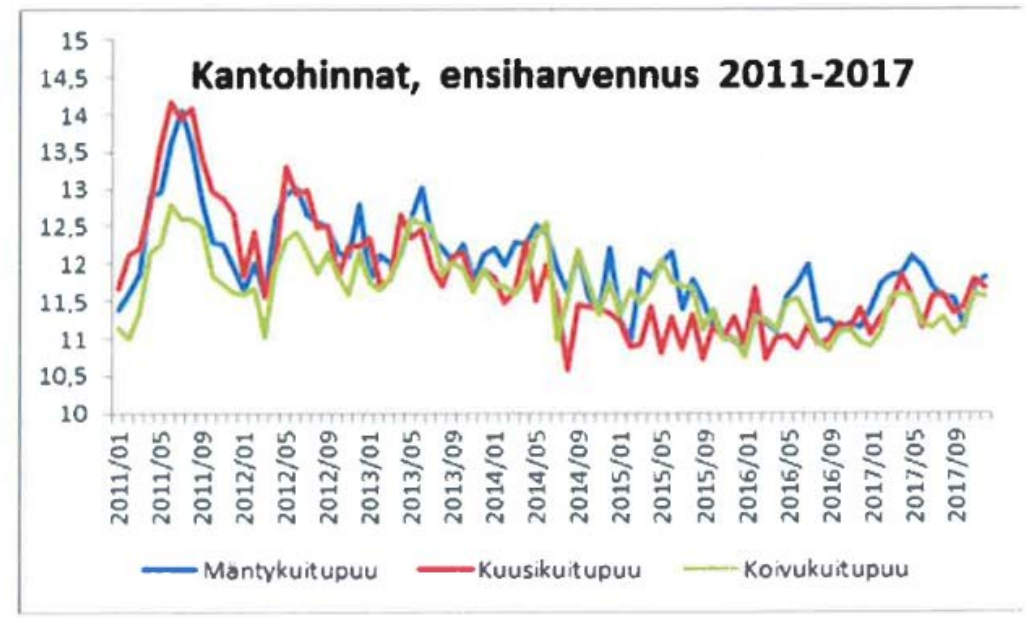


Finnish	English
€/m^3	EUR/m^3
Vuosineljännes	Quarter
Kannot	Stumps

Latvusmassa	Treetop mass
Kokopuu	Whole timber
Rankapuu	De-branched tree trunks
Energiapuu keskimäärin	Energy wood on average

Source: Natural Resources Institute Finland, Energy wood sales.

Figure 1: Actual prices of energy wood from stumpage sale expressed in financial terms for the most recent quarter, January 2014 - October 2017 (deflation: wholesale price index)



Finnish	English
Kantohinnat, ensiharvennus 2011-2017	Stumpage price, first thinning; 2011–2017
Mäntykuitupuu	Pine pulpwood
Kuusikuitupuu	Spruce pulpwood
Koivukuitupuu	Birch pulpwood

Figure 2: Trend of pulpwood stumpage price between 2011 and 2017. Source: Ministry of Agriculture and Forestry.

The price index for wood pellets has been stable for a long time (Figure 2). During the review period in 2015–2016, the price trend has been clearly decreasing with respect to industrial users (Figure 3) and less steeply decreasing with respect to consumer prices (Figure 4).

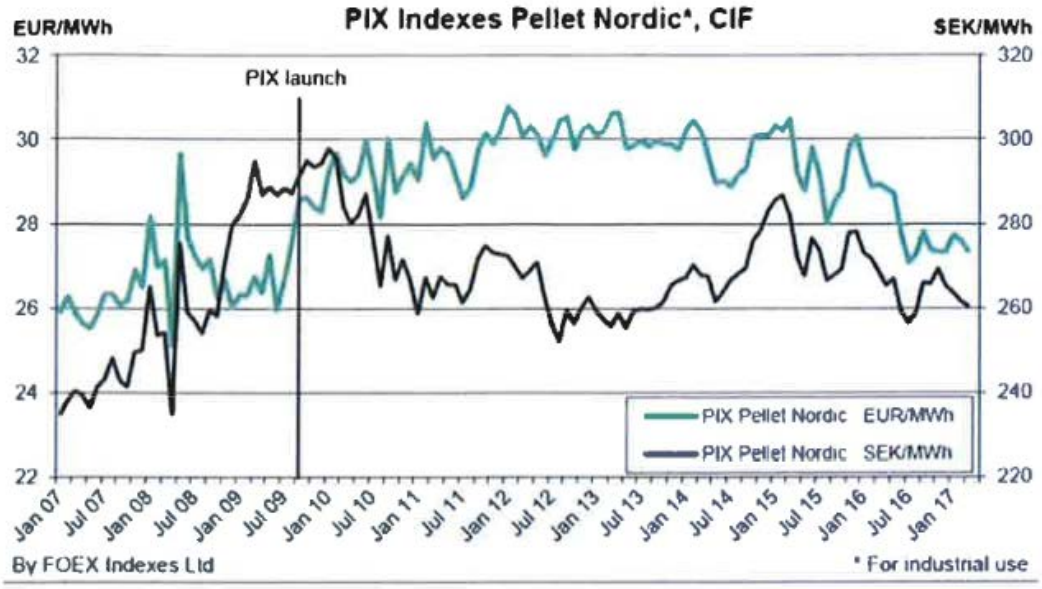
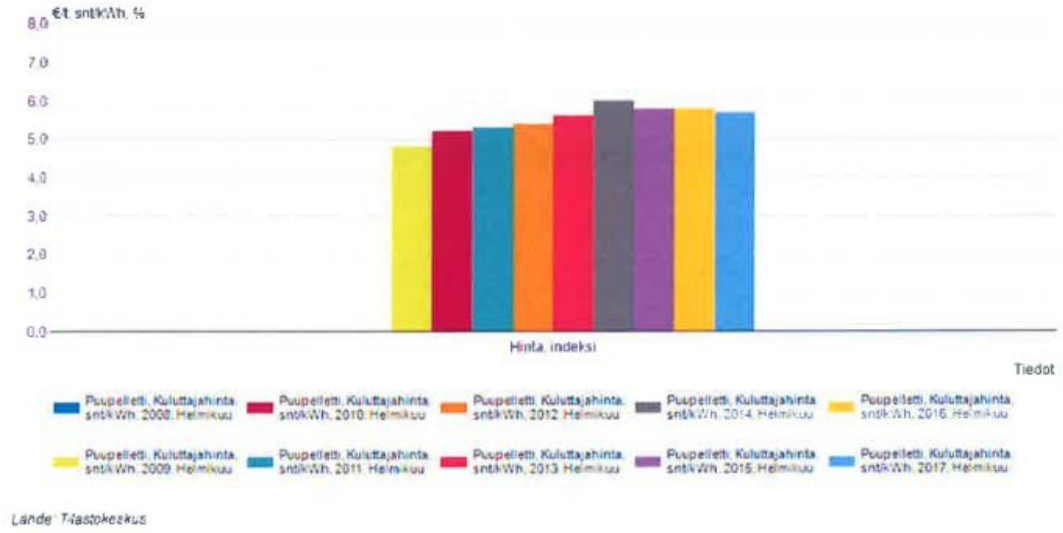


Figure 3: Price trend for pellets, January 2007 – March 2017, EUR/MWh

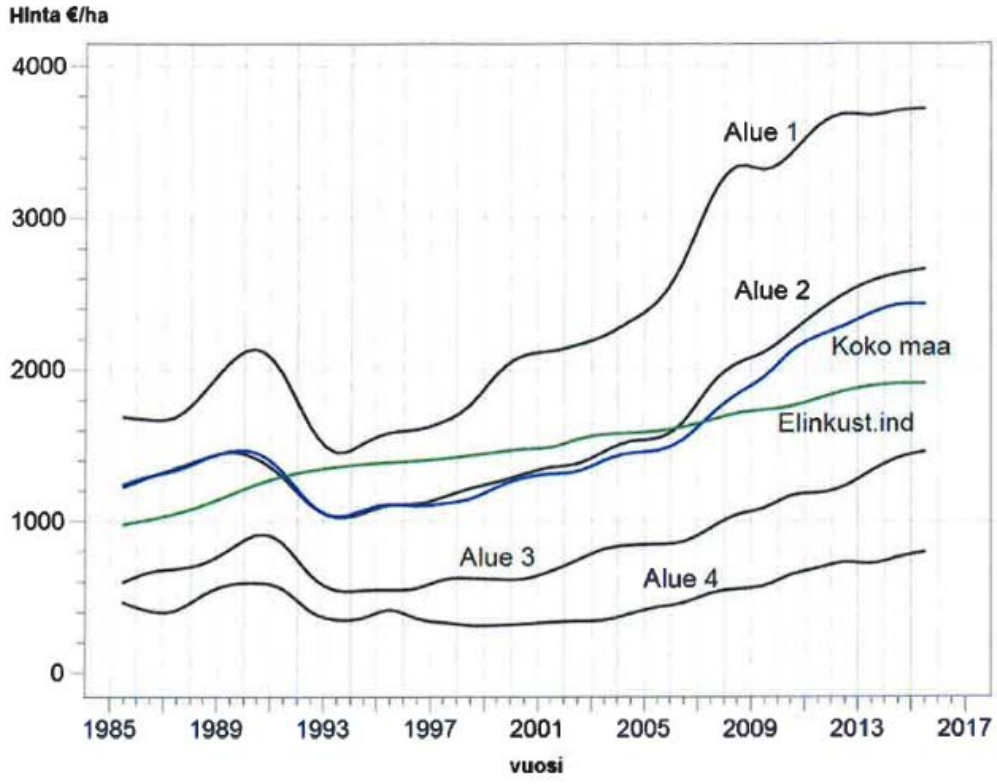


Finnish	English
€/t; snt/kWh, %	EUR/t; cent/kWh, %
Hinta, indeksi	Price, index
Tiedot	Data
Puupelletti. Kuluttajahinta. snt/kWh, 2008. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2008. February
Puupelletti. Kuluttajahinta. snt/kWh, 2009. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2009. February
Puupelletti. Kuluttajahinta. snt/kWh, 2010. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2010. February
Puupelletti. Kuluttajahinta. snt/kWh, 2011.	Wood pellet. Consumer price. cent/kWh,

Helmikuu	2011. February
Puupelletti. Kuluttajahinta. snt/kWh, 2012. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2012. February
Puupelletti. Kuluttajahinta. snt/kWh, 2013. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2013. February
Puupelletti. Kuluttajahinta. snt/kWh, 2014. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2014. February
Puupelletti. Kuluttajahinta. snt/kWh, 2015. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2015. February
Puupelletti. Kuluttajahinta. snt/kWh, 2016. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2016. February
Puupelletti. Kuluttajahinta. snt/kWh, 2017. Helmikuu	Wood pellet. Consumer price. cent/kWh, 2017. February

Figure 4: Consumer prices of wood pellets in heat generation and index (incl. VAT)

The price of woodland and forests has risen more rapidly than the cost-of-living index in Southern Finland, although the growth has stabilised over the last few years (Figures 5, 6 and 7). The increasing use of wind power and bioenergy have affected the price trend in areas that are suitable for their production, but there are no detailed statistics available. The indices below have been calculated for the *Kiinteistöjen kauppahintatilasto 2015* ('Real Estate Sales Prices Statistics 2015'). The publication of Kiinteistöjen kauppahintatilasto was already discontinued once, which is why the coverage of the review does not extend until the end of 2016. The publication of the statistics will be continued in late 2018 (Source: National Land Survey of Finland).



Finnish	English
Hinta €/ha	Price, EUR/ha
Alue 1	Area 1
Alue 2	Area 2
Koko maa	Whole country
Elinkust.ind	Cost-of-living index
Alue 3	Area 3
Alue 4	Area 4
vuosi	year

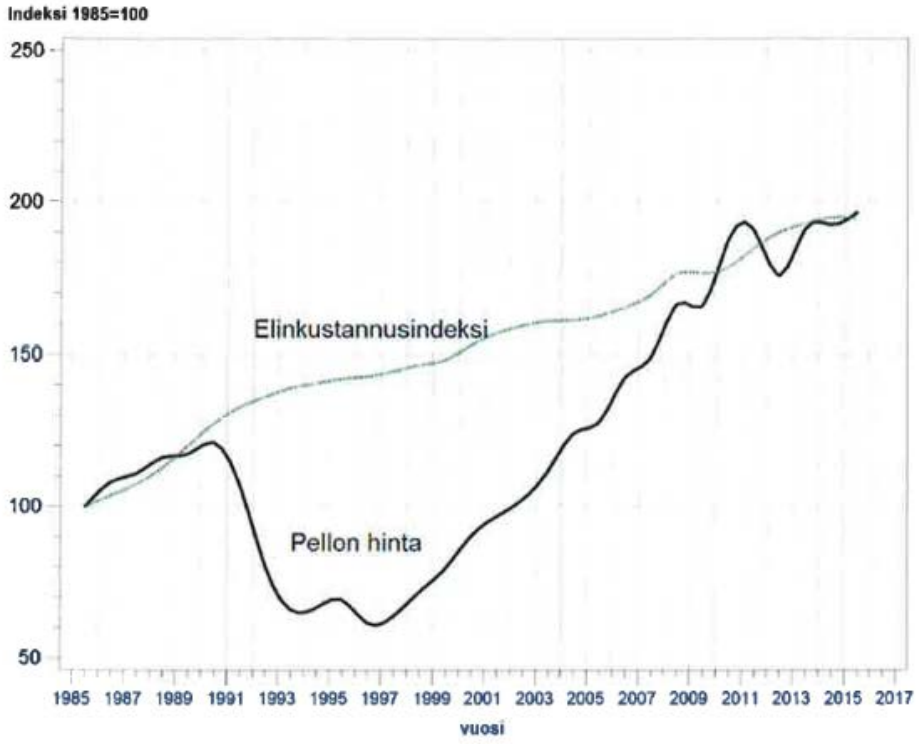
Area 1: Uusimaa, Finland Proper, Eastern Uusimaa, Satakunta, Kanta-Häme, Pirkanmaa, Päijät-Häme, Kymenlaakso, South Karelia, Åland Islands

Area 2: South Savo, North Savo, North Karelia, Central Finland, South Ostrobothnia, Ostrobothnia, Central Ostrobothnia

Area 3: North Ostrobothnia, Kainuu

Area 4: Lapland

Figure 5. Forest price trend per area, 1985–2015. (Source: National Land Survey of Finland.)

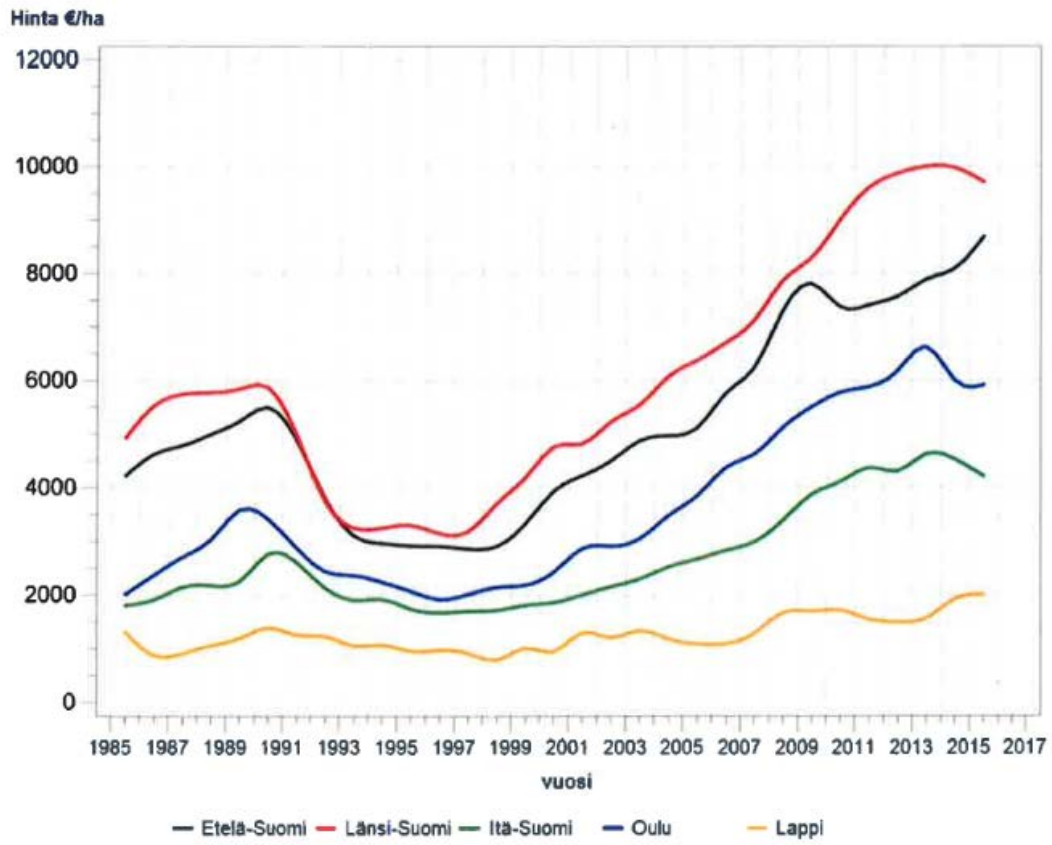


Finnish	English
indeksi 1985=100	index 1985=100
Elinkustannusindeksi	Cost-of-living index

Pellon hinta	Price of arable land
vuosi	year

Price trend for land and cost-of-living index, whole country

Figure 6. Price trend for arable land, whole country 1985-2015



Finnish	English
Hinta €/ha	Price, EUR/ha
Etelä-Suomi	Southern Finland
Länsi-Suomi	Western Finland
Itä-Suomi	Eastern Finland
Oulu	Oulu
Lappi	Lapland

Figure 7. Price trend for arable land by region, 1985-2015

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 wind-power plants that are to be constructed or refurbished in connection with it is estimated (by the Finnish Forest Administration) to be approximately 1.5 hectares per plant. The 550 wind-power plants that had been built by the end of 2016 have therefore taken a surface area of approximately 820 hectares of forest, i.e. 8.2 cubic kilometres, out of other economic use.

Land-lease revenues can fluctuate within the range of EUR 5 000 – 15 000 per year per power plant. Land-lease prices and any one-off compensation are trade secrets between the wind-power enterprise and the landowner, and there are no statistics on them. It has, however, been estimated that leasing an area for a wind-power plant is more viable than engaging in forestry from the perspective of the forest owner.

These areas are excluded from forest growth, but the landowner receives rental income as agreed. Other restrictions on the use of the area in question depend on the legislation and planning rules, but there are not many such restrictions. There are not generally any restrictions on traffic other than in the immediate vicinity of the power plant. Roads that have been improved or constructed for power plants promote timber transportation and other traffic in the area, so they could even improve the other economic uses of the area.

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 in the RES Directive have been transposed into national law by the Act on Biofuels and Bioliquids, which entered into force on 1 July 2013. Since the entry into force of that Act, there has been strong growth in the consumption of double-counted biofuels and bioliquids (biofuels within the meaning of Article 21(2)). In 2015–2016, operators in this sector in Finland have invested particularly in the development of biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material.

Table 5: **Production and consumption of biofuels within the meaning of Article 21(2) (ktoe)**

Biofuels within the meaning of Article 21(2)[26]	2015	2016
Production – Fuel type X (please specify)	N/A	N/A
Consumption – Fuel type X (please specify)	N/A	N/A
Total production of biofuels within the meaning of Article 21(2)	N/A	N/A
Total consumption of biofuels within the meaning of Article 21(2)	457	144
% share of fuels within the meaning of Article 21(2) from total RES-T	90 %	89 %

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

For the time being, the production of biofuels and bioliquids in Finland is based on material from domestic and imported waste and residues. Monitoring is 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 biodiversity, for example. The production of biofuels therefore cannot be assessed to have had an impact on any of these factors in Finland.

[26] Biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material.

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 following estimate of net savings from greenhouse-gas emissions is a theoretical estimate. Electricity and heat generation in the forestry industry is based on biomass created as a by-product from industrial processes. It is essentially erroneous to assume, particularly with regard to the forestry industry, that the electricity and heat required by industry could be generated using fossil fuels. If it were not possible to use biomass to generate electricity and heat for the forestry industry, there could not have been a forest industry in Finland.

The following assumptions have been made when estimating the net savings achieved in greenhouse-gas emissions from the use of renewable energy:

- Biofuels: in accordance with Article 22(2) of Directive 2009/28/EC;
- For separate electricity generation (hydro power, wind power, solar power and separate electricity generation using bioenergy), the net savings have been estimated using the emission factor to be 0.095 Mt CO_2/PJ. The emission factor corresponds to the mean emission factor for separate condensate production based on fossil fuels in Finland. With regard to hydro power, wind power and solar power, it is assumed that one unit of energy is replaced by 2.4 units of fossil fuel. With regard to bioenergy, this fuel-consumption ratio appears in Calculation 1. Biomass emissions have been taken into account when assessing the reduction in emissions that is due to bioenergy, in accordance with Annex II to the Commission's report;
- Heat-pump energy and solar-powered heating are replaced in the calculation by separate fossil-powered heat generation. The net savings have been estimated using the emission factor to be 0.075 Mt CO_2/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 generation based on bioenergy, the net savings have been estimated using the emission factor to be 0.074 Mt CO_2/PJ. The emission factor takes account of the reduction in net savings where biomass emissions are assumed to have a value of 0.001 Mt CO_2/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 the emission factor to be 0.082 Mt CO_2/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 net GHG emission saving from using renewable energy (Mt CO_2 equivalent)**

Environmental constraints	2015	2016
Total estimated net GHG emission saving from using renewable energy[27]		
- Estimated net GHG saving from the use of renewable electricity	17.42 Mt	18.11 Mt
- Estimated net GHG saving from the use of renewable energy in heating and cooling	25.74 Mt	27.41 Mt

[27] 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.

- Estimated net GHG saving from the use of renewable energy in transport	0.98 Mt	0.36 Mt

11. Please report on (<u>for the preceding two years</u>) and estimate (<u>for the following years up to 2020</u>) 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 growth in the share of renewable energy was clarified and estimated in conjunction with the update to the energy and climate strategy. Finland is still following the trajectory laid down in the RES Directive, so the target set for Finland by 2020 will be met. The share of renewables currently exceeds the situation as set out in the trajectory.

Table 7: **Actual and estimated excess and/or deficit (-) production of energy from renewable sources compared to the indicative trajectory which could be transferred to and/or imported from other Member States/third countries (ktoe)[28,29]**

	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)	0	0	0	0	0	0	0	0	0	0	0	0

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

Finland has not implemented any statistical transfers, joint projects or joint support schemes with other countries in 2015–2016. Finland has also not concluded any such agreements for future 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 energy generation has been estimated to be 50 %. The estimate is based on sample surveys. In 2014, a national recommendation on the implementation of composition tests was produced to improve the quality of sample surveys, and the number of sample surveys has risen. A composition database has been set up

[28] 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 2020. In each report Member State may correct the data of the previous reports.

[29] When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. –x ktoe).

to record the data, with the aim of collating and processing the results of the quality and composition tests for various types of waste.