



REPUBLIC OF CYPRUS



**MINISTRY OF ENERGY,
COMMERCE AND INDUSTRY**

**5TH PROGRESS REPORT UNDER ARTICLE 22
OF DIRECTIVE 2009/28/EC**

Two-year period: 2017-2018

CONTENTS

INTRODUCTION	5
1. Sectoral and overall shares and actual consumption of energy from renewable sources in the preceding 2 years 2017-2018 (Article 22(1)(a) of Directive 2009/28/EC).....	7
Table 1: Sectoral (electricity generation, heating and cooling, and transport) and overall shares of energy from renewable sources.....	7
Table 1a: Calculation table for the renewable energy contribution of each sector to final energy consumption (ktoe)	11
Table 1b: Total actual contribution (installed capacity, gross electricity generation) from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity generation. .	13
Table 1c: Total actual contribution (final energy consumption) from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable sources in heating and cooling (ktoe).....	16
Table 1d: Total actual contribution from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable sources in the transport sector (ktoe),.....	19
2. Measures taken in the preceding 2 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 the relevant National Renewable Energy Action Plan (Article 22(1)(a) of Directive 2009/28/EC).	21
Table 2: Overview of all policies and measures	21
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).	28
Information.....	31
2.b. Please describe the measures for 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).	32
3. Please describe the support schemes and the 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).	33
Table 3a: Support schemes for the years 2017-2018 for individuals.....	36
Table 3b: Total subsidy amounts allocated per technology in 2017 and 2018.....	38
Table 3c: Incentives and conditions regarding the use of RES in buildings, according to the Order of the Minister for the Interior No 1/2014	41

3.1. Please provide information on how subsidised electricity is allocated to final customers for the purposes of Article 3(6) of Directive 2003/54/EC (<i>Article 22(1)(b) of Directive 2009/28/EC</i>).	44
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 (<i>Article 22(1)(c) of Directive 2009/28/EC</i>).	44
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 system reliability and protection of the system against fraud (<i>Article 22(1)(d) of Directive 2009/28/EC</i>).	45
6. Please describe the developments, in the preceding 2 years, in the availability and use of biomass resources for energy purposes (<i>Article 22(1)(g) of Directive 2009/28/EC</i>).	47
Table 4: Biomass supply for energy use	47
Table 4a: Current agricultural land use for production of crops dedicated to energy production (ha)	49
7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding 2 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 (<i>Article 22(1)(h) of Directive 2009/28/EC</i>).	49
8. Please describe the development and share of biofuels made from wastes, residues, non-food cellulosic material, and ligno cellulosic material (<i>Article 22(1)(i) of Directive 2009/28/EC</i>).	50
Table 5: Development of biofuels	50
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 2 years. Please provide information on how these impacts were assessed, with references to relevant documentation on these impacts within your country (<i>Article 22(1)(h) of Directive 2009/28/EC</i>).	51
10. Please estimate the net greenhouse gas emission saving due to the use of energy from renewable sources (<i>Article 22(1)(k) of Directive 2009/28/EC</i>).	51
Table 6: Estimated greenhouse gas emission saving from the use of renewable energy (t CO ₂ eq)	51
11. Please report on (for the preceding 2 years) and estimate (for the following years up to 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. (<i>Article 22(1)(l), (m) of Directive 2009/28/EC</i>).	51
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),	52
11.1. Please provide details of statistical transfers, joint projects and decision rules for joint support schemes.	52
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 (<i>Article 22(1)(n) of Directive 2009/28/EC</i>).	53

13. Please provide the amounts of biofuels and bioliquids in energy units (ktoe) corresponding to each category of feedstock group listed in Part A of Annex VIII taken into account by that Member State for the purpose of complying with the targets set out in Article 3(1) and (2), and in the first subparagraph of Article 3(4).53

ANNEX I.....54

Description of the methodology used to estimate net greenhouse gas emission saving due to the use of (a) electricity from renewable energy sources, (b) renewable energy sources in heating-cooling, and (c) renewable energy sources in transport.54

INTRODUCTION

The 5th Progress Report on the promotion of the use of energy from renewable sources for the two-year period 2017-2018 in the Republic of Cyprus was prepared in accordance with the provisions of Article 22 of Directive 2009/28/EC, using the format of the template prepared by the Commission.

In 2018 the RES share in gross final consumption of energy of the Republic of Cyprus amounted to 13.78%, exceeding the national mandatory target of 13% RES share in gross final energy consumption in 2020, as set out in Annex I to the Directive.

The increased RES use share in 2018 is due to the fact that total consumption of RES energy in 2018 includes data on the use of renewable energy from heat pumps as well as data on the use of timber for heating purposes collected directly from domestic consumers. These data came from studies carried out by the Department of Environment and the Statistical Service. Due to a lack of reliable data, previous progress reports did not include contributions from the above technologies / energy sources.

Moreover, the RES share was 9.74% in 2017, exceeding the indicative target of 9.47% RES share in gross final consumption of energy for the two-year period 2017-2018, as referred to in the indicative trajectory of Part B of Annex I to Directive 2009/28/EC.

In summary, the individual sectors performed as follows:

Heating-cooling: The average RES share in heating-cooling in the two-year period 2017-2018 was 31.06%, thus outperforming the NAP indicative target of 22.1% for 2018. The average RES share in heating-cooling rose by 7.4% in the two-year period 2017-2018 compared to that of the previous two-year period 2015-2016 (23.66%).

Electricity generation: The average RES share in electricity generation in the two-year period 2017-2018 was 9.18%. The indicative target for a 12% RES share in electricity generation in 2018, as set in the context of the 'Updated NAP section pertaining to electricity generation for the period 2015-2020' was not attained. The average RES share in electricity generation rose slightly by 0.62% in the two-year period 2017-2018 compared to that of the two-year period 2015-2016 (8.56%).

Regarding the promotion of electricity generation from RES, the 'Plan for electricity generation from renewable energy sources for self-consumption', which covers the installation of net-metering photovoltaic systems for all consumers and the installation of autoproduction and net-billing RES systems for commercial and industrial consumers, continued successfully. The net-billing category was launched in July 2018 to meet the needs of commercial and industrial electricity consumers with seasonal fluctuations in electricity consumption.

At the same time, to promote commercial RES-electricity generation installations, the 'Plan for RES electricity generation projects to be included eventually in the competitive electricity market' was relaunched in 2017. Investors were particularly interested in this Plan. Under the Plan, 102 MW of photovoltaic systems, 2.3 MW of biomass/biogas plants and a 12 MW wind farm have been licensed.

The photovoltaic systems for which applications were submitted under the above Plans are expected to become operational in the period 2019-2021, resulting in a significant increase in the RES percentage in the electricity generation sector.

Transport: The average RES share in transport over the two-year period 2017-2018 was 2.57%, remaining roughly the same as in the previous two years (2.54%), and as a result the two-year intermediate targets set in the NAP, where 3.8% and 4.2% use rates of RES in transport were set for 2017 and 2018, respectively, have not been met. In the two-year period 2017-2018, the RES share in transport originated entirely from the use of biodiesel produced from used cooking oil, which, according to the provisions of the Directive, is considered to be twice as high for the purposes of achieving the target of 10% RES in transport.

Please note that, although the individual sectoral targets for RES energy use in the electricity and transport sectors have not been achieved, due to the increased contribution to the heating-cooling sector, as mentioned above, the indicative intermediate target for the two-year period (9.47%) as well as the final target for 2020 have been exceeded.

1. Sectoral and overall shares and actual consumption of energy from renewable sources in the preceding 2 years 2017-2018 (Article 22(1)(a) of Directive 2009/28/EC).

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

	2017	2018
RES-H&C ² (%)	25	37.11
RES-E ³ [10](%)	8.98	9.37
RES-T ⁴ (%)	2.53	2.61
Overall RES share ⁵ (%)	9.74	13.78
<i>Of which from cooperation mechanism⁶ (%)</i>	0	0
<i>Surplus for cooperation mechanism⁷ (%)</i>	0	0

The RES share in gross final consumption of energy was 13.78% in 2018, exceeding the indicative target of 9.47% for the two-year period 2017-2018, as well as the national mandatory target of 13% RES contribution in 2020, as specified in Annex I to Directive 2009/28/EC and in the National Action Plan (NAP) for Renewable Energy. The following charts show the share of RES use in total and sectoral (electricity generation, heating and cooling, and transport) energy consumption in the Republic of Cyprus during the previous years.

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 Article 5(1)(b) and Article 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 the NREAPs applies.

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

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

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

⁶ In percentage point of overall RES share.

⁷ In percentage point of overall RES share.

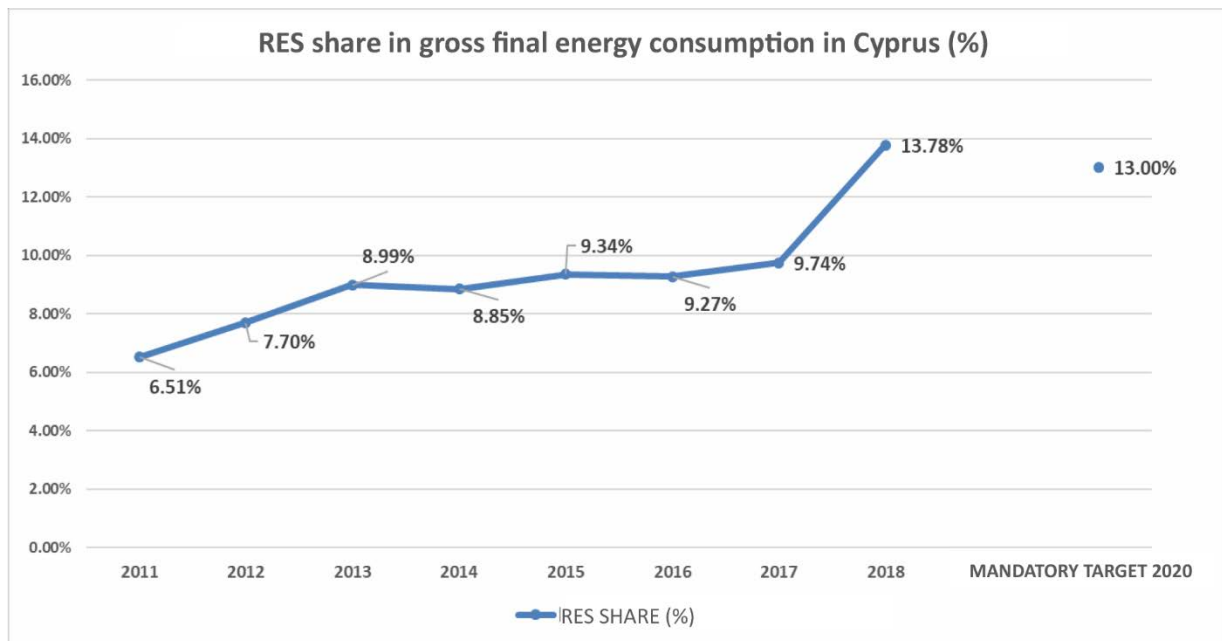


Chart 1: RES share in final gross energy consumption per year

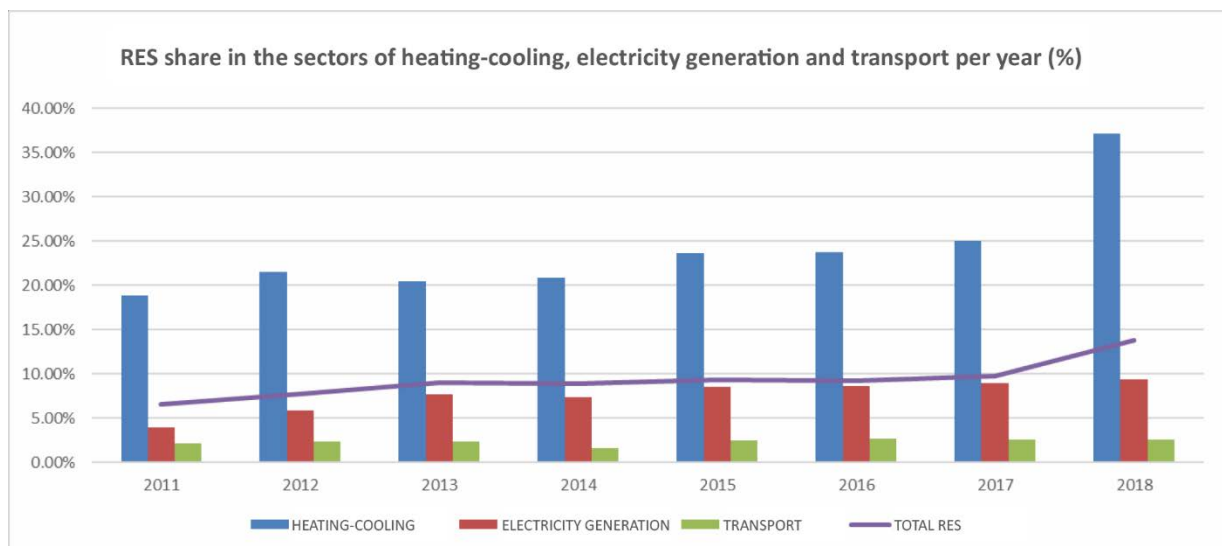


Chart 2: RES share in the sectors of heating-cooling, electricity generation and transport per year

The large increase in 2018 is due to the inclusion of data on the use of RES energy in heat pumps and data on the use of timber for heating purposes collected directly by consumers. These data came from studies carried out by the Department of Environment and the Statistical Service. Due to a lack of reliable data, previous progress reports did not include contributions from the above technologies / energy sources. The above contribution of heat pumps and timber has helped to achieve the intermediate target for the period 2017-2018 and given that there will be no significant changes in energy consumption, the target of 13% RES share in 2020 can also be achieved, irrespective of the achievement of sectoral objectives in the fields of transport and electricity generation.

Chart 3 presents the contribution of each technology / energy source to the overall RES use rate in the Republic of Cyprus for the years 2017 and 2018. The following charts show the prevalence of solar energy in overall RES, due to the widespread use of solar thermal and photovoltaic systems. They also show the important role of the contribution of heat pumps, which accounts for about 20% of total RES use (2018).

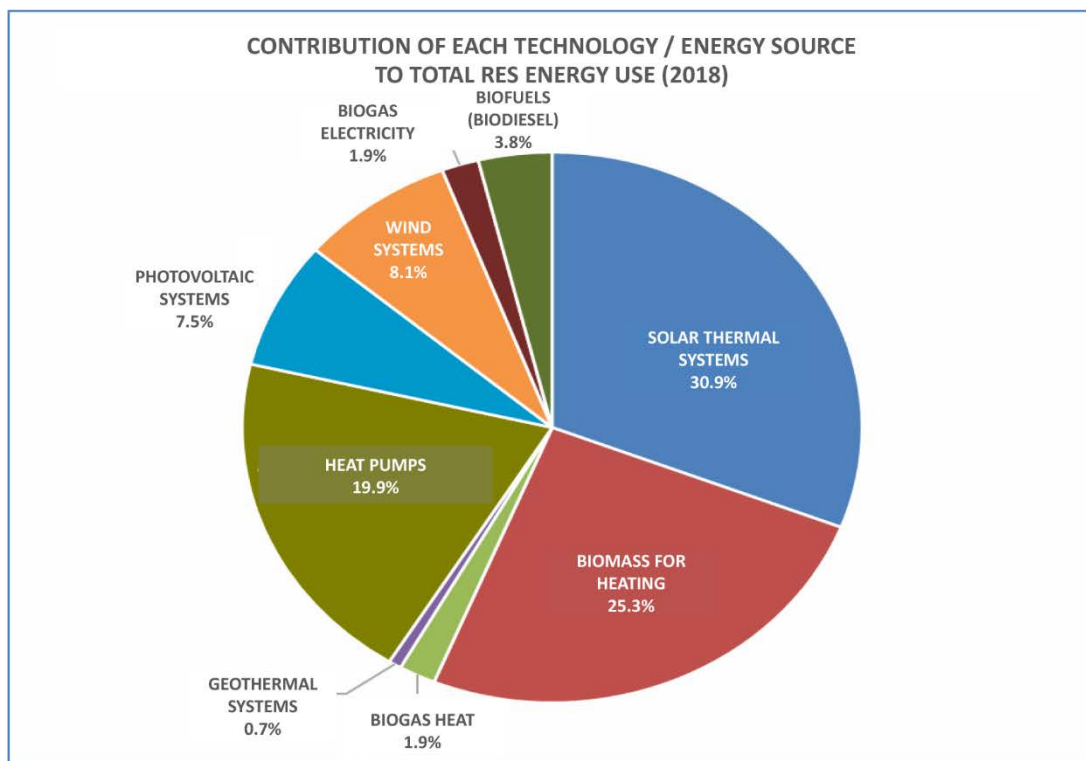
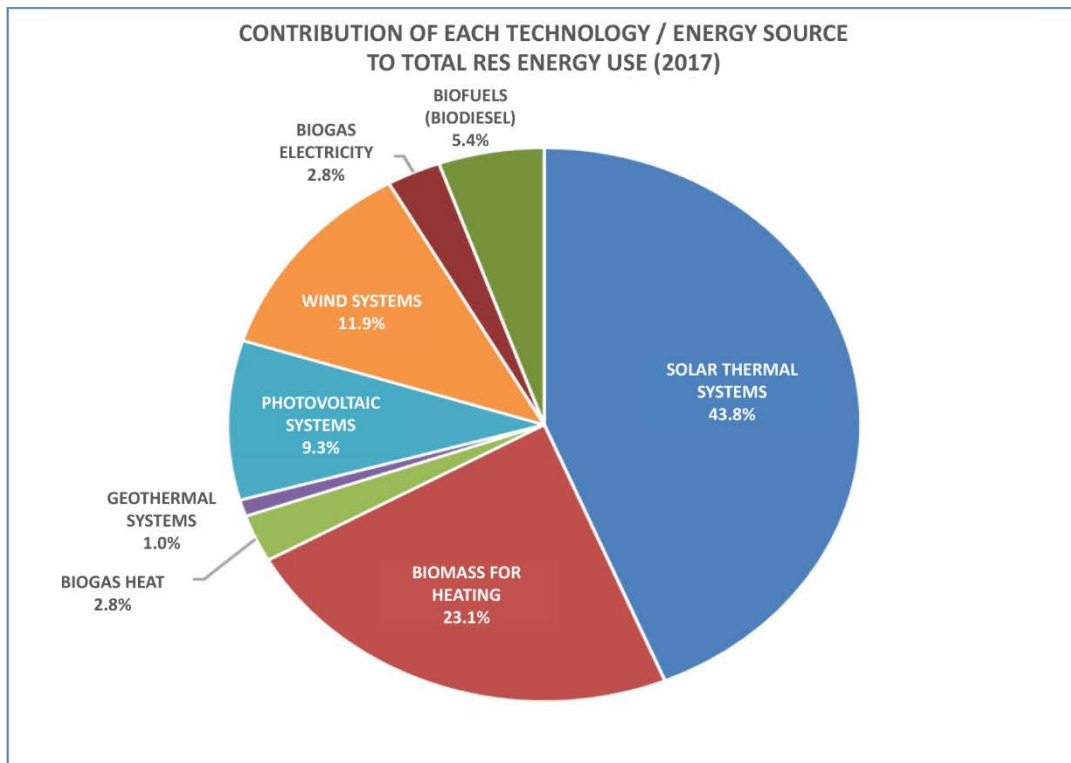


Chart 3: Contribution of each technology / energy source to the overall RES energy use in the years 2017 and 2018.

The individual sectors performed as follows:

Heating-cooling: Table 3 of the National Action Plan (NAP) included a forecast for a 21.3% and 22.1% RES share in heating-cooling for the years 2017 and 2018, respectively. As shown by the information included in Table 1, the forecasts for the two-year period 2017-2018 in this sector were outperformed, reaching 25% and 37.11% in 2017 and 2018, respectively. The average RES share in heating-cooling rose by 7.4% in the two-year period 2017-2018 compared to that of the previous two-year period 2015-2016 (23.66%).

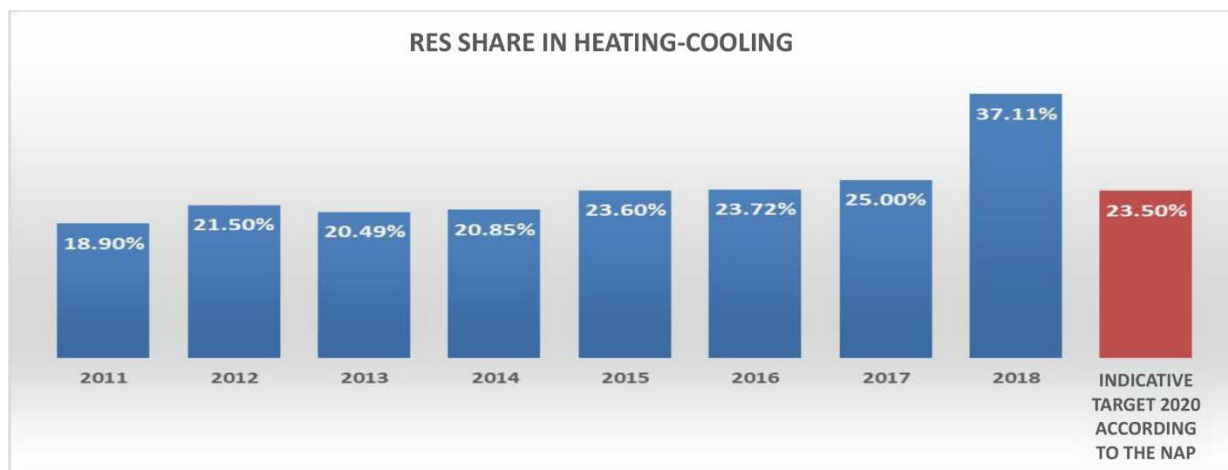


Chart 4: RES share in the heating-cooling sector per year

Electricity generation: The ‘Updated NAP section pertaining to RES electricity generation for the period 2015-2020’ included a forecast for an 11% and 12% RES share in electricity generation for the years 2017 and 2018, respectively. These forecasts were not fulfilled. The RES share in electricity generation stood at 8.98% and 9.37% in 2017 and 2018, respectively. The average RES share in electricity generation rose slightly by 0.62% in the two-year period 2017-2018 compared to that of the two-year period 2015-2016 (8.56%). Over the two-year period 2017-2018, total average electricity generation from RES increased by 56.7 GWh, corresponding to a 14% increase.

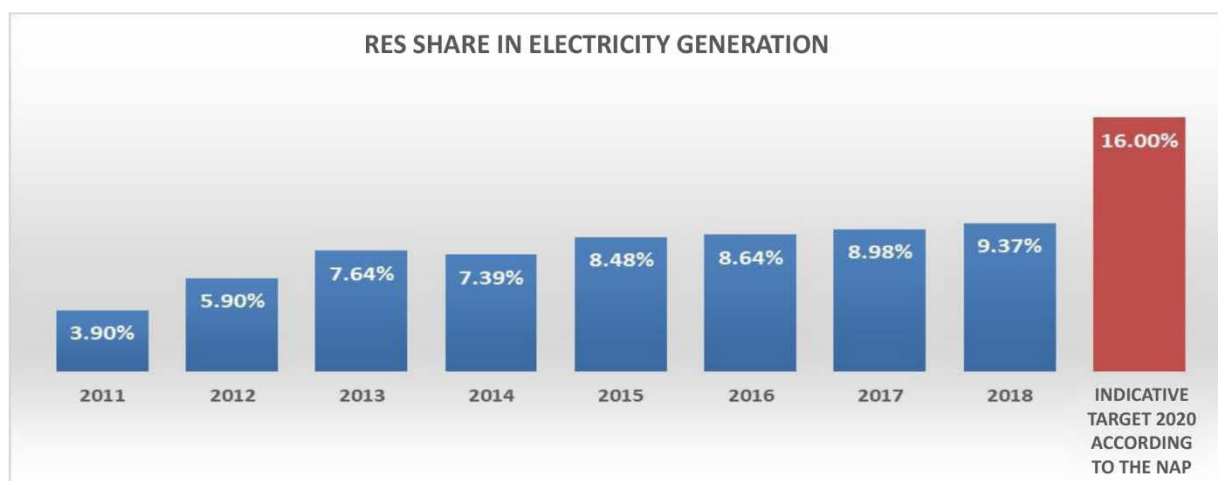


Chart 5: RES share in the electricity generation sector per year

The delay in achieving the target is mainly due to the small penetration of RES systems in the electricity market, which, although expected to be operational in 2016, this has not been achieved yet. In view of the above delay, the Ministry of Energy, Trade and Industry has launched two Plans with the aim of promoting RES in the electricity generation sector until the electricity market becomes operational.

Please note that a number of high-capacity photovoltaic parks are currently under construction, which are expected to increase significantly the share of RES in electricity generation in the coming period.

Transport: The RES share in transport stood at 2.53% and 2.61% in 2017 and 2018, respectively. The forecasts set out in Table 4b of the NAP for 6.2% and 7.6% in 2017 and 2018, respectively, have not been achieved. The average RES share in transport in 2017-2018 (2.57%) remained roughly the same as in the previous two years (2.54%). The contribution of RES to the transport sector derives solely from the obligation of transport fuel suppliers to mix biofuels in the conventional fuels that they place on the market by at least 2.4%. This obligation has remained stable over the previous years.

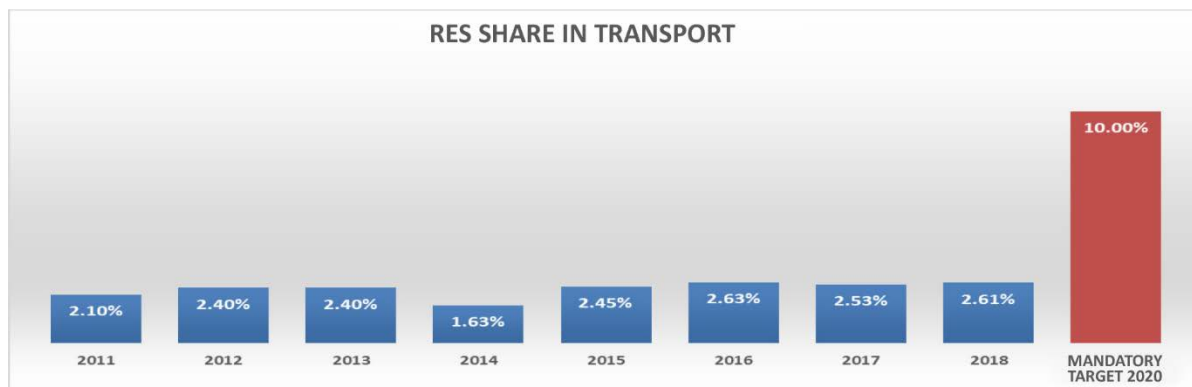


Chart 6: RES contribution in the transport sector per year

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	113.27	182.40
(B) Gross final consumption of electricity from RES	38.50	40.47
(C) Final consumption of energy from RES in transport	8.66	8.90
(D) Gross total RES consumption ⁹	160.43	231.77
(E) Transfer of RES <u>to</u> other Member States	0	0
(F) Transfer of RES <u>from</u> other Member States and 3rd countries	0	0
(G) RES consumption adjusted for target (D)-(E)+(F)	160.43	231.77

⁸ Facilitates comparison with Table 4a of the NREAPs.

⁹ In accordance with 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.

Actual gross total energy consumption from RES in 2017 and 2018 is lower than the forecasts reported in Table 4a of the NAP, which provided for a total energy consumption of RES of 202 ktoe and 221 ktoe in 2017 and 2018, respectively. However, as energy consumption was lower than the forecasts included in the NAP, RES shares in total energy consumption in 2017 and 2018 outperformed those set out in the NAP.

Gross final energy consumption in 2017 and 2018 was 1 647 ktoe and 1 682 ktoe, respectively (following the reduction for the limit of energy consumption in aviation in accordance with the provisions of Article 5(6) of the Directive). Table 1 of the NAP for 2017 and 2018 provided for gross final energy consumption of 1 943 ktoe and 1 971 ktoe, respectively (following the reduction for the limit of the amount of energy consumed in aviation).

Chart 7 presents the contribution of each sector (heating-cooling, electricity generation and transport) to total RES energy consumption in 2017 and 2018. RES energy in Cyprus largely derives from the heating-cooling sector, mainly due to the increased use of solar thermal systems and subsequently due to energy from heat pumps and the use of biomass.

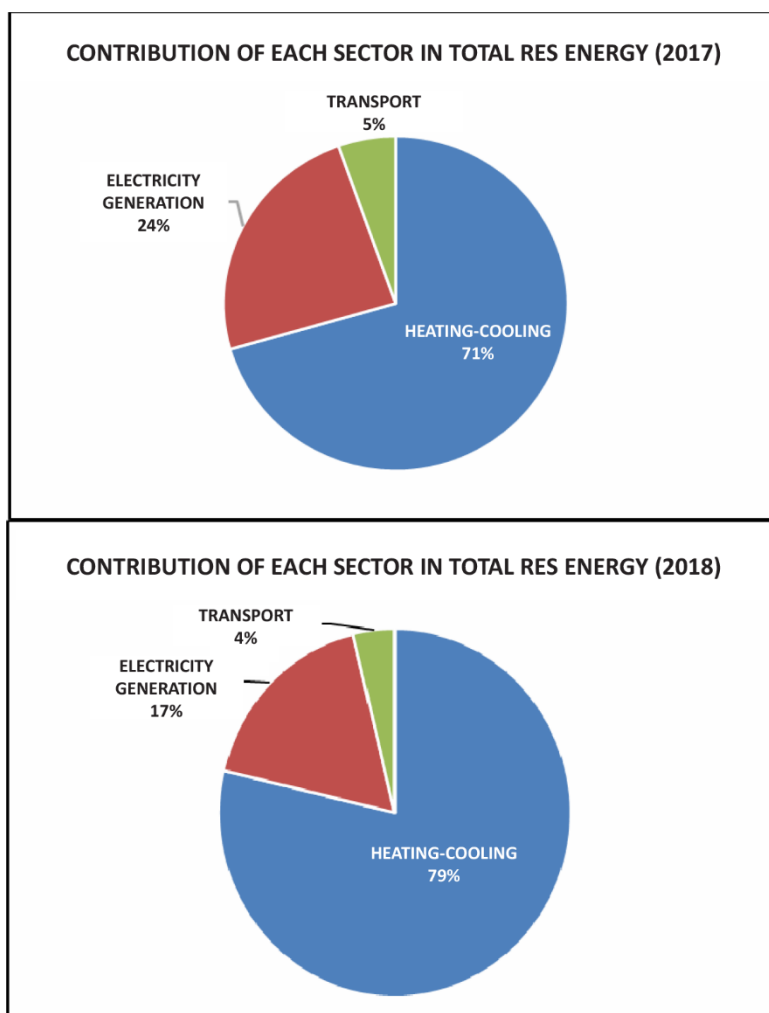


Chart 7: Contribution of the sector of heating-cooling, electricity generation and transport to the total use of energy from RES in 2017 and 2018.

Table 1b: Total actual contribution (installed capacity, gross electricity generation) from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity generation¹⁰.

	2017		2018	
	MW	GWh	MW	GWh
Hydro ¹¹ :	0	0	0	0
non pumped	0	0	0	0
<1MW	0	0	0	0
1 MW-10 MW	0	0	0	0
>10 MW	0	0	0	0
<i>pumped</i>	0	0	0	0
<i>mixed</i> ¹²	0	0	0	0
Geothermal energy	0	0	0	0
Solar:	114.42	173.73	124.57	201.21
<i>photovoltaic</i> ¹³	114.42	173.73	124.57	201.21
<i>concentrated solar power</i>	0	0	0	0
Tide, wave and ocean energy	0	0	0	0
Wind farms ¹⁴ :	157.5	222.40	157.5	217.25
<i>onshore</i>	157.5	222.40	157.5	217.25
<i>offshore</i>	0	0	0	0
Biomass ¹⁵ :	10.4	51.55	12.81	52.09
<i>solid biomass</i>	0	0	0	0
<i>biogas</i>	10.4	51.55	12.81	52.09
<i>bioliquids</i>	0	0	0	0
TOTAL	282.32	447.68	294.88	470.55
<i>of which in CHP</i>		51.55		52.09

The following conclusions are reached by comparing Table 1b against the information included in the ‘Updated NAP section pertaining to RES electricity generation for the period 2015-2020’:

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 Standalone systems not connected to the electricity grid which have received no subsidy are not included, because of insufficient data

¹⁴ Small standalone wind turbines are not included, because of insufficient data

¹⁵ Only those complying with applicable sustainability criteria (see last subparagraph of Article 5(1) of Directive 2009/28/EC) are taken into account.

2017

- The 2017 National Action Plan foresees that total installed capacity of RES systems in electricity generation would amount to 319.7 MW (137.2 MW from photovoltaic systems, 15 MW from biomass/biogas systems and 167.5 MW from wind farms). The total installed capacity was 282.32 MW (114.42 MW from photovoltaic systems, 10.4 MW from biomass/biogas systems and 157.5 MW from wind farms). The forecast was fulfilled by 88.3%.
- The total contribution of RES to electricity generation was 447.68 GWh, deviating by 11.87% from the forecast in the updated NAP for a total RES electricity generation of 508 GWh in 2017.
- Actual total electricity generation in 2017 amounted to 4 974 GWh, which is about 6.5% above the forecast in the updated NAP for total electricity generation in 2017 equal to 4 670 GWh.
- The RES share in electricity generation in 2017 was 8.98% compared to the 11% forecast included in the NAP.

2018

- It was forecasted for 2018 that there would be a total RES installed capacity of 352.7 MW (170.2 MW from photovoltaic systems, 15 MW from biomass/biogas systems and 167.5 MW from wind farms). The total installed capacity amounted to 294.88 MW (124.57 MW from photovoltaic systems, 12.81 MW from biomass/biogas systems and 157.5 MW from wind farms). The forecast was fulfilled by 83.6%.
- The total contribution of RES to electricity generation amounted to 470.55 GWh, deviating by 16.27% from the forecast in the updated NAP for a total RES electricity generation of 562 GWh in 2018.
- Actual total electricity generation in 2018 amounted to 5 024 GWh, which is about 4% above the forecast in the updated NAP for total electricity generation in 2018 equal to 4 810 GWh.
- The RES share in electricity generation in 2018 was 9.37% compared to the 12% forecast included in the NAP.

Chart 8 shows the installed capacity of RES projects per year, showing the gradual annual increase in the installed capacity of PV systems. Chart 9 shows the gradual increase of electricity generated from RES in previous years mainly from PV systems, whose total generation for the two-year period 2017-2018 was close to that of wind farms. Chart 10 shows the installed power of each RES technology in electricity generation compared to the forecasts set out in the NAP for 2017 and 2018.

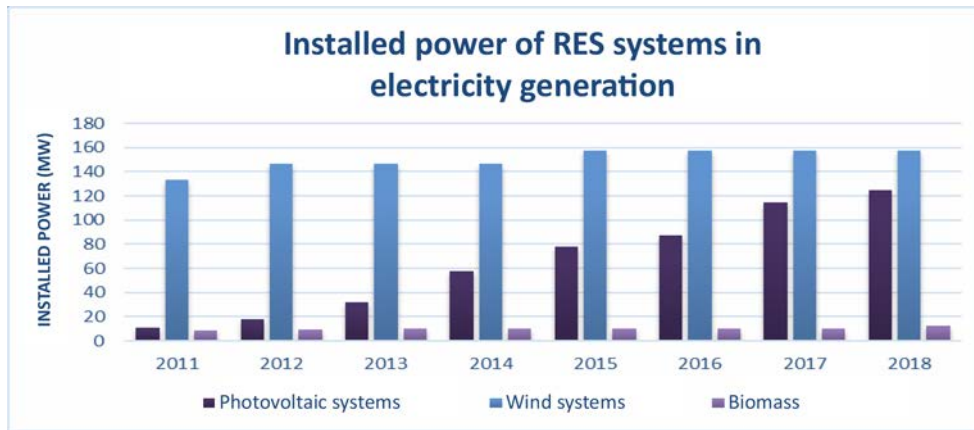


Chart 8: Installed power of RES systems in electricity generation per year

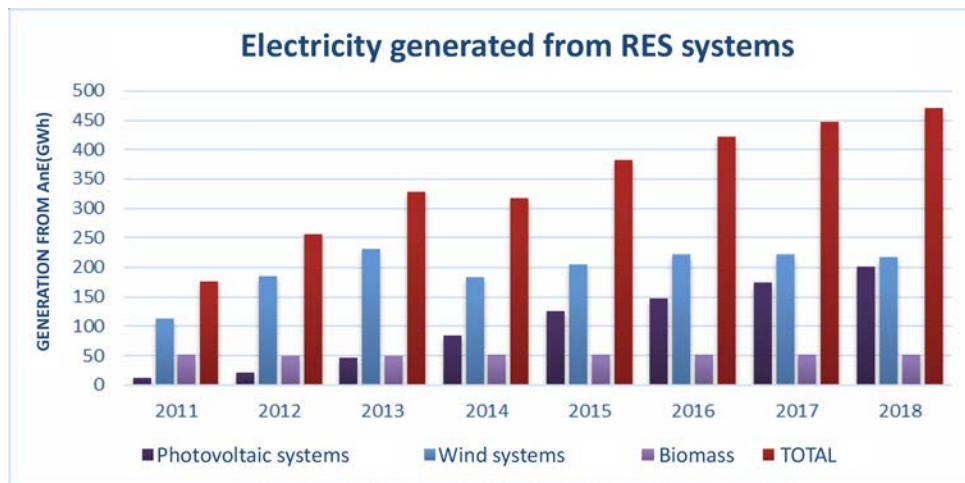


Chart 9: Electricity generated by RES systems per year

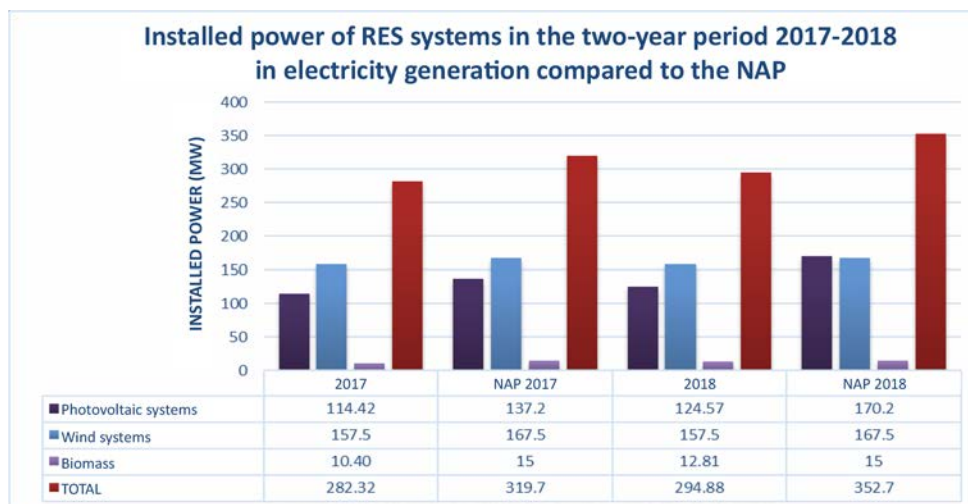


Chart 10: Installed power of RES systems in electricity generation in 2017 and 2018 compared to the power projected in the NAP.

During the next two-year period 2019-2020, the total installed capacity of photovoltaic systems is expected to increase significantly, as shown by the increased interest from investors in PV systems installations for both net-metering, net-billing purposes and commercial PV parks that will be included in the ‘Plan for RES electricity generation projects to be included eventually in the competitive electricity market’, in the context of which 102 MW of photovoltaic parks, 2.3 MW of biomass/biogas plants and 12 MW of wind farms have already been licensed and are under

construction. Moreover, the ‘Plan for RES electricity generation in the context of the transitional regulation of the electricity market for the projects to be included eventually in the competitive electricity market’, was launched in 2019, in which photovoltaic parks with a total capacity of 260 MW were included, plus one 18 MW wind farm. Indicatively, by October 2019, the total power of photovoltaic parks in the net-metering category increased to 53.59 MW, 6.35 MW photovoltaic parks were installed in the net-billing category, and photovoltaic parks with a total capacity of 10.15 MW were placed into service in the context of the competitive electricity market plan, thus increasing the total installed capacity of PV systems to 159 MW.

Table 1c: Total actual contribution (final energy consumption¹⁶) from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable sources in heating and cooling (ktoe)¹⁷

	2017	2018
Geothermal (excluding low temperature geothermal heat in heat pump applications)	0	0
Solar energy	70.23	71.63
Biomass ¹⁸ :	41.49	63.12
<i>solid biomass</i>	37.05	58.68
<i>biogas</i>	4.441	4.441
<i>bioliquids</i>	0	0
Renewable energy from heat pumps:		
- of which aerothermal	0	46.09
- of which geothermal	1.55	1.55
- of which hydrothermal	0	0
TOTAL	113.27	182.39
<i>Of which DH¹⁹</i>	0	0
<i>Of which biomass in households²⁰</i>	9.45	22.11

¹⁶ Direct use and district heating as defined in Article 5(4) of Directive 2009/28/EC.

¹⁷ Facilitates comparison with Table 11 of the NREAPs.

¹⁸ Only those complying with applicable sustainability criteria (see last subparagraph of Article 5(1) of Directive 2009/28/EC) are taken into account.

¹⁹ District heating and/or cooling from total renewable heating and cooling consumption (RES-DH).

²⁰ From total renewable heating and cooling consumption.

The following conclusions are reached by comparing Table 1c against the forecasts included in Table 11 of the NAP:

2017

- In accordance with the NAP, the total RES share in heating-cooling should be 110.46 ktoe in 2017. The projection has been exceeded as the actual share of RES in heating-cooling reached 113.27 ktoe in 2017. Individual projections for 81.63 ktoe from solar systems and 2.16 ktoe from heat pumps have not been met, whereas the projection for 26.67 ktoe from biomass has been exceeded (see Chart 12).
- In Table 1 of the NAP for 2017, the projected total energy consumption in the heating-cooling sector was 517 ktoe, whereas the actual consumption amounted to 453 ktoe.
- The RES share in heating-cooling was 25% in 2017, outperforming the NAP projections for a RES share of 21.3% in 2017. The projection of 23.5% in 2020 has also been exceeded.

2018

- In accordance with the NAP, the RES share in heating-cooling should be 115.01 ktoe in 2018. The projection has been exceeded, as the actual share of RES in heating-cooling reached 182.39 ktoe. Individual projections for 27.87 ktoe contribution from biomass and 2.43 ktoe from heat pumps have also been exceeded. Only the projection of 84.71 ktoe from solar systems was not achieved (see Chart 12).
- In Table 1 of the NAP for 2018, the projected total energy consumption in the heating-cooling sector was 521 ktoe, but the actual consumption amounted to 491.55 ktoe.
- In 2018, the RES share in the heating-cooling sector stood at 37.11%, exceeding both the NAP projection of 22.1% RES in the heating-cooling sector in 2018 and the indicative target of 23.5% in 2020.

The significant increase in the RES share in heating-cooling is due to the fact that the overall RES contribution for 2018 took into account the following data, which were not included in the previous progress reports, due to lack of reliable information:

- i. Use of renewable energy from heat pumps. In the context of research carried out by the Department of Environment, data have been collected on total performance and performance indicators of heat pumps installed in Cyprus. The energy captured by heat pumps and considered as RES energy was calculated in accordance with the methodology set out in Annex VII to Directive 2009/28/EC and in the guidelines referred to in Commission Decision 2013/114/EU.
- ii. Use of timber for heating purposes in homes collected directly from consumers. After conducting relevant research, the Statistical Service has reassessed and increased the contribution of biomass from timber collected for own use directly from domestic consumers.

It is noted that, despite the increasing contribution from heat pumps and biomass (timber), the main source of RES energy in the heating-cooling sector is still the use of solar energy for heating purposes through solar panels, whose contribution in 2018 accounts for 39% of RES share in the heating-cooling sector and 31% of total RES energy.

Chart 11 shows the contribution of each RES technology in the field of heating and cooling in previous years, and Chart 12 shows the contribution of each technology in the two years 2017-2018 compared to the projections set out in the NAP.

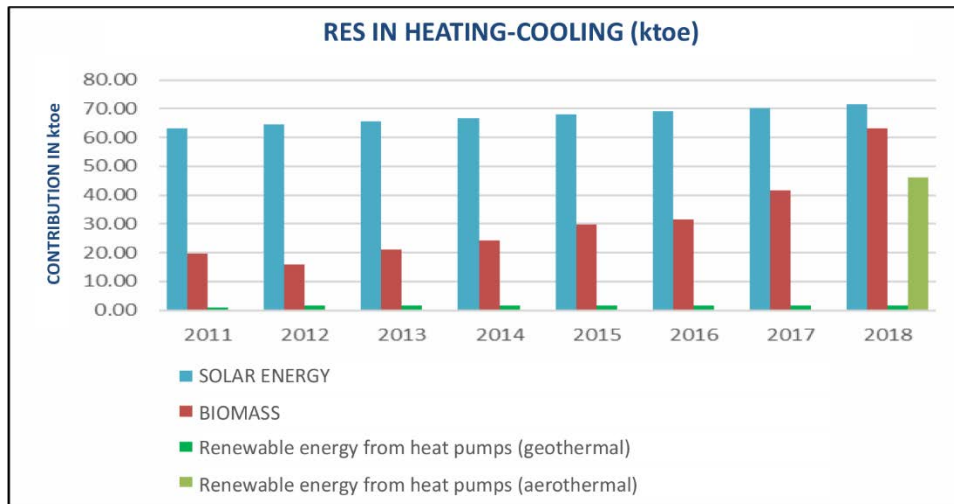


Chart 11: Contribution of each technology / energy source to the share of RES in the heating-cooling sector per year

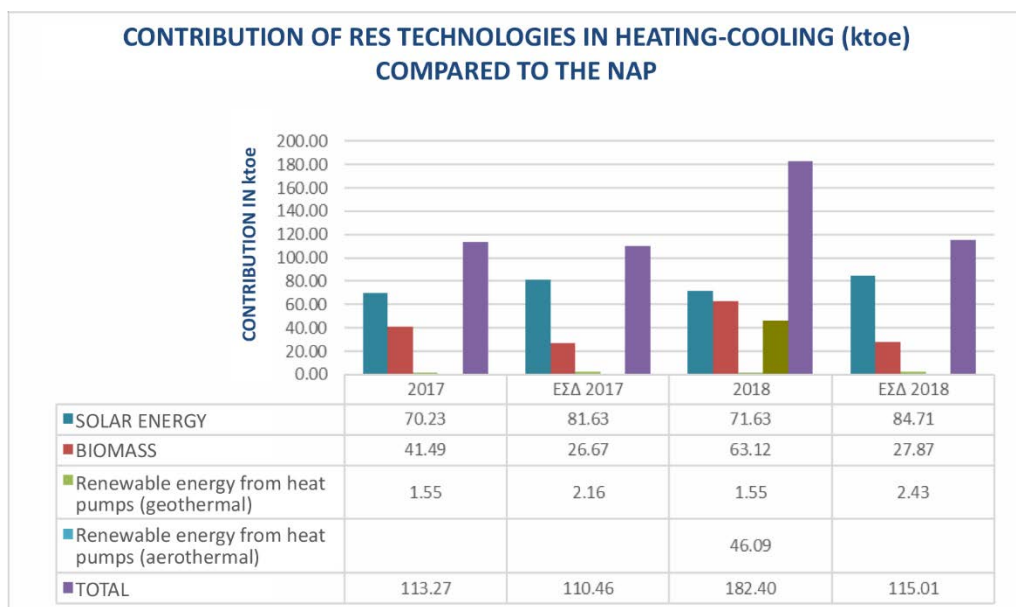


Chart 12: Contribution of each technology / energy source to the share of RES in the heating and cooling sector in 2017 and 2018 compared to the projections in the NAP.

Table 1d: Total actual contribution from each renewable energy technology in the Republic of Cyprus to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable sources in the transport sector (ktoe)^{21, 22}

	2017	2018
- Bioethanol	0	0
- Biodiesel (FAME)	8.66	8.90
- Hydrotreated Vegetable Oil (HVO)	0	0
- Biomethane	0	0
- Fischer-Tropsch diesel	0	0
- Bio-ETBE	0	0
- Bio MTBE	0	0
- Bio-DME	0	0
- Bio-TAEE	0	0
- Biobutanol	0	0
- Biomethanol	0	0
- Pure vegetable oil	0	0
Total sustainable biofuels	8.66	8.90
Of which		
sustainable biofuels produced from feedstock listed in Part A of Annex IX	0	0
other sustainable biofuels eligible for the target set out in Article 3(4)(e)	0	0
sustainable biofuels produced from feedstock listed in Part B of Annex IX	8.66	8.90
sustainable biofuels the contribution of which towards the renewable energy target is limited in accordance with Article 3(4)(d)	0	0
Imports from third countries:	0	0
Hydrogen from renewables	0	0
Renewable electricity	0	0
Of which	0	0
consumed in road transport	0	0
consumed in rail transport	0	0
consumed in other transport sectors	0	0
other (Please specify)	0	0
other (Please specify)	0	0

The RES share in transport was 2.53% and 2.61% in 2017 and 2018, respectively. This contribution falls short of that shown in the indicative trajectory of Table 4b of the NAP, i.e. 6.2% and 7.6%, respectively.

²¹ For biofuels take into account only those complying with sustainability criteria (see the last subparagraph of Article 5(1)).

²² Facilitates comparison with Table 12 of the NREAPs.

In the two-year period 2017-2018, biofuels with used cooking oil as their raw material were exclusively used in the Republic of Cyprus, the contribution of which in achieving the RES target in transport is considered to be twice their energy content, according to Annex IX to the Directive.

The RES contribution in transport in Cyprus has resulted entirely from the obligation imposed in 2011 on all transport fuel suppliers, to mix biofuels that meet the sustainability criteria with conventional transport fuels (petrol and diesel) with a view to ensuring that the average annual biofuel energy content of conventional fuels represents 2.4% of the total energy content of the conventional fuels they place on the market (RAA 431/2011, which was replaced by RAA 328/2013).

To develop an economically and technically optimal strategy for achieving the 10% RES target in transport and the optimal penetration of alternative transport fuels in Cyprus, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has conducted the study '[Penetration of alternative fuels in Cyprus road and maritime sectors](#)'. The study was funded by the European Commission (European Commission Structural Reform Support Services) and the German Ministry of Economy and Energy.

Please note the following concerning the study results:

- The target regarding the consumption of 10% RES energy in transport by 2020 is hard to attain and cost-ineffective for Cyprus due to a number of technical difficulties.
- The very hot climate of Cyprus, combined with the volatile nature of bioethanol, does not allow for using petrol mixed with bioethanol, throughout the year, as the petrol steam pressure requirements laid down in standard EN 228 are not met. The study suggests the use of petrol mixed with bioethers such as ETBE (ethyl-tertio-butyl-ether).
- The most economically viable option to achieve this goal is the use of advanced biofuels and other biofuels whose contribution to the target is double, mainly biodiesel from used cooking oil. However, the study showed that to attain the target, it is necessary to convert a large number of petrol-driven vehicles into diesel-driven ones (approximately 40%), which is unrealistic within such a short period of time.
- The study also recommended the use of B100 in buses (in approximately 50% of the fleet) as the most cost-effective method for attaining the 10% RES target in transport. Due to restrictions in the contracts with public transport companies and other technical obstacles, the use of B100 in buses is hard to implement by 2020.

In order to reach the 10% target regarding RES energy use in transport in 2020, the Republic of Cyprus is considering a statistical transfer agreement with other Member States, in combination with an increase in the mixing rate of biofuels in conventional motor fuels, to the extent that this is technically feasible and affordable.

2. Measures taken in the preceding 2 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 the relevant 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
<p>1. Subsidy for the installation of photovoltaic systems with a capacity of up to 10 kW in the homes of vulnerable consumers, using the net-metering method, under which the electricity consumed is offset against that generated.</p> <p>Total available capacity: 1.2 MW</p>	Financial	Promoting RES and reducing electricity costs for vulnerable consumers.	Vulnerable groups of consumers.	This measure supplements the measures set out in Table 5 of the NAP.	<p>The measure has been in place since 2013.</p> <p>In 2019 the measure was incorporated into the Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in homes (see Measure 8)</p>
<p>2. Support scheme for the installation of photovoltaic systems with a capacity of up to 10 kW for all consumers, using the net-metering method, under which the electricity consumed is offset against that generated.</p> <p>Total available capacity: 15.5 MW for installations in homes of non-vulnerable consumers and 15 MW for installation in non-residential establishments (commercial, industrial, etc.)</p>	Regulatory	Promoting RES and reducing electricity costs for all consumers	All electricity consumers	This measure supplements the measures set out in Table 5 of the NAP.	<p>The measure was launched in 2013.</p> <p>The maximum capacity of photovoltaic systems that can be included in the net-metering category increased from 5.2 kW to 10 kW in 2018.</p> <p>The measure will be terminated on 15 June 2020 or as soon as the available capacity is covered.</p>
3. Support scheme for the	Regulatory	Promoting RES	Commercial and	This measure	The measure was

<p>installation of photovoltaic systems and biomass/biogas systems with a capacity of 10 kW to 10 MW using the autoproduction method in commercial and industrial establishments.</p> <p>Total available capacity: 40 MW</p>		<p>and reducing electricity costs for commercial and industrial consumers</p>	<p>industrial consumers</p>	<p>supplements the measures set out in Table 5 of the NAP.</p>	<p>launched in 2013.</p> <p>The measure was amended in 2017 to cover biomass/biogas plants in addition to PV systems.</p> <p>The measure will be terminated on 15 June 2020 or as soon as the available capacity is covered.</p>
<p>4. Support scheme for the installation of net-billing RES systems from 10 kW up to 10 MW in commercial and industrial premises and public buildings.</p> <p>Total available capacity: 40 MW</p>	<p>Regulatory</p>	<p>Promoting RES and reducing electricity costs for commercial and industrial consumers</p>	<p>Commercial and industrial consumers</p>	<p>This measure supplements the measures set out in Table 5 of the NAP.</p>	<p>The measure was launched on 2 July 2018.</p> <p>The measure will be terminated on 15 June 2020 or as soon as the available capacity is covered.</p>
<p>5. Support scheme for the installation of independent photovoltaic systems and stand-alone biomass/biogas systems in premises/parcels not connected with the grid.</p>	<p>Regulatory</p>	<p>Promoting RES and the supply of electricity to premises/parcels located in areas where there is no electricity supplied via the grid.</p>	<p>All consumers</p>	<p>This measure replaces measures set out in Table 5 of the NAP. (Installations of independent photovoltaic systems were subsidised up until 2013 in the context of the aid schemes.)</p>	<p>Start date: 2016</p> <p>The measure shall remain in force until it is amended.</p>
<p>6. Plan for the installation of photovoltaic systems, using the net-metering method, in public school buildings with a capacity</p>	<p>Regulatory</p>	<p>Promoting RES and reducing electricity costs for public buildings.</p>	<p>Public school buildings</p>	<p>This measure supplements the measures set out in</p>	<p>Start date: 15.11.2017</p> <p>The measure will be terminated as soon as</p>

from 5.2 to 20 kW. Total available capacity: 3 MW		Informing the public about the use of RES energy		Table 5 of the NAP.	the available capacity is covered.
7. Plan for the installation or replacement of solar hot water systems for residential use.	Financial	Promoting RES	Owners of residential units with a building permit up until 21 December 2007	Existing measure also implemented in the context of previous Support Schemes	The Plan is applied on an annual basis. The Plan announced in 2018 was terminated on 6 February 2019.
8. Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in homes. This Plan provides subsidies to net-metering photovoltaic systems installed in homes. It provides increased subsidies for the installation of PV in combination with thermal insulation to the roof of the home.	Financial	Promoting RES and Energy Savings. Reducing the cost of electricity to residential consumers.	Vulnerable residential consumers. Owners of residential units with a building permit until 1 January 2017.	This measure replaces measures set out in Table 5 of the NAP. The measure subsidises photovoltaic systems included in measure 2	The Plan was announced on 14 November 2018. The application period of the Plan started on 12 March 2019 and ended on 20 December 2019
9. Decision to promote projects for the generation of from RES operating on a commercial basis. The Council of Ministers adopted Decision No 78.656 of 15 April 2015 abolishing the support schemes providing for guaranteed subsidy prices for RES electricity generation projects and the integration of such projects in the competitive electricity market. In the interim period up until the	Regulatory	Promoting RES. Regulation of the functioning of the competitive electricity market.	Investors in RES electricity generation projects	This measure replaces measures set out in Table 5 of the NAP. Termination of aid schemes that provide for a guaranteed selling price for RES electricity generation projects	Start date: 15.4.2015.

competitive electricity market is launched investors are allowed to enjoy the current RES electricity price specified by the Cyprus Energy Regulatory Authority (CERA), until the launch of the competitive electricity market whereupon these projects will have to be included in that market.					
10. Plan for RES electricity generation projects to be included eventually in the competitive electricity market. It concerns the installation of RES electricity generation systems for commercial purposes. The electricity generated by systems included in the Plan is sold to the grid at the current RES purchasing price, up until one year after the launch of the competitive electricity market (CEM).	Regulatory	<p>Promoting RES. Arrangement for the operation of the CEM. Inclusion of RES projects in the CEM.</p> <p>102 MW of photovoltaic parks, 2.3 MW of biomass/biogas plants and 12 MW of wind farms were licensed and are being implemented as part of the project.</p>	Investors in RES electricity generation projects	This measure supplements the measures set out in Table 5 of the NAP.	<p>The measure was first implemented in 2016.</p> <p>The application period for the Plan launched in the two-year period 2017-2018 started on 16 October 2017 and ended on 30 April 2018.</p>
11. CERA Regulatory Decision No 04/2017 (RAA 223/2017): ‘On the application of a transitional regulation in the electricity market of Cyprus prior to full implementation of the new electricity market model’.	Regulatory	Installation of commercial projects involving RES for electricity generation, prior to the launch of the competitive electricity market.	Investors in RES electricity generation projects	This measure supplements the measures set out in Table 5 of the NAP.	The transitional regulation of the electricity market applies from 1 September 2017 until the full implementation of the new Electricity Market Model.

<p>This decision decided the implementation of a transitional regulation in the electricity market with bilateral contracts between producers and suppliers, prior to full implementation of the new electricity market model.</p>		<p>Under the transitional regulation, a producer may participate in the electricity market with conventional plants as well as with RES plants for electricity generation.</p>			
<p>12. Plan for RES electricity generation projects in the context of the transitional regulation of the electricity market to be included eventually in the competitive electricity market.</p>	<p>Regulatory</p>	<p>Promoting RES. Arrangement for the operation of the CEM. Inclusion of RES projects in the CEM.</p> <p>The maximum available total capacity of RES projects that can be implemented under the Plan is 260 MW.</p>	<p>Investors in RES electricity generation projects</p>	<p>This measure supplements the measures set out in Table 5 of the NAP.</p>	<p>The application period for the Plan started on 11 April 2019 and ended on 18 June 2019.</p> <p>The list of the projects included in the Plan was announced on 16 August 2019.</p>
<p>13. Determination of minimum RES utilisation rate for every new building and every new building unit.</p> <p>According to the Decree on the Energy Efficiency of Buildings (Minimum Energy Efficiency Requirements) of 2016, as of 1 January 2017:</p> <ul style="list-style-type: none"> • At least 25% of total 	<p>Regulatory</p>	<p>Improving the Energy Efficiency of Buildings and Promoting RES</p>	<p>New buildings and new building units</p>	<p>This measure supplements the measures set out in Table 5 of the NAP.</p>	<p>The requirements were put in place on 1 January 2017</p>

<p>primary energy consumption must originate from RES in residential buildings that do not consist of building units.</p> <ul style="list-style-type: none"> • At least 3% of total primary energy consumption must originate from RES in residential buildings that consist of building units. • At least 7% of total primary energy consumption must originate from RES in non-residential buildings and building units. 					
14. Obligation to replace conventional transport fuels with biofuels at a level of 2.4% per energy content of all transport fuels (RAA 328/2013)	Regulatory	Increase in the proportion of biofuel in transport	Oil companies	Existing measure supplementing the measures set out in Table 5 of the NAP	Start date: 21.10.2013
15. Certificate for small-scale RES system installers. Establishing a RES installer register	For information	Training RES system installers	Small-scale RES system installers	This measure supplements the measures set out in Table 5 of the NAP.	Start date: 13.11.2015
16. 'Save & Upgrade' plan for residential buildings (2nd call).	Financial	Energy upgrading of existing residential buildings	Owners of residential units with a building permit up until 21 December 2007.	This measure replaces measures set out in Table 5 of the NAP	<p>The measure was launched on 16 April 2018</p> <p>End date: 8.6.2018</p> <p>A similar plan was implemented in the period 2015-2016</p>
17. 'Save & Upgrade' plan for	Financial	Energy upgrading	Owners of residential	This measure replaces	The measure was

residential buildings within the British Bases		of existing residential buildings	units with building permits dated until 21 December 2007, located within the British Bases.	measures set out in Table 5 of the NAP	launched on 21 May 2018 End date: 31.12.2018
--	--	-----------------------------------	---	--	---

- * 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?

In addition, various Energy Savings plans were implemented during the period 2017-2018, which have indirectly contributed to the achievement of the RES target, reducing overall energy consumption.

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).

The following measures have been taken by each competent authority during the period 2017-2018 to improve administrative procedures and remove barriers to the development of RES projects:

I. Cyprus Energy Regulatory Authority (CERA)

During the two-year period 2017-2018, CERA decided to continue the measure of exempting RES electricity generation systems with a capacity of up to 5 kW from the obligation to obtain construction and operating licences. To set up RES electricity generation systems with a total capacity from 1 kW to 20 kW, it is necessary to apply to CERA for exemption from the obligation to obtain a licence, and there is an exemption from the obligation to apply for exemption from the obligation to obtain a licence. Photovoltaic systems included in net-metering, net-billing and autoproduction support systems are exempted from the obligation to apply for exemption from the obligation to obtain construction and operating licences.

In 2015, CERA issued Regulatory Decision No 01/2015 setting out the detailed planning for modifying the regulatory framework for the operation of the electricity market of Cyprus (RAA 164/2015), which modified the electricity market operation framework and removed the barriers existing in the electricity market rules that prevented RES-E from participating in the electricity market.

Taking into account, inter alia, the provisions of the above Regulatory Decision No 01/2015, the developments regarding the operation of the new electricity market model and the lengthy procedures required, the concern of CERA, the State and the House of Representatives regarding the delay in the full commercial operation of the new electricity market model, CERA decided to take steps to fill the inevitable gap in the functioning of the competitive electricity market.

In this context, CERA proceeded to adopt Regulatory Decision No 04/2017 (RAA 223/2017): ‘On the application of a transitional regulation in the electricity market of Cyprus prior to full implementation of the new electricity market model’. This Regulatory Decision stipulated, inter alia, the following:

- The implementation and main features of the transitional regulation in the electricity market of Cyprus with ‘bilateral contracts between producers and suppliers’ prior to full implementation of the new electricity market model.
- A producer may participate in the transitional regulation in the electricity market as a producer with either conventional power plants or renewable energy sources for electricity generation, provided that it holds a generation licence for a unit of higher net capacity than the threshold set by CERA. By decision No 234/2018, CERA set this threshold at 1 MW.
- The specification of the supply licence criteria that must be met by interested parties for applying for a licence.

- The specification of the methodology for calculating the monthly weighted wholesale tariff (T-W).
- Receipt by CERA, as of 1 September 2017, of applications for a licence to build and operate power plants and applications for a supply licence.
- It was specified that the transitional regulation in the electricity market of Cyprus will be in force until full implementation of the new electricity market model, where the work of all participants, EAC-Generation and EAC-Supply will be transferred to the new electricity market operation framework.

Moreover, by means of Decision No 118/2017, CERA issued detailed transitional rules regulating the transitional regulation in the electricity market with ‘bilateral contracts between producers and suppliers’.

II. Distribution System Operator (Electricity Authority of Cyprus)

The Ministry of Energy, Commerce and Industry continued to implement support plans/schemes in the two-year period 2017-2018, promoting RES projects using the net-metering, autoproduction and net-billing method, as well as RES electricity generation projects to be included eventually in the competitive electricity market (with guaranteed purchase of electricity generated at the avoidance cost by the EAC up to twelve months following the implementation of the new electricity market rules). In accordance with the provisions of these Plans, the Distribution System Operator (DSO) has undertaken the management of the projects that have been included in them (receiving and examining applications, approving and issuing connection terms).

Please note that, regarding the plan for the inclusion of RES projects in the CEM, about 250 applications for RES projects were collected from all the Network Users Service Centres of the DSO all over Cyprus, for issuing an indicative initial cost estimation. Of these, 72 applications for a total installed capacity of 102 MW, 2.3 MW biomass/biogas plants and a 12 MW wind farm, were finally processed/approved.

Moreover, the individual administrative procedures followed by the DSO in the management of the projects of the specific Plans have been improved, in particular by facilitating applicants, simplifying administrative procedures and reducing bureaucracy. A typical example is that the assumption by the DSO of the management of the Ministry’s Plans has led to the integration, for the Plans in question, of the process of submitting and examining an application for connection to the DSO with the application process for inclusion in the Plan, which significantly reduced the time required and simplified the application procedure for applicants and the processing of the application by the competent authorities (the DSO and the Ministry).

III. Cyprus Transmission System Operator (CTSO)

CTSO continued to accept applications for connection to the transmission system, provided that they are accompanied by a construction licence from the Cyprus Energy Regulatory Authority (CERA). Based on the approved Technical Guide - Connection Procedures, CTSO does not request any licence other than the CERA Construction Licence. Under the new method, the procedures for obtaining the other licences are carried out parallel to the review of the connection application, thus avoiding any additional delays due to the licensing process. Similarly, CTSO allows the applicant to speed up the planning and licensing procedures for network connection works, by means of a separate agreement.

IV. Department of the Environment

According to the 2018 Act on the Assessment of the Environmental Impact of Certain Projects, an Environmental Impact Assessment Study must be prepared for the following RES Projects:

- Wind turbines with capacity equal to or greater than 10 MW.
- Photovoltaic systems to be installed on the ground, with capacity equal to or greater than 1 MW.
- Photovoltaic systems to be installed on the ground, with capacity equal to or greater than 500 KW and lower than 1 MW, within protection zones and areas and within agricultural zones.
- Solar parks with installed capacity equal to or greater than 10 MW.
- Other projects for the utilisation of RES with installed capacity equal to or greater than 1 MW.
- Projects for the production of biofuels or bioliquids with capacity equal to or greater than 20 cubic metres/day.
- Projects for the production of hydrogen to be used as fuel.
- Offshore RES utilisation facilities, such as wind farms and wave energy projects.

The following projects are submitted to the Environmental Authority to determine if an environmental impact assessment study is required:

- Geothermal drilling
- Installations for hydroelectric energy production
- Wind turbines with capacity less than 10 MW
- Photovoltaic systems installed on the ground, with capacity up to 500 KW, within protected zones and areas, including areas of the Natura 2000 network and within agricultural areas.
- Solar parks and other projects for the utilisation of RES with installed capacity less than 10 MW, within protected zones and areas, including areas of the Natura 2000 network and within agricultural areas.
- Projects for the production of biofuels or bioliquids with capacity less than 20 cubic metres/day.

The Act on the Assessment of the Environmental Impact of Certain Projects from 2005 to 2014 was revised in 2018 and the following improvements and simplifications have been made with regard to the conduct of an Environmental Impact Assessment (EIA) for RES projects:

- The capacity of wind turbines requiring an Environmental Impact Assessment has increased from 1 MW to 10 MW or more. Information on wind turbine plants with capacity below 10 MW shall be submitted to the Environmental Authority to determine if an environmental impact assessment study is required.
- The capacity of photovoltaic systems requiring an Environmental Impact Assessment has increased from 100 kW to 1 MW or more.
- No Environmental Impact Assessment or submission of any information for inspection to the Environmental Authority is required to install photovoltaic systems of any capacity on the roofs of existing buildings.
- Hydroelectric power plants are no longer required to carry out an EIA, but to submit data to the Environmental Authority to determine whether an EIA must be prepared.

V. Town Planning and Housing Department

In the two-year period 2017-2018, the framework and procedures for planning and building permits for the development of RES projects remained the same.

Under the framework in place, it was not required to obtain a town planning permit for photovoltaic systems up to 150 kW, on condition that said systems are installed in a specific manner in accordance with the General Town and Country Planning Decree of 2014 (RAA 451/2014), and it was not required to obtain a building permit for photovoltaic systems up to 20 kW installed in legally existing buildings.

The General Town and Country Planning Decree of 2014 (RAA 451/2014) was amended on 22 November 2019 by another decree (RAA 376/2019) which increased the cases and capacity of PV systems for which no town planning permit was required. Specifically, the new Decree no longer requires a town planning permit for:

- i. Installation of a PV system, irrespective of its capacity, on the envelope of a legally existing building, provided that the system is installed according to concrete specifications.
- ii. Installation of a PV system, irrespective of its capacity, in the territory of a property within an industrial or craft zone or area.
- iii. Installation of a PV system with a capacity of up to 150 kW in the territory of a property where there is a legally existing building, provided that the system is installed according to concrete specifications.
- iv. Installation of a photovoltaic system with a capacity of up to 150 kW in a property located in a defined development zone, but outside any archaeological sites or ancient monuments, outside any defined beaches or protected natural areas or protected landscapes or protected areas included in the Natura 2000 network, outside any defined special wild bird and habitat protection areas, outside airports, airstrips and military facilities, projects or areas, on condition that there is sufficient access to the property in accordance with the provisions of the relevant order of the Minister for the Interior and that there are no system elements located closer than 10 m to any property boundary.

Moreover, in June 2019, the Town Planning and Housing Department sent a Guidance Circular to the Town Planning Authorities on the licensing process for photovoltaic parks. The purpose of the Circular is to provide adequate guidance to the competent authorities in order to mitigate the problem caused because investors chose unsuitable parcels for the development of PV parks, resulting in difficulties and delays in the examination of authorisation applications and in many cases local and environmental authorities were adversely affected by the projects.

Information

All competent authorities responsible for the authorisation and licensing of RES plants operate websites providing all necessary information, such as the application forms, the licensing procedure, the grid connection procedure, the aid plans, the connection terms or contracts template, technical guides, lists of applications submitted, considered, and rejected, etc.

Moreover, the Ministry of Energy, Commerce and Industry, in cooperation with other competent authorities, is launching the possibility to submit digital applications for RES projects, the creation of a one-stop shop, also in line with the new RES Directive (2001/2018/EC), and examines measures to further improve administrative procedures for the faster completion of the RES project licensing process and the better provision of information to the public.

2.b. Please describe the measures for 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 Authority of Cyprus (EAC)-Supply purchases all the energy fed into the distribution/transmission system, which is generated by RES plants included in one of the support schemes of the Ministry of Energy, provided that the terms laid down in the purchase agreement between the EAC-Supply and the RES producer, as well as those laid down in the transmission and distribution rules in force each time, are met. The new commercial RES projects that will be directly integrated into the Transition Regulation of the Electricity Market will be the exception.

In accordance with the legislation in force, CTSO gives priority to RES power plants in dispatching the electricity generated. More specifically, RES plants enjoy preferential treatment in terms of the dispatch of the electricity they generate as they feed all that electricity into the system, on condition that the safe and reliable operation of the electricity supply system is not adversely affected in any way.

With regard to the requisite new infrastructure and/or improvement of the existing transmission network, CTSO is preparing a 10-year transmission system development plan, which will be submitted to CERA for approval. The 10-year plan, which is subject to annual review, includes all grid development projects considered necessary in order to maintain a safe and reliable system, with due account taken of the new RES projects. CTSO follows the instructions/guidelines provided by CERA, which are consistent with the EU framework, thus ensuring that new infrastructure projects are designed and planned to facilitate optimal financial and operational connectivity for RES projects.

Transmission System connection/reinforcement costs are recovered by the Transmission System Operator through the charges for use and/or connection of users to the Transmission System, and Distribution System connection/reinforcement costs are recovered by the Distribution System Operator through the charges for use and/or connection of users to the Distribution System.

Regarding the connection charges to the Transmission System, CERA, by its Decision No 821/2012 dated 30 November 2012, approved the 'Key Billing Policy Principles for Connection of RES Producers, Conventional Producers and Customers to the Transmission and Distribution Network', with effect from 1 January 2013. The relevant documents are posted on the CTSO website. The following rules are in force in accordance with the current charging policy:

Assumption of costs: Costs are calculated using the shallow connection method. Connection costs are calculated on the basis of the technically acceptable solution with the minimum cost. RES producers/applicants bear and pay the full cost incurred for connecting their plants to the network.

Allocation of costs: CTSO encourages applicants who wish to be connected in the same area to apply for grid connection at the same time so that connection costs can be shared. Otherwise, the cost is shared on the basis of reimbursable expenditure, meaning that the first applicant assumes the connection costs and, if at a later stage another (RES or non-RES) applicant applies for connection within 10 years from the first connection, the first applicant is entitled to reimbursement from subsequent applicants of part of the costs incurred.

Regarding connections of RES producers to the Distribution System (excluding autoproduction), for which DSOs have issued terms of connection, the Charging Policy adopted by CERA based on Regulatory Decision 03/2013, which is published on the website of the DSO (EAC), shall apply. It is further noted that, for the purpose of facilitating the applicants and sharing connection costs as equitably as possible, a recommendation was made to CERA to revise DSO Billing Policy so that: (i) a reimbursable contribution scheme for the Distribution System may be adopted, and (ii) in the case of applications for connection involving a distribution network, the sharing shall be based on the applicants' requested capacity.

With regard to applications of autoproducers for connection using the net-metering or net-billing method (incorporated in the 'Ministry's plan for RES electricity generation for own consumption'), the approved Billing Policy shall apply as it applies to all consumers.

3. Please describe the support schemes and the 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 following support schemes were implemented in the period 2017-2018 to promote RES energy:

1. Plan for Electricity Generation from Renewable Energy Sources for Own Consumption, covering:
 - I. The installation of net-metering photovoltaic (PV) systems with capacity up to 10 kW for all consumers (residential and non-residential/commercial). The total capacity of the PV systems that could be installed in the net-metering category was 20 MW. In this category, new PV systems with a total capacity of 4.96 MW and 5.39 MW were installed in 2017 and 2018, respectively.
 - II. Installation of RES systems (photovoltaic systems, biomass/biogas plants, etc.), with a capacity of 10 kW to 10 MW, using the net-billing method, in commercial or industrial premises and public buildings.
 - III. Installation of photovoltaic systems and biomass/biogas systems with a capacity of 10 kW to 10 MW, using the autoproduction method, in commercial and industrial premises and public buildings.

The total capacity of RES systems that could be included in the net-billing and autoproduction category was 40 MW.
 - IV. Installation of stand-alone photovoltaic systems and stand-alone biomass/biogas systems not connected to the grid. In this category there was no restriction on the maximum capacity of each system or the total capacity of the systems that could be installed.

The above Plan has been in place since 2013, and the following modifications have been made during the period 2017-2018:

- In 2017, the autoproduction category has been modified to cover the installation of biomass/biogas plants in addition to the installation of photovoltaic systems. As part of this modification, the Plan has been renamed from 'Solar Energy for All' to 'Plan for Electricity Generation from Renewable Energy Sources for Own Consumption'.
 - The new category of net-billing was added in 2018. This category is an improvement of the existing autoproduction category in order to meet the needs of all commercial and industrial electricity consumers (including those with seasonal fluctuations in electricity consumption).
 - The maximum capacity of photovoltaic systems that can be included in the net-metering category increased from 5.2 kW to 10 kW in 2018.
2. Subsidy for the installation of photovoltaic systems using the net-metering method in the homes of vulnerable consumers. The subsidy amounted to EUR 900 per installed kW, with a maximum subsidy amount of EUR 2 700 per system and per beneficiary. This subsidy was granted from 2013 to 2018 under the 'Plan for Electricity Generation from Renewable Energy Sources for Own Consumption'. In 2019 it was incorporated into the 'Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in Homes' and the maximum subsidy amount was raised to EUR 3 600 per beneficiary / residential unit.
 3. The special charges for network usage, ancillary services and other services imposed for the implementation of the net-metering, autoproduction and net-billing system using photovoltaic systems and biomass/biogas systems operating within the framework of the 'Plan for RES electricity generation for own-consumption' have been revised by CERA Decision No 180/2018.
 4. Plan for the installation of photovoltaic systems in public school buildings. The Plan involves the installation of photovoltaic systems with a capacity of 5.2 kW to 20 kW, in public school buildings, using the net-metering method. The total installed capacity of the photovoltaic systems that can be installed in the context of the Plan is 3 MW. The roofs of the school buildings where the photovoltaic panels will be installed will be insulated.
 5. Plan for RES electricity generation projects to be included eventually in the competitive electricity market. A similar Plan was implemented in 2016. The Plan envisaged the installation of 120 MW photovoltaic systems, 17.5 MW wind systems, 5 MW biomass recovery systems, 50 MW solar thermal systems and 20 MW wave energy recovery systems. The end date for the submission of applications for the Plan was 30 April 2018. 102 MW of photovoltaic parks, 2.3 MW of biomass/biogas plants and 12 MW of wind farms were licensed as part of the Plan.

The electricity generated by the systems included in the Plan will be purchased by EAC-Supply at the respective RES Purchase Price, as set by CERA, in accordance with the Electricity Purchase Agreement to be signed between the applicant and EAC-Supply. This Agreement will be terminated twelve (12) months after the date of entry into force of the new Electricity Market Rules and the systems will be integrated and operate within the competitive electricity market.

6. Plan for RES electricity generation projects in the context of the transitional regulation of the electricity market to be included eventually in the competitive electricity market. The Plan envisaged the installation of RES systems of a total power of 150 MW, irrespective of technology, which will operate under the transitional regulation of the electricity market. All projects to be included in the Plan will be included in the Competitive Electricity Market (CEM) when that becomes operational.

The Plan was launched on 8 April 2019 and the application period ended on 18 June 2019. The list of projects included in the Plan was announced on 16 August 2019.

7. Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in homes.

The following Investment Types are subsidised under the Plan:

Category 1: Thermal insulation of the roofs of existing homes.

Category 2: Thermal insulation of the roofs of existing homes, in combination with installation of a photovoltaic system, using the net-metering method.

Category 3: Installation of a photovoltaic system in existing homes, using the net-metering method.

The Plan was announced on 14 November 2018. The application period for the Plan began on 12 March 2019 and ended on 20 December 2019. The Plan will be put in place again in 2020.

8. Plan for the installation or replacement of solar hot water systems for residential use. This Plan aims to provide economic incentives in the form of a State subsidy for replacing or installing solar water heaters in existing homes (with building permit before 21 December 2007). The Plan is applied on an annual basis.
9. 'Save & Upgrade' plan for residential buildings (2nd call). The application period for the Plan started on 16 April 2018 and ended on 8 June 2018. The Plan supported actions for the large-scale upgrade of existing homes owned by natural persons. The Plan was co-financed by the Republic of Cyprus and the Cohesion Fund (CF) in the context of the Operational Programme 'Competitiveness and Sustainable Development' 2014-2020. Subsidised actions included the purchase and installation of a solar water heater, the installation of a central solar system for space heating and/or cooling, and the purchase and installation of a high-efficiency aérothermal, geothermal or hydrothermal pump for the operation of central heating and/or cooling systems. The Plan was first launched in March 2015.

10. ‘Save & Upgrade’ plan for residential buildings within the British Bases. The application period for the Plan started on 21 May 2018 and ended on 31 December 2018. The Plan sponsored actions for large-scale energy upgrading of existing homes owned by natural persons residing permanently in British Bases. Subsidised actions included the purchase and installation of a solar water heater, the installation of a central solar system for space heating and/or cooling, and the purchase and installation of a high-efficiency aérothermal, geothermal or hydrothermal pump for the operation of central heating and/or cooling systems.

All the above support schemes (except No 8) were adopted following the preparation of the National RES Action Plan 2010-2020. The table below provides details on the economic incentives granted in the form of State subsidy under support schemes 2, 7 and 8.

Table 3a: Support schemes for the years 2017-2018 for individuals.

Support scheme	Technology	Subsidy
<p>Plan for Electricity Generation from Renewable Energy Sources for Own Consumption.</p> <p>The aid was replaced by sub-category 3B in the ‘Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in Homes’ announced on 14 November 2018.</p>	<p>Small-scale residential PV systems to be installed on the rooftops of homes owned by vulnerable groups of consumers, using the net-metering method, under which the electricity consumed is offset against that generated.</p>	<p>A subsidy of EUR 900 for each kW installed was granted to vulnerable groups of residential consumers, with a subsidy ceiling of EUR 2 700 per system.</p>
<p>Plan for the installation or replacement of solar hot water systems for residential use.</p>	<p>Solar hot water production systems.</p>	<p>The subsidy was: EUR 350 per residential unit for the installation/replacement of a complete water heating solar system, and EUR 175 per residential unit for the installation/replacement of solar systems for water heating.</p>
<p>Support Scheme to encourage the use of Renewable Energy Sources and Energy Saving in homes.</p>	<p>Category 1: Thermal insulation of the roofs of existing homes.</p> <p>It concerns homes for which the application for a town planning/building permit was submitted before 21 December 2007.</p>	<p>30% subsidy on eligible expenses with a maximum subsidy of EUR 1 500.</p>
	<p>Category 2: Thermal insulation of the roofs of existing homes in combination with installation of a photovoltaic system, using the net-metering method.</p> <p>It concerns homes for which the application for a town planning/building permit was submitted before 21 December 2007.</p>	<p>It includes:</p> <ul style="list-style-type: none"> ➤ 35% subsidy on eligible roof insulation costs, with a maximum subsidy of EUR 1 800. ➤ EUR 300 subsidy for each installed kW, with a maximum subsidy of EUR 1 200.

<p>Category 3: Installation of a photovoltaic system in existing homes, using the net-metering method.</p>	
<p>Sub-category 3A: PV systems in residential consumer premises. This applies to homes for which the application for a town planning/building permit was submitted before 1 January 2017.</p>	<p>EUR 250 subsidy for each installed kW, with a maximum subsidy of EUR 1 000.</p>
<p>Sub-category 3B: PV systems in the homes of vulnerable consumers.</p>	<p>EUR 900 subsidy for each installed kW, with a maximum subsidy of EUR 3 600.</p>

Table 3b: Total subsidy amounts allocated per technology in 2017 and 2018

	Category of investments	Type of support	Amount of Sponsorship/Subsidy	Amount of Sponsorship/Subsidy granted (€)	Amount of Sponsorship/Subsidy granted (€)
				2017	2018
	HEATING-COOLING SECTOR				
1	Installation and/or replacement of solar hot water systems for residential use.	Investment grant	EUR 350 for the installation or replacement of an integrated solar water heating system, and EUR 175 for the installation/replacement of solar panels	193 025	290 371
2	Installation and/or replacement of central active water heating systems.	Investment grant	45% (natural persons) / 30% (legal persons) of the eligible costs of the investment	35 344*	11 822*
3	Installation and/or replacement of solar space heating and/or cooling systems.	Investment grant	55% (natural persons) / 35% (legal persons) of the eligible costs of the investment	174 323*	71 568*
4	Use of a heat pump with a geothermal heat exchanger	Investment grant	55% (natural persons) / 40% (legal persons) of the eligible costs of the investment	0	220 802*
5	Utilisation of biomass for space heating	Investment grant	15% or 25% or 35% of the eligible budget	0	16 966*
	Total annual support to the heating-cooling sector			402 692	611 529

	ELECTRICITY GENERATION SECTOR				
6	Photovoltaic (net-metering) systems in the homes of vulnerable consumer groups		EUR 900/kW with a maximum of EUR 2 700 per system	850 303	485 631
7	Autonomous photovoltaic systems		55% (natural persons) / 40% (legal persons) of the eligible costs of the investment	0	7 594*
8	Autonomous water extraction photovoltaic systems		40% of the eligible costs of the investment	13 269*	0
	SUBSIDIES	Production subsidy - Fixed purchase price			
9	Wind farms		EUR 0.166/kWh	17 854 864	14 722 514
10	Biomass/biogas plants		EUR 0.135/kWh	1 221 768	717 559
11	Photovoltaic systems connected to the grid		EUR 0.138-0.383/kWh (depending on the year of installation) + Prices based on an award procedure	12 174 913	9 887 234
	Total annual support to the electricity generation sector			32 115 117	25 820 532

*It refers to applications incorporated into previous year plans and paid in the period 2017-2018.

Incentives and conditions regarding the use of RES in buildings, according to the Order of the Minister for the Interior No 1/2014

On 17 November 2014, the Minister for the Interior issued an order under Article 6 of the Town and Country Planning Act, setting out incentives and/or requirements for encouraging the use of RES in different types of developments. The order aims to create the conditions for encouraging natural and legal persons to produce energy from RES and concerns different types of developments, as described in the order. The incentive granted consists in increasing the building ratio, or in some cases the use of RES is a requirement for the applicability of other incentives under the development plans. The incentives are presented in detail in the following Table of Incentives and Conditions in relation to RES use.

Following are the key provisions of Order 1 of 2014:

- The use of RES concerns PV and solar-thermal system installations.
- In the case of PV systems used to generate electricity, the installation is connected to the grid.
- This applies to new or existing developments.
- All developments covered by the Order must meet the minimum energy generation requirements in conjunction with the relevant RES energy efficiency requirements of the development.

It is understood that the minimum RES energy generation requirements listed in the following table can be met through different energy efficiency combinations of the development and installation of RES systems. However, to ensure better environmental protection, combinations that focus primarily on reducing the energy needs of the development (e.g. better thermal insulation of the building) and then meet the required rate of the resulting energy needs with RES energy, are preferred.

Table 3c: Incentives and conditions regarding the use of RES in buildings, according to the Order of the Minister for the Interior No 1/2014

Serial No	Type of building development or use	Key requirements					Incentive for increasing building ratio by:	Scope
		Requirements	Optional use of the incentive or mandatory requirement for other incentives for this type of development to apply		Energy rating category of the establishment	Mandatory minimum coverage percentage (%) of RES on total energy needs for the relevant use or minimum installed capacity in relation to the floor area of the development		
			Optional incentive	Mandatory requirement for applicability of other incentives under the development plans				
1	All types of developments (in addition to types 3-5 below) that fall within the development boundary (or in the vicinity thereof)	As indicated in the respective development plans	Optional		A	25% (*1), (*2)	5%	All of Cyprus
2	Sizeable composite use		Optional		A	25% (*1), (*2)	5%	All of Cyprus

	developments, sizeable composite urban use developments, special developments outside urban development areas and boundaries							
3	Industries, crafts establishments and warehouses		Optional		A (only for the part of the building that falls under Act 142(I)/2006 on the energy performance of buildings, as amended)	2kW/100 m ² of the total industrial space/year (*1)	5%	All of Cyprus
4	Tall buildings as indicated in the respective development plans			Requirement for applicability of other incentives	A	25% (*1), (*2)	-	Applies in relation to the provisions of the local plans of Nicosia, Larnaca, Limassol and Paphos

5	Developments with desired uses in central areas			Requirement for applicability of other incentives for desired uses	A	25% (*1), (*2)	-	Applies to the local plans of Nicosia, Larnaca, Limassol and Paphos
---	---	--	--	--	---	----------------	---	---

Notes: (*1) Primary energy based on the methodology for calculating the energy performance of buildings

(*2) Combination of the energy efficiency level of the development and installation A (see relevant condition of para. 5.1 of Order 1 of 2014)

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

As also mentioned in Question 2b too, EAC-Supply, being currently the sole operating electricity supplier in Cyprus, has to purchase all the energy produced by RES units included in a support scheme and fed into the distribution/transmission network at the tariffs specified by CERA, on condition that the terms laid down in the purchase agreement between EAC-Supply and the producer and in the distribution and transmission rules in force each time are met.

Regarding RES projects included in support schemes which provided for a guaranteed selling price of the generated energy, a 15- to 20-year long agreement is signed by and between EAC and the system owner for purchasing the energy generated. For the projects included in the 'Scheme for RES electricity generation projects to be included eventually in the competitive electricity market', the electricity generated will be purchased by the EAC-Supply up to twelve (12) months after the date when the new Electricity Market Rules enter into force.

EAC sends to the Ministry of Energy, Commerce and Industry the monthly amount of electricity generated by RES units that receive support and publishes the RES share in electricity generation in its annual report, to inform consumers too.

Please note that CERA, by its Decision No 1279/2015 of 28 May 2015, approved the methodology for calculating the fuel mix used in electricity generation in Cyprus and the fuel mix of the suppliers, as well as the resulting technical manual setting out the procedure for calculating the fuel mix used in electricity generation and the fuel mix of the suppliers, and the disclosure of the fuel mix of electricity suppliers.

CERA also adopted a decision to approve the methodology used to disclose the fuel mix of the supplier, as required by Article 3(9) of Directive 2009/72/EC.

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).

The practice used to calculate the amount and intensity of the grant/subsidy takes into account the following:

- the domestic renewable energy potential per technology,
- the cost, maturity, efficiency, potential, development and social acceptance of each technology,
- the safety of network operation and the capabilities offered by each technology in terms of reserve,
- the dispersed and decentralised RES energy generation.

As referred to under Question 2 (Table 2, measure 9), a new policy for promoting RES electricity generation projects has been implemented since April 2015, whereupon the support schemes that provided for the a guaranteed amount of subsidy for RES electricity generation projects were abolished. Investors implementing RES electricity generation projects now enjoy the current RES electricity price specified by CERA up until the competitive electricity market (CEM) is launched, whereupon these projects will be included in that market and thus compete with conventional technologies on equal terms.

In the two-year period 2017-2018, no support schemes for the production of biofuels from waste, residues, non-edible cellulose and ligno-cellulosic materials have been implemented in Cyprus.

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 system reliability and protection of the system against fraud (Article 22(1)(d) of Directive 2009/28/EC).

The Republic of Cyprus operates a system of guarantees of origin for electricity from RES but it has not taken any steps to create a system of guarantees of origin for heating and cooling from RES, as there are no central heating-cooling systems and district heating or cooling networks on the island.

Pursuant to the 2013 Act on the Promotion and Encouragement of the Use of Renewable Energy Sources²³, as well as the new Regulatory Decision of the Cyprus Energy Regulatory Authority²⁴, Cypriot legislation has fully transposed Article 15 of Directive 2009/28/EC on the guarantees of origin for electricity produced from RES.

The Cyprus Transmission System Operator, being the authorised issuer of guarantees of origin, has operated an electronic register since December 2010 for both the guarantees of origin from RES and the guarantees of origin from high-efficiency cogeneration of heat and power. On 1 February 2011, CTSO issued the first guarantee of origin for the first wind farm installed in Cyprus.

CTSO has taken a number of measures to ensure the reliability of the system and protect it against fraud, in addition to those described in the Directive (setup of an electronic register, issuance of guarantees of origin with a unique identification number). Firstly, the electronic register has been so designed as to integrate actual measurements taken by remote transmission from electricity meters installed at the connecting point between RES power plants and the transmission/distribution system. Two meters are installed in each RES power plant (a main meter and a verification meter), which are certified, tested and sealed in accordance with the legislation in force. Moreover, measures have been taken in each RES plant to prevent the feeding into the grid of electricity from conventional sources or via other interconnections. In addition to that, each RES power plant is inspected on a regular basis to ensure that the output recorded comes from RES only. CTSO has also drawn up a technical manual setting out the electronic registry's entire operating procedure, and all necessary measures have been taken to ensure controlled access to the electronic register (solely by entry of the authorised user's name and the password), the provision of relevant supporting documentation and thorough checks at each phase of the procedure used to issue guarantees of origin.

²³ Act 112(I)/2013

²⁴ Regulatory Decision No 02/2010 under Article 21 of Act 162(I)/2006

The electronic register of guarantees of origin operated by CTSO was upgraded 2013 to fully conform to the regulations of the Association of Issuing Bodies (AIB), whereas the CTSO became a full member of AIB in September 2014. The connection of the electronic register of guarantees of origin with AIB's server, known as AIB hub, was completed in June 2019. Thus, from July 2019, through the AIB hub, it is possible both to export Cypriot guarantees of origin from RES to other European countries, and to import European guarantees of origin (from AIB hub member countries) to Cyprus.

6. Please describe the developments, in the preceding 2 years, in the availability and use of biomass resources for energy purposes (Article 22(1)(g) of Directive 2009/28/EC).

Table 4: Biomass supply for energy use

		Amount of domestic raw material in tonnes (tn)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU in tonnes (tn)		Primary energy in amount of imported raw material from the EU (ktoe)		Amount of imported raw material from non EU in tonnes (tn)		Primary energy in amount of 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:													
	Feedstock												
Direct supply of wood biomass from forests and other wooded land for energy generation (fellings, etc.)**	Wood biomass	39 985	43 838	14.39	15.78	721.00	295.29	0.26	0.11	882.58	361.82	0.32	0.13
Indirect supply of wood biomass (residues and co-products from wood industry, etc.)	Scrap wood / wood residues	1 044.44	1 133.33	0.38	0.41	548.04	331.42	0.20	0.12	584.76	271.83	0.21	0.10
	Processed wood fuel (charcoal)	2 491	1 617	1.79	1.16	147.05	137.58	0.11	0.10	13 075.13	12 326.06	9.41	8.87
	Wood pellets	0	0	0	0	170.53	82.43	0.07	0.03	3 196.64	1 824.15	1.31	0.75
Agricultural by-products / processed residues and fishery by-products **	Charcoal from olive pit	3 987	4 732	1.71	2.03	0	0	0	0	0	0	0	0
	Meat meal	1 757	1 254	0.62	0.45	0	0	0	0	0	0	0	0
Biomass from waste (municipal, industrial etc.) **	Biomass from tyres	5 428	7 560	1.19	0.81	0	0	0	0	0	0	0	0
	Dried sewage sludge	1 051	519	0.27	0.15	12 511	11 324	3.21	3.20	0	0	0	0
	ASF	191	381	0.02	0.06	0	0	0	0	0	0	0	0
	RDF (Refuse-derived fuel)	1 518	2 715	0.25	0.6	86 632	106 977	14.21	23.69	0	0	0	0

Energy crops (grasses, etc.) and short rotation trees (please specify)	0	0	0	0	0	0	0	0	0	0	0	0	0
Other (please specify)	Biogas from animal and municipal waste			8.87	8.92	0	0	0	0	0	0	0	0
Biomass supply for transport:													
Common arable crops for biofuels (please specify main types)		0	0	0	0	0	0	0	0	0	0	0	0
Energy crops (grasses, etc.) and short rotation trees for biofuels (please specify main types)		0	0	0	0	0	0	0	0	0	0	0	0
Other (please specify)	Used cooking oil	0	0	0	0	9 727	10 001	8.66	8.90	0	0	0	0

* 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 agricultural land use for production of crops dedicated to energy production (ha)

Land use	Area (ha)	
	2017	2018
1. Land used for common arable crops (wheat, sugar beet, etc.) and oilseeds (rapeseed, sunflower, etc.) (Please specify main types)	0	0
2. Land used for short rotation trees (willows, poplars) (Please specify main types)	0	0
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum (Please specify main types)	0	0

No agricultural land was used in Cyprus for the production of crops intended for energy production in the period 2017-2018.

7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding 2 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).

In the years 2017 and 2018, no agricultural land was used in Cyprus to produce energy crops or crops intended solely for energy purposes. Therefore, no changes were made to the prices of basic commodities and to land uses, associated with an increase in the use of biomass or other forms of renewable energy.

Most domestic agricultural products and by-products in Cyprus are used in food and feed, instead of energy purposes. The agricultural sector of Cyprus cannot support the exploitation of substantial volumes of products or by-products from agriculture and forestry for energy generation purposes, primarily due to the water shortage problems and the absence of large agricultural parcels in Cyprus. In addition to that, the absence of large quantities of biomass from forestry does not allow for the increased use of such biomass for energy purposes.

Moreover, the Republic of Cyprus promotes the use of animal, municipal and industrial waste as raw material for biomass energy production, and therefore there has not been, nor is there expected to be in the near future, any significant impact on other sectors reliant on agriculture and forestry which could lead to a change to the price of raw materials or land use.

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).

There was no domestic production of biofuels in Cyprus in the period 2017-2018.

Please note that a quantity of used cooking oil is collected in Cyprus and exported to other MS for biodiesel production.

Table 5: Development of biofuels

Please provide the total amounts of biofuels **made** from the feedstocks listed in Annex IX of Directive 2009/28/EC (ktoe)

<i>Feedstocks as listed in Part A of Annex IX to Directive 2009/28/EC</i>	2017	2018
<i>(a) Algae, if cultivated on land in ponds or photobioreactors.</i>	0	0
<i>(b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under Article 11(2)(a) of Directive 2008/98/EC.</i>	0	0
<i>(c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC, from private households, subject to separate collection as defined in Article 3(11) of that Directive.</i>	0	0
<i>(d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in Part B of this Annex.</i>	0	0
<i>(e) Straw</i>	0	0
<i>(f) Animal manure and sewage sludge</i>	0	0
<i>(g) Palm oil mill effluent and empty palm fruit bunches</i>	0	0
<i>(h) Tall oil pitch</i>	0	0
<i>(i) Crude glycerine</i>	0	0
<i>(j) Bagasse</i>	0	0
<i>(k) Grape marcs and wine lees</i>	0	0
<i>(l) Nut shells</i>	0	0
<i>(m) Husks</i>	0	0
<i>(n) Cobs cleaned of kernels of corn.</i>	0	0
<i>(o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil.</i>	0	0
<i>(p) Other non-food cellulosic material as defined in point (s) of the second subparagraph of Article 2.</i>	0	0
<i>(q) Other ligno-cellulosic material as defined in point (r) of the second subparagraph of Article 2, except saw logs and veneer logs.</i>	0	0
<i>Feedstocks as listed in Part B of Annex IX to Directive 2009/28/EC</i>	2017	2018
<i>(a) Used cooking oil</i>	0	0
<i>(b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council</i>	0	0

Resource assessment

Please provide a resource assessment of the feedstock listed in Annex IX to Directive 2009/28/EC, focusing on the sustainability aspects relating to the effect of the replacement of food and feed products for biofuel production, taking due account of the principles of the waste hierarchy established in Directive 2008/98/EC and the biomass cascading principle, taking into consideration the regional and local economic and technological circumstances, the maintenance of the necessary carbon stock in the soil and the quality of the soil and the ecosystems.

In the two-year period 2017-2018, no biofuels were produced in Cyprus, and therefore there was no effect on the production of food and feed products or in the maintenance of the necessary carbon stock in the soil and the quality of the soil and the ecosystems.

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 2 years. Please provide information on how these impacts were assessed, with references to relevant documentation on these impacts within your country (Article 22(1)(h) of Directive 2009/28/EC).

In 2017 and 2018, no biofuels and bioliquids were produced in Cyprus.

It is noted that, for each project involving the production of biofuels and bioliquids, environmental impact is assessed separately through relevant legislation and the impact on biodiversity, water, air and soil is assessed. Although the Department of Environment examined a number of applications for biofuel production projects and assessed their environmental impact, depending on the type of project and its location, no project has progressed to production.

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

Annex I describes in detail the methodology used to calculate net greenhouse gas emission saving due to the use of renewable energy in electricity generation, heating/cooling and transport.

Table 6: Estimated greenhouse gas emission saving from the use of renewable energy (t CO₂eq)

Environmental aspects	2017	2018
<i>Total estimated net greenhouse gas emission saving from using renewable energy²⁵</i>	515 569	755 141
- Estimated net greenhouse gas emission saving from the use of renewable electricity	122 053	132 824
- Estimated net greenhouse gas emission saving from the use of renewable energy in heating and cooling	363 603	592 210
- Estimated net greenhouse gas emission saving from the use of renewable energy in transport	29 913	30 107

11. Please report on (for the preceding 2 years) and estimate (for the following years up to 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), (m) of Directive 2009/28/EC).

In the two-year period 2017-2018, just like in the previous two-year periods for which a report had been submitted, the Republic of Cyprus exceeded the intermediate targets set out in Part B of Annex I to Directive 2009/28/EC concerning the RES share in gross final consumption of energy. The surplus RES energy in ktoe shown in Table 7 relates to the extra RES energy consumed in the Republic of Cyprus compared to the minimum RES energy that should have been consumed to attain the indicative trajectory targets. These surpluses relate to RES energy mainly in the heating-cooling sector.

²⁵ 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 greenhouse gas saving.

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)^{26, 27}

	2015	2016	2017	2018	2019	2020
Actual/estimated production excess or deficit (Please distinguish per type of renewable energy and per origin/destination of import/export)	28.66	28.89	4.42	72.49	18.24	50.73

	2017	2018	2019	2020
Corresponding RES share by indicative trajectory / final target	9.47%	9.47%	13%	13%
Actual/estimated RES share	9.74%	13.78%	14.07%	15.97%
Difference	0.27%	4.31%	1.07%	2.97%
Actual/estimated RES energy (ktoe)	160.43	231.77	239.8	272.8
Minimum RES energy to achieve indicative trajectory / final objective (ktoe)	156.01	159.28	221.56	222.07
Actual/estimated surplus or production deficit	4.42	72.49	18.24	50.73

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

In the two-year period 2017-2018, the Republic of Cyprus has not signed with other States any agreement on statistical transfers, joint projects or joint support schemes.

With regard to the binding target for a minimum of 13% renewable energy use in 2020, the Republic of Cyprus is expected to achieve it using only domestic RES electricity generation and is not expected to use co-operation mechanisms (already in 2018 the overall share of RES in total consumption energy exceeded 13%)

²⁶ Please use actual figures to report on the excess production in the two years prior to submission of the report, and estimates for the following years up to 2020. In each report the Member State may correct the data of the previous reports.

²⁷ When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. -x ktoe).

In order to achieve the 10% target for renewable energy use in transport in 2020, due to the obstacles and problems encountered in achieving domestic use of RES (see Question 1), a statistical transfer agreement with other Member States that have achieved that target is being considered. In particular, the possibility of concluding a statistical transfer agreement to achieve the target in transport through technical assistance from the Structural Reform Support Service (SRSS) is being considered.

The Republic of Cyprus is not expected to participate in joint projects with other Member States and/or third countries within the next two years (until 2020).

The national procedures and arrangements on statistical transfers, joint projects and joint support schemes are set out in Articles 15-18 of the 2013 Act on the Promotion and Encouragement of the Use of Renewable Energy Sources (Act 112(I)/2013).

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).

In the two-year period 2017-2018, waste (dried sewage sludge, ASF, RDF, tyres, meat meal) was used by the cement production industry to generate heating. The biomass fraction of specific alternative fuels was determined by analyses carried out by laboratories accredited according to EN ISO/IEC 17025.

13. Please provide the amounts of biofuels and bioliquids in energy units (ktoe) corresponding to each category of feedstock group listed in Part A of Annex VIII taken into account by that Member State for the purpose of complying with the targets set out in Article 3(1) and (2), and in the first subparagraph of Article 3(4).

Feedstock group	2017	2018
Cereals and other starch-rich crops	0	0
Sugars	0	0
Oil crops	0	0

ANNEX I

Description of the methodology used to estimate net greenhouse gas emission saving due to the use of (a) electricity from renewable energy sources, (b) renewable energy sources in heating-cooling, and (c) renewable energy sources in transport.

1. Introduction

The estimate of net greenhouse gas emission saving due to use of (a) electricity generation from renewable energy sources, and (b) renewable energy sources in heating-cooling, was made using data by the department responsible for calculating greenhouse gas emissions, i.e. the Department of Environment of the Ministry of Agriculture, Rural Development and the Environment. The estimate of net greenhouse gas emission saving due to the use of RES in transport was made by the Energy Service of the Ministry of Energy, Commerce and Industry.

2. Methodology

Electricity generation and heating-cooling

The steps taken to calculate savings referred to under points (a) and (b) are:

- (a) Collection of RES energy consumption data.
- (b) Collection of data on energy sources that would have been used if no renewable energy sources were available.
- (c) Collection of greenhouse gas emission coefficients for energy sources that would have been used if no renewable energy sources were used.
- (d) Conversion of energy consumption into TJ.
- (e) Calculation of greenhouse gas emissions.
- (f) Conversion of greenhouse gas emissions into carbon dioxide equivalent (tonnes).
- (g) Calculation of total savings.

Transport

The net greenhouse gas emission reduction (saving) due to the use of biofuels in road transport was estimated as the difference between the emissions produced by the use of diesel and those produced by the use of a biodiesel mixture of specific proportions, using the typical greenhouse gas emission reduction values set out in the biofuel sustainability certificates.

A detailed presentation of the steps followed to calculate the net reduction (saving) in greenhouse gas emissions due to the use of biofuels in road transport is shown below:

- (a) The energy from biofuels consumed in transport was calculated in MJ.
- (b) The greenhouse gas emissions of energy from the use of biofuels were calculated using the typical greenhouse gas emission value for each biofuel, as set out in the biofuel sustainability certificates.
- (c) Greenhouse gas emissions from the aforementioned amount of energy were calculated assuming that said amount corresponded to conventional fuel. Currently, only biodiesel is mixed with diesel in Cyprus; therefore, said quantity was treated as if it were diesel.
- (d) After calculating the greenhouse gas emissions from the aforementioned amount of diesel, a net reduction in greenhouse gas emissions was calculated by subtracting the emissions from the use of biofuels.

3. Results

(a) Collection of RES energy consumption data

The source of renewable energy consumption data is the national energy balance prepared annually by the Energy Service of the Ministry of Energy, Commerce and Industry. The data for the years 2017 and 2018 are shown in Table 1.

Please note the following regarding biomass:

- Biomass consumed by the cement plant is solid and liquid waste.
- Biomass used for heating purposes in houses and services is composed of wood and wood residues.
- Biomass used for cooking purposes is charcoal.
- Biomass used in agriculture/livestock farming comes from cogeneration of electricity/heat from anaerobic livestock waste processing plants.
- Biomass used in industry comes from wood residues and olive pits.

Table 1. Consumption of renewable energy in 2017 and 2018, in toe.

Electricity (toe)	2017	2018
Electricity from biomass	4 434	4 480
Self-consumption in biogas/biomass plants	1 295	1 375
Fed into the electricity grid	3 139	3 105
Electricity from photovoltaic systems	14 940	17 304
Self-consumption (net-metering, net-billing, stand-alone)	2 292	2 944
Fed into the electricity grid	12 648	14 360
Electricity from wind power	18 185	19 010
Self-consumption in wind farms	37	37
Fed into the electricity grid	18 148	18 973
Total (toe)	37 559	40 794

Thermal energy (toe)	2017	2018
Solar thermal		
Domestic hot water	59 698	60 886
Space heating	10 535	10 745
Geothermal	1 551	1 551
Space heating		
Heat pumps		46 093
Space heating		
Biomass		
Cement industry	19 777	28 956
Cooking	11 313	10 138
Space heating	3 894	17 143
Industry heating	2 062	2 443
Consumption in biogas/biomass plants	4 441	4 441
Total	113 271	182 396

(b) Collection of data on energy sources that would have been used if no renewable energy sources were available.

It was acknowledged that, if no RES were used, the energy produced would come from the sources presented in Table 2. The data for the cement industry are based on the annual reports submitted by the plant under Act 110(I)/2011²⁸ for the years 2017 and 2018.

Table 2. Energy sources that would have been used if no renewable energy sources were available in 2017 and 2018, in %.

Electricity	Electr.	Diesel (Gas oil)	Kerosene	Light fuel oil	Pet-coke	RFO	LPG	Coal
Biomass, photovoltaic systems, wind farms.	100%							
Thermal energy								
Solar energy								
Domestic hot water	21.57%	42.11%	6.12%	2.42%			27.78%	
Space heating	38.73%	34.35%	5.59%				21.33%	
Geothermal		100%						
Heat pumps	100%							
Biomass								
Cement industry (2016)		0.05%			95.08%	1.24%	0.25%	3.38%
Cement industry (2017)		0.16%			79.10%	1.08%	0.34%	19.32%
Cooking	100%							
Space heating and consumption in biogas/biomass plants	40.00%	34.31%	5.22%	0.27%			20.20%	
Industry heating	29.14%	17.88%		32.25%			20.73%	

²⁸ The Establishment of a Scheme for Greenhouse Gas Emission Allowances Trading Act of 2011 (No 110(I)/2011)

(c) Collection of greenhouse gas emission coefficients for energy sources that would have been used if no renewable energy sources were used.

The greenhouse gas emission coefficients used to calculate emissions are shown in Table 3.

Table 3. Greenhouse gas emission coefficients per type of gas for 2017 and 2018, in kg/TJ.

Emission coefficient (kg/TJ)	2017	2018	Source
Electricity generation			
CO ₂	77 363	77 515	Annual ETS report from the plant ^a
CH ₄	3	3	IPCC 2006 GHG guidelines ^b
N ₂ O	0.6	0.6	IPCC 2006 GHG guidelines ^b
Cement production			
Liquid fuel			
CO ₂ Diesel	74 100	74 100	IPCC 2006 GHG guidelines ^d
CO ₂ Petcoke	93 900	93 610	Annual ETS report from the plant ^c
CO ₂ RFO	77 400	77 400	IPCC 2006 GHG guidelines ^d
CH ₄ Diesel, Petcoke, RFO	3	3	IPCC 2006 GHG guidelines ^d
N ₂ O Diesel, Petcoke, RFO	0.6	0.6	IPCC 2006 GHG guidelines ^d
CO ₂ LPG	63 100	63 100	IPCC 2006 GHG guidelines ^d
CH ₄ LPG	1	1	IPCC 2006 GHG guidelines ^d
N ₂ O LPG	0.1	0.1	IPCC 2006 GHG guidelines ^d
Coal			
CO ₂	93 610	94 480	Annual ETS report from the plant ^c
CH ₄	10	10	IPCC 2006 GHG guidelines ^d
N ₂ O	1.5	1.5	IPCC 2006 GHG guidelines ^d
Other industries (diesel)			
Industry heating			
CO ₂	74 100	74 100	IPCC 2006 GHG guidelines ^e
CH ₄	3	3	IPCC 2006 GHG guidelines ^d
N ₂ O	0.6	0.6	IPCC 2006 GHG guidelines ^d
Services, agriculture (diesel)			
Space heating			
CO ₂	74 100	74 100	IPCC 2006 GHG guidelines ^e
CH ₄	10	10	IPCC 2006 GHG guidelines ^d
N ₂ O	0.6	0.6	IPCC 2006 GHG guidelines ^d
Kerosene			
CO ₂	71 900	71 900	IPCC 2006 GHG guidelines ^e
CH ₄	10	10	IPCC 2006 GHG guidelines ^d
N ₂ O	0.6	0.6	IPCC 2006 GHG guidelines ^d
Light fuel oil			
CO ₂	77 400	77 400	IPCC 2006 GHG guidelines ^e
CH ₄	10	10	IPCC 2006 GHG guidelines ^d
N ₂ O	0.6	0.6	IPCC 2006 GHG guidelines ^d
LPG			
CO ₂	63 100	63 100	IPCC 2006 GHG guidelines ^e
CH ₄	5	5	IPCC 2006 GHG guidelines ^d
N ₂ O	0.1	0.1	IPCC 2006 GHG guidelines ^d

^a Based on the reports submitted as part of the implementation of the Establishment of a Scheme for Greenhouse Gas Emission Allowance Trading Act of 2011 (Act 110(I)/2011). This was calculated by dividing the total CO₂ emissions by the total electricity production for the year, from the three power plants.

^b IPCC, 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, pg. 2.16.

^c Based on the reports submitted as part of the implementation of the Establishment of a Scheme for Greenhouse Gas Emission Allowance Trading Act of 2011 (Act 110(I)/2011). Coefficients used for the cement production plant using biomass.

^d IPCC, 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, pg. 2.18.

^e IPCC, 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, pg. 2.20.

(d) Conversion of energy consumption into TJ.

Energy consumption was converted from toe to TJ with the following formula:

$$ECTJ = EC_{toe} \times 41\,868 / 1\,000$$

where ECTJ is energy consumption in TJ, EC_{toe} is energy consumption in toe and 41 868 is the conversion coefficient from ktoe to TJ²⁹.

(e) Calculation of greenhouse gas emissions.

Greenhouse gas emissions were calculated with the following formula:

$$GHG_x = EF_x \times ECTJ / 1\,000$$

where GHG_x is emissions of greenhouse gas x in tonnes, EF_x is the coefficient of the greenhouse gas x in kg/TJ, and ECTJ is energy consumption in TJ.

The results of the application of the aforementioned formula are shown in Table 4.

Table 4. Greenhouse gas emission savings due to use of renewable energy in 2016 and 2017, in tonnes of CO₂, CH₄ and N₂O.

Electricity	2017 (t)			2018 (t)		
	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
Electricity from biomass	14 360.96	0.55	0.11	14 539.03	0.56	0.11
Self-consumption in biogas/biomass plants	4 194.70	0.16	0.03	4 462.58	0.17	0.03
Fed into the electricity grid	10 166.26	0.39	0.08	10 076.45	0.39	0.08
Electricity from photovoltaic systems	48 392.83	1.88	0.38	56 158.61	2.17	0.43
Self-consumption (net-metering, net-billing, stand-alone)	7 425.31	0.29	0.06	9 553.44	0.37	0.07
Fed into the electricity grid	40 967.52	1.59	0.32	46 605.17	1.80	0.36
Electricity from wind power	58 900.14	2.28	0.46	61 693.14	2.39	0.48
Self-consumption in wind farms	119.36	0.005	0.001	119.60	0.005	0.001
Fed into the electricity grid	58 780.78	2.28	0.46	61 573.54	2.38	0.48
Total	121 653.93	4.71	0.95	132 390.78	5.12	1.02

²⁹ IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, introduction, pg 5

Thermal energy	2017 (t)			2018 (t)		
Solar energy						
Domestic hot water	179 192.83	17.75	1.15	182 843.27	18.10	1.18
Space heating	32 152.10	2.74	0.22	32 818.58	2.80	0.22
Geothermal						
Space heating	4 811.16	0.65	0.04	4 811.16	0.65	0.04
Heat pumps						
Space heating				149 589.84	5.79	1.16
Biomass						
Cement industry	77 502.70	2.68	0.52	113 315.30	5.27	0.94
Cooking	36 644.36	1.42	0.28	32 902.88	1.27	0.25
Space heating	11 915.58	1.01	0.08	52 494.38	4.44	0.36
Industry heating	6 375.56	0.49	0.04	7 555.87	0.58	0.05
Consumption in biogas/biomass plants	13 587.79	1.15	0.09	13 599.09	1.15	0.09
Total	362 182.08	27.89	2.42	589 930.37	40.05	4.29

(f) Conversion of greenhouse gas emissions into carbon dioxide equivalent (tonnes).

To calculate greenhouse gas emission saving due to the use of renewable energy in 2017 and 2018 in tonnes of CO₂, equivalent, CH₄ and N₂O emissions were multiplied by the global warming potential of each gas. **The coefficient for methane is 25 and 298 for dinitrogen monoxide³⁰.** Table 5 shows the greenhouse gas emission saving due to the use of renewable energy in 2017 and 2018, in tonnes of CO₂ equivalent for each gas.

³⁰ Decision 24/CP.19 Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention

Table 5. Greenhouse gas emission saving due to use of renewable energy in 2017 and 2018 in tonnes of CO₂ equivalent

Electricity	2017 (t CO ₂ eq.)			2018 (t CO ₂ eq.)		
	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
Electricity from biomass	14 360.96	13.93	33.19	14 539.03	14.07	33.54
Self-consumption in biogas/biomass plants	4 194.70	4.07	9.69	4 462.58	4.32	10.29
Fed into the electricity grid	10 166.26	9.86	23.50	10 076.45	9.75	23.24
Electricity from photovoltaic systems	48 392.83	46.92	111.84	56 158.61	54.33	129.54
Self-consumption (net-metering, net-billing, stand-alone)	7 425.31	7.20	17.16	9 553.44	9.24	22.04
Fed into the electricity grid	40 967.52	39.72	94.68	46 605.17	45.09	107.50
Electricity from wind power	58 900.14	57.10	136.13	61 693.14	59 696	142.30
Self-consumption in wind farms	119.36	0.116	0.276	119.60	0.116	0.276
Fed into the electricity grid	58 780.78	56.99	135.85	61 573.54	59.58	142.03
Total	121 653.93	117.95	281.16	132 390.78	128.10	305.38

Thermal energy	2017 (t CO ₂ eq.)			2018 (t CO ₂ eq.)		
	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
Solar energy						
Domestic hot water	179 192.83	443.72	343.44	182 843.27	452.55	350.28
Space heating	32 152.10	68.61	64.85	32 818.58	69.98	66.14
Geothermal						
Space heating	4 811.16	16.23	11.61	4 811.16	16.23	11.61
Heat pumps						
Space heating				149 589.84	144.74	345.05
Biomass						
Cement industry	77 502.70	66.90	155.25	113 315.30	131.71	280.08
Cooking	36 644.36	35.53	84.69	32 902.88	31.84	75.90
Space heating	11 915.58	25.23	24.25	52 494.38	111.07	106.73
Industry heating	6 375.56	12.19	12.77	7 555.87	14.50	15.13
Consumption in biogas/biomass plants	13 587.79	28.77	27.65	13 599.09	28.77	27.65
Total	362 182.08	697.18	724.51	589 930.37	1 001.39	1 278.57

(g) Calculation of total savings.

Greenhouse gas emission savings due to the use of renewable energy in 2017 and 2018 were as follows:

- From the use of electricity produced from renewable sources: 122.053 t CO₂ eq. for 2017 and 132.824 t CO₂ eq. for 2018.
- From the use of renewable energy sources in heating-cooling: 363.604 t CO₂ eq. for 2017 and 592.210 t CO₂ eq. for 2018.

The aforementioned data are shown in detail in Table 6.

Table 6. Total greenhouse gas emission saving due to use of renewable energy in 2017 and 2018 in tonnes of CO₂ equivalent.

Electricity	2017 (t CO₂ eq.)	2018 (t CO₂ eq.)
Electricity from biomass	14 408.08	14 586.63
Self-consumption in biogas/biomass plants	4 208.46	4 477.19
Fed into the electricity grid	10 199.61	10 109.44
Electricity from photovoltaic systems	48 551.59	56 342.49
Self-consumption (net-metering, net-billing, stand-alone)	7 449.67	9 584.72
Fed into the electricity grid	41 101.92	46 757.77
Electricity from wind power	59 093.37	61 895.13
Self-consumption in wind farms	119.75	119.99
Fed into the electricity grid	58 973.61	61 775.14
Total	122 053.04	132 824.25

Thermal energy	2017 (t CO₂ eq.)	2018 (t CO₂ eq.)
Solar energy		
Domestic hot water	179 979.99	183 646.10
Space heating	32 285.56	32 954.69
Geothermal		
Space heating	4 839.00	4 839.00
Heat pumps		
Space heating		150 079.63
Biomass		
Cement industry	77 724.85	113 727.08
Cooking	36 764.58	33 010.61
Space heating	11 965.06	52 712.18
Industry heating	6 400.52	7 585.50
Consumption in biogas/biomass plants	13 644.21	13 655.52
Total	363 603.77	592 210.31

Estimating net greenhouse gas savings due to the use of energy from renewable sources in transport.

The following factors were taken into account to estimate greenhouse gas savings in transport due to the use of renewable energy sources (biofuels):

- CO₂ savings are calculated over the useful life of fuel and not on combustion.
- CO₂ emissions from the biofuels used in transport were determined on the basis of biofuel sustainability certificates provided by the suppliers of transport fuel (oil companies) for the biofuels they placed on the market.
- In the two-year period 2017-2018, the entire amount of biofuels consumed was used for mixing with diesel. Consequently, the use of biofuels was replaced by the use of amounts of diesel only.
- Greenhouse gas emissions from the use of diesel are determined at 95.1 gCO₂eq/MJ, in accordance with Council Directive (EU) 2015/652 of 20 April 2015 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels.
- It was assumed that the amounts of other greenhouse gases produced in transport are negligible, and therefore only CO₂ savings were calculated.

The net greenhouse gas emissions saving from the use of biofuels in transport was estimated as the difference between the emissions produced by the use of diesel and those produced by the use of biodiesel. The calculations for 2017 and 2018 are shown in the tables below.

2017

Table of calculated greenhouse gas savings due to the use of energy from renewable sources in transport in 2017

Feedstock used in biofuel production	Amount of biofuels used (MT)	Energy content by weight, based on Annex III to Directive 2009/28/EC (MJ/kg)	MJ	Value for calculating greenhouse gas emissions from the use of biofuels, in accordance with sustainability certificates (gCO2eq/MJ)	gCO2eq from the use of biofuels	Value for calculating greenhouse gas emissions from the use of diesel, in accordance with Directive (EU) 2015/652 (gCO2eq/MJ)	gCO2eq if diesel was used instead of biofuels	Greenhouse gas emissions saving (gCO2eq)	CO2 savings in %
Used cooking oil 1	7 403.24	37	273 919 938	14	3 834 879 125	95.1	26 049 786 057	22 214 906 932	85.3%
Used cooking oil 2	1 858	37	68 737 062	5.3	364 306 431	95.1	6 536 894 643	6 172 588 212	94.4%
Used cooking oil 3	466	37	17 242 000	6.6	113 797 200	95.1	1 639 714 200	1 525 917 000	93.1%
TOTAL	9 727		359 899 000		4 312 982 756		34 226 394 900	29 913 412 144	

29 913 tCO2eq

2018

Table of calculated greenhouse gas savings due to the use of energy from renewable sources in transport in 2018

Feedstock used in biofuel production	Amount of biofuels used (MT)	Energy content by weight, based on Annex III to Directive 2009/28/EC (MJ/kg)	Energy (MJ)	Value for calculating greenhouse gas emissions from the use of biofuels, in accordance with sustainability certificates (gCO2eq/MJ)	gCO2eq from the use of biofuels	Value for calculating greenhouse gas emissions from the use of diesel, in accordance with Directive (EU) 2015/652 (gCO2eq/MJ)	gCO2eq if diesel was used instead of biofuels	Greenhouse gas emissions saving (gCO2eq)	CO2 savings (%)
Used cooking oil 1	9 127	37	337 699 000	14	4 727 786 000	95.1	32 115 174 900	27 387 388 900	85.3%
Used cooking oil 2	874	37	32 338 000	11	355 718 000	95.1	3 075 343 800	2 719 625 800	88.4%
TOTAL	10 001		370 037 000		5 083 504 000		35 190 518 700	30 107 014 700	

30 107 tCO2eq

