REPUBLIC OF CYPRUS **MINISTRY OF ENERGY, COMMERCE, INDUSTRY AND TOURISM**

2ND PROGRESS REPORT UNDER ARTICLE 22 OF DIRECTIVE 2009/28/EC

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1. Sectoral and overall shares of energy from renewable sources <u>in the preceding two years</u> (Article 22(1)(a) of Directive 2009/28/EC).

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

	Year N-2 (2011)	**Year N-1 (2012)**
RES-H&C (%)	**18.9%**	**21.5%**
RES-E (%)	**3.9%**	**5.9%**
RES-T(%)	**2.1%**	**2.4%**
Overall RES share (%) not taking account of the civil aviation limit reduction	**6.1%**	**7.0%**
Total RES share (%) after reduction for civil aviation limit[1]	**6.51%**	**7.7%**
Of which from cooperation mechanism (%)	**0**	**0**
Surplus for cooperation mechanism (%)	**0**	**0**

Comparing the data in the above 2012 Table against the relevant forecasts as cited in Table 3 of the National Action Plan (NAP) demonstrates the following as regards the individual RES shares in the 3 sectors:

- The forecasts on the RES-H&C (%) share were achieved, as the NAP had estimated the relevant share at 17.8%.
- The forecasts on the RES-E (%) share were achieved, as the NAP had estimated the relevant share at 4.4%.
- The 2.5% forecast for the RES-T (%) share was almost achieved, as the percentage was 2.4%.

Moreover, the Republic of Cyprus, with a 7.7% RES share in gross final energy consumption, has exceeded the indicative trajectory for the periods 2013-2014 and 2015-2016 since 2012, as pursuant to Annex I to the Directive[2] the total renewable energy share in the gross final energy consumption in Cyprus should stand at 5.93% in 2013-2014 and 7.45% in 2015-2016.

[1] Calculation of gross final energy consumption pursuant to Article 5(6).
[2] Directive 2009/28/EC of the European Parliament and of the Council of 23rd April 2009

Table 1a: **Calculation table for the renewable energy share for each sector in final energy consumption (ktoe)**[3]

	Year N-2 (2011)	**Year N-1 (2012)**
(A) Gross final consumption of RES for heating and cooling	**83.58**	**81.95**
(B) Gross final consumption of electricity from RES	**15.30**	**22.10**
(C) Gross final consumption of energy from RES in transport	**16.01**	**17.00**
(D) Gross total RES consumption	**114.892**	**121.055**
(E) Transfer of RES to other Member States	**0**	**0**
(F) Transfer of RES from other Member States and third countries	**0**	**0**
(G) RES consumption adjusted for target (D)-(E)+(F)	**114.892**	**121.055**

[3] Facilitates comparison with Table 4a of the NREAPs.

Table 1.b: **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[4]**

	Year N-2 (2011)		Year N-1 (2012)	
	MW	GWh	MW	GWh
Hydro[5]:	0	0	0	0
non pumped	0	0	0	0
<1MW	0	0	0	0
1MW-10 MW	0	0	0	0
>10MW	0	0	0	0
pumped	0	0	0	0
gross[6]	0	0	0	0
Geothermal:	0	0	0	0
Solar:	10.6	11.89	17.7	21.44
photovoltaic	10.6	11.89	17.7	21.44
concentrated solar power	0	0	0	0
Tide, wave, ocean	0	0	0	0
Wind:	133.5	113.78	146.7	184.61
onshore	133.5	113.78	146.7	184.61
offshore	0	0	0	0
Biomass[7]:	8.7	51.61	9.5	50.24
solid biomass	0	0	0	0
biogas	8.7	50.49	9.5	50.04
bioliquids		1.12		0.2
TOTAL	152.8	177.28	173.9	256.29
of which in CHP	8.52	50.49	9.32	50.04

Charts 1(a) and 1(b) below, compare the aforementioned table against Table 10 of the NAP for 2011 and 2012, respectively. As presented in the chart, the Republic of Cyprus has succeeded in implementing the minimum RES share in electricity for 2011 and 2012, set as a target in the NAP. Specifically, according to the forecast, the total installed RES power would come to 128 MW in 2011 (of which 8 MW would come from photovoltaic, 6 MW from biomass and 114 MW from wind farms), while the actual total installed power for 2011 came to 152.8 MW (of which 10.6 MW from photovoltaic, 8.7 MW from biomass and 133.5 MW from wind farms). The total installed RES power would come to 132 MW in 2012

4 Facilitates comparison with Table 10a of the NREAPs.

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

6 In accordance with new Eurostat methodology.

7 Take into account only those complying with applicable sustainability criteria. See the last point of Article 5(1) of Directive 2009/28/EC.

(of which 12 MW would come from photovoltaic, 6 MW from biomass and 114 MW from wind farms), while the actual total installed power for 2012 came to 173.9 MW (of which 17.7 MW from photovoltaic, 9.5 MW from biomass and 146.7 MW from wind farms).

Charts 2(a) and 2(b) present a comparison between the estimated and actual RES generation per RES technology in GWh for 2011 and 2012, respectively.

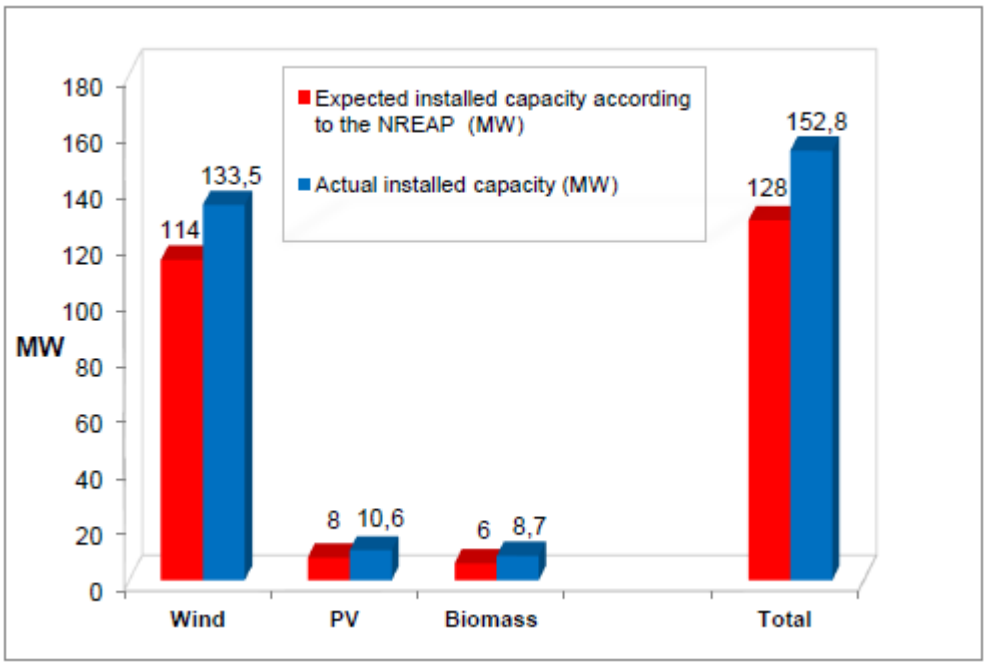

Chart 1(a). Estimated installed power (in MW) on the basis of the National Action Plan and actual installed power (in MW) per RES technology for 2011 in electricity

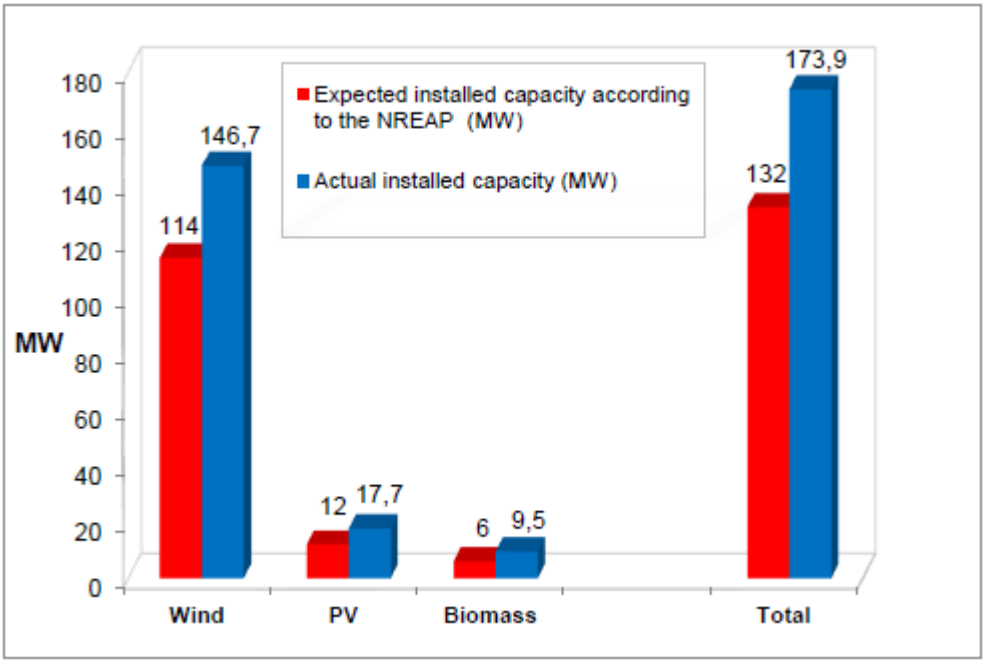

Chart 1(b). Estimated installed power (in MW) on the basis of the National Action Plan and actual installed power (in MW) per RES technology for 2012 in electricity

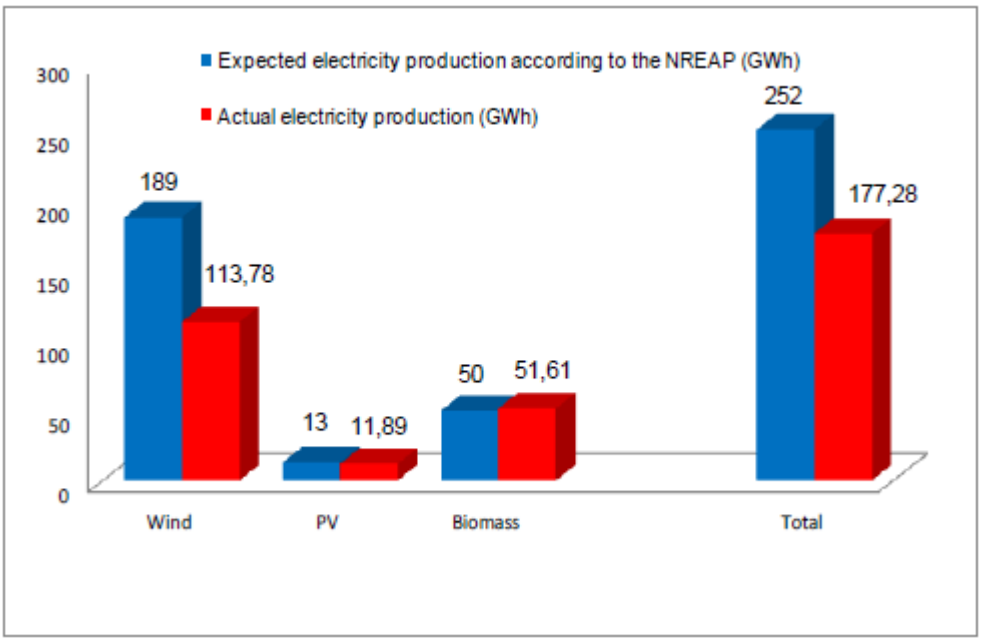

Chart 2(a). Estimated production (in GWh) on the basis of the National Action Plan and actual production (in GWh) per RES technology for 2011, in electricity.

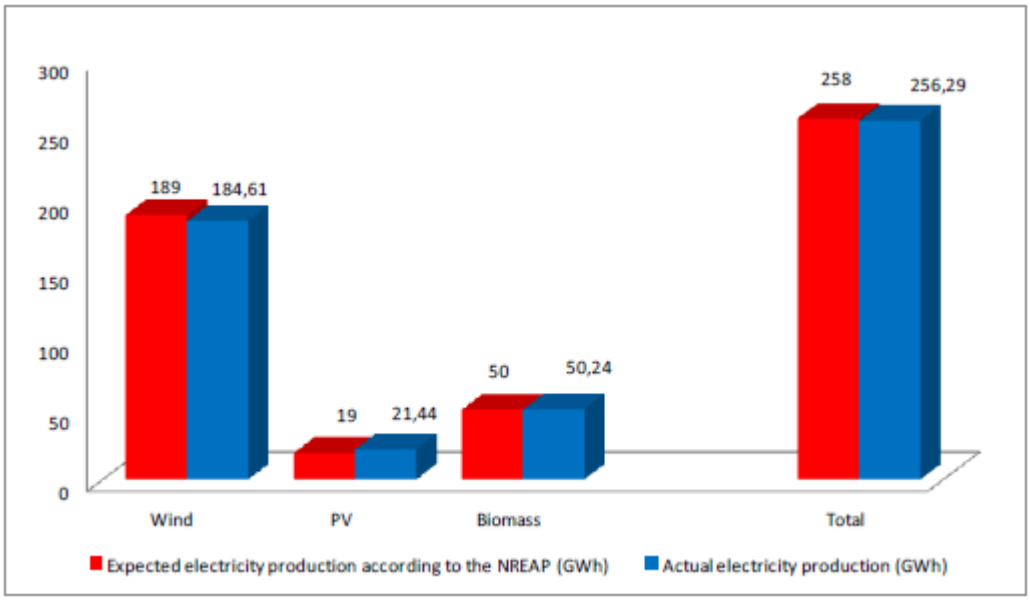

Chart 2(b). Estimated production (in GWh) on the basis of the National Action Plan and actual production (in GWh) per RES technology for 2012, in electricity.

Chart 3 below presents the actual installed power in MW for the years 2011 and 2012.

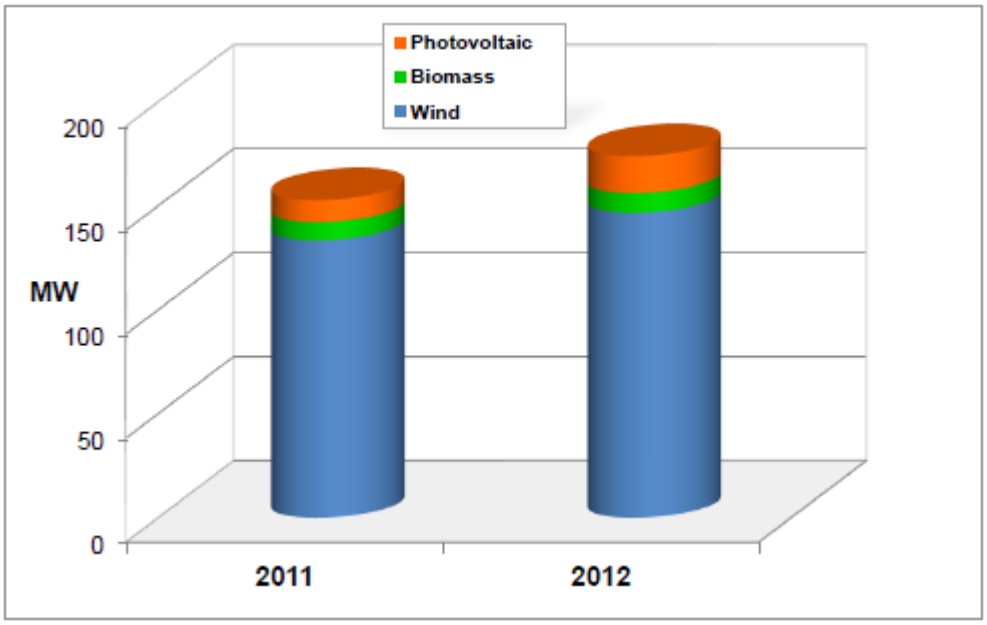

Chart 3. Actual installed power (in MW) for 2011 and 2012

Table 1c: **Total actual contribution (final energy consumption[8]) 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 heating and cooling (ktoe)[9]**

	Year N-2 (2011)	***Year N-1 (2012)***
Geothermal (excluding low temperature geothermal heat in heat pump applications)	**0**	**0**
Solar	**62.99**	**64.47**
Biomass[10]	**19.55**	**16.00**
solid biomass	15.27%	11.68%
biogas	4.28	4.32
bioliquids	0	0
Renewable energy from heat pumps: *of which aerothermal* *of which geothermal* *of which hydrothermal*	**1.05**	**1.48**
TOTAL	**83.59**	**81.95**
Of which in DH[11]	**0**	**0**
Of which biomass in households[12]	**5.49**	**5.75%**

Charts 4(a) and 4(b) present a comparison of the aforementioned table against the forecasts recorded in Table 11 of the NAP. The comparison demonstrates the following:

- The overall RES share in heating and cooling in 2011 was 83.59 ktoe, i.e. it exceeded the predicted indicative trajectory set out in the NAP for 2011 (81.32 ktoe).
- Specifically, the predictions for achieving 61.5 ktoe from solar plants, 19.24 ktoe from biomass and 0.58 ktoe from heat pumps in 2011 (Table 11 of the NAP) have been achieved.
- The overall RES share in heating and cooling in 2012 was 81.95 ktoe, while the predicted share for 2012 according to the indicative trajectory set out in the NAP was 85.77 ktoe. Both the predicted solar and geothermal shares for 2012 have been achieved. The predicted 20.36 ktoe biomass share has not been achieved.

8 Direct use and district heat as defined in Article 5(4) of Directive 2009/28/EC.
9 Facilitates comparison with Table 11 of the NREAPs.
10 Take into account only those complying with applicable sustainability criteria. See Article 5(1) of Directive 2009/28/EC.
11 District heating and/or cooling from total renewable heating and cooling consumption (RES- DH).
12 From the total renewable heating and cooling consumption.

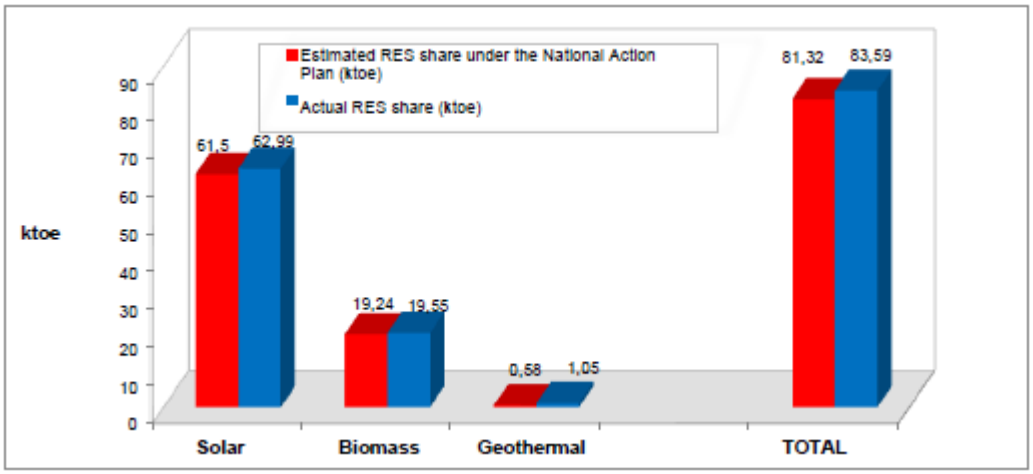

Chart 4(a). Estimated share (in ktoe) on the basis of the National Action Plan and actual share (in ktoe) per RES technology for 2011, in heating/ cooling

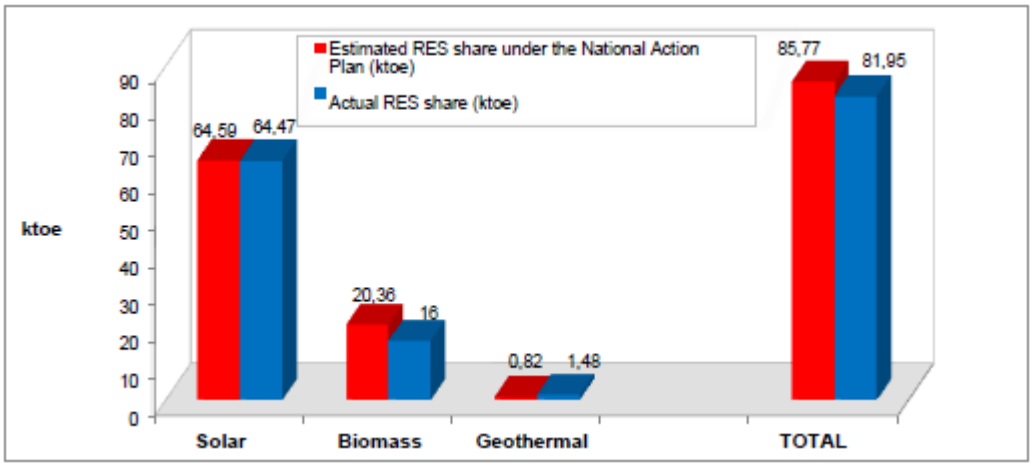

Chart 4(b). Estimated share (in ktoe) on the basis of the National Action Plan and actual share (in ktoe) per RES technology for 2012, in heating/ cooling

Table 1d: **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 the transport sector (ktoe)[13], [14]**

	Year N-2 (2011)	Year N-1 (2012)
Bioethanol/bio-ETBE	**0**	**0**
Of which biofuels[15] Article 21(2)	**0**	**0**
Of which imported[16]	**0**	**0**
Biodiesel	**16.01**	**17.00**
Of which biofuels[17] Article 21(2)	**0.1**	**0.1**
Of which imported[18]	**10.49**	**10.63**
Hydrogen from renewables	**0**	**0**
Renewable electricity	**0**	**0**
Of which road transport	**0**	**0**
Of which non-road transport	**0**	**0**
Others(as biogas, vegetable oils, etc.) –please specify	**0**	**0**
Of which biofuels[19] Article 21(2)	**0**	**0**
TOTAL	**16.01**	**17.00**

[13] As regards biofuels, take into account only those complying with applicable sustainability criteria. See the last point of Article 5(1).

[14] Facilitates comparison with Table 12 of the NREAPs.

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

[16] From the whole amount of bioethanol / bio-ETBE.

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

[18] From the whole amount of biodiesel.

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

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

Table 2: Overview of all policies and measures

Name & reference of the measure	*Type of measure*	*Expected result*	*Targeted group and/or activity*	*Existing or planned*	*Start and end dates of the measure*
1. Grant scheme for installing domestic photovoltaic systems of a capacity of up to 3kW by vulnerable consumers, using the "net-metering" method. Total maximum capacity: 6MW	**Financial**	**Promoting RES and reducing electricity costs for vulnerable consumers**	**Vulnerable domestic consumers.**	**The said measure supplements the measures set out in Table 5 of the NAP**	**Start date: 2013** **Date of completion: the deadline for applications was 13 December 2013, but the facilities are expected to be completed within the 1st quarter of 2014** **The measure is expected to be repeated in 2014** **Currently the extent of the measure is under assessment**

2. Measure for installing domestic photovoltaic systems of a capacity of up to 3kW by domestic consumers, using the "net-metering" method. Total maximum capacity: 9MW	**Regulatory**	**Promoting RES and reducing electricity costs for domestic consumers**	**Domestic consumers**	**The measure supplements the measures set out in Table 5 of the NAP**	**Start date: 2013** **Date of completion: the deadline for applications was 31 December 2013, but the facilities are expected to be completed within the 1st quarter of 2014** **The measure is expected to be repeated in 2014** **Currently the extent of the measure is under assessment**
3. Measure for applying a system that provides for netting the electricity received from the network against that generated by photovoltaic systems (net-metering) to buildings used as facilities by local authorities. Total capacity: 0.2 (MW)	**Regulatory**	**Promoting RES and reducing electricity costs for local authorities**	**Local authorities (Municipalities/ Communities)**	**The said measure supplements the measures set out in Table 5 of the NAP**	**Start date: 2013** **Date of completion: the deadline for applications was 31 December 2013, but the facilities are expected to be completed within the 1st quarter of 2014** **The measure is expected to be repeated in 2014**

4. Measure for installing photovoltaic systems using the autoproduction method in commercial/industrial establishments.	**Regulatory**	**Promoting RES and reducing electricity costs for commercial/industrial consumers**	**Commercial and industrial establishments**	**The said measure supplements the measures set out in Table 5 of the NAP**	**Start date: 2013** **End date: 1st half of 2014** **The measure is expected to be repeated in 2014**
5. Promoting road lighting using solar energy	**Financial and mild**	**Promoting RES and providing electrification to areas that could not be electrified in the past**	**Municipalities/ Communities**	**The measure is a follow-up on that which started in 2011**	**Start date: 2011**
6. Obligation to replace conventional fuels in transports with biofuels by 2.4% per energy content of all fuels in transports[20]	**Regulatory**	**Increase in the biofuel proportion in transports**	**Oil companies**	**Existing measure supplementing the measures of Table 5 of the NAP**	**Start date: 21/10/2011**
7. Tender for the installation of photovoltaic farms of a total capacity of 50MW	**Financial**	**Promoting RES and reducing electricity costs for consumers**	**Natural and legal persons**	**Existing measure supplementing the measures of Table 5 of the NAP**	**Start date: June 2012** **End date: end of 2014**

[20] RAA 431/2011

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 Republic of Cyprus has made progress in taking the following measures for improving administrative procedures and removing barriers to the promotion of RES energy:

1. **Keeping wind farm power stations up to 30kW and photovoltaic and biomass systems up to 20 kW exempt from the obligation to obtain a construction and operation license from the Cyprus Regulatory Authority**

2. **Keeping photovoltaic systems up to 20 kW exempt from the obligation to obtain a town planning permit, given that the systems are installed in a specific manner, and exemption of photovoltaic systems up to 20 MW from the obligation to obtain a building permit.**

An environmental impact assessment, it is not required in the following circumstances:

- **Wind turbines with capacity up to 30 kW (a preliminary environmental impact assessment is required for wind turbines with capacity above 31 kW);**
- **Photovoltaic facilities with capacity up to 100 kW;**
- **Power generation plants using biomass, with capacity up to 20 kW;**
- **Wave energy power plants.**

Additionally, the Ministry of Energy, Commerce, Industry and Tourism, in cooperation with all competent authorities, is looking into ways to further simplify the licensing procedures for RES systems, so as to significantly reduce the time needed for their consideration.

The Cyprus Transmission System Operator (CTSO) accepts applications for connection to the transmission system, provided that the applications are accompanied by an authorisation (construction authorisation) from the Cyprus Energy Regulatory Authority (CERA). The CTSO decided, with a view to improving administrative procedures and making things easier for applicants, not to request a town planning permit or other permits when a connection application is filed. Under the new procedure for considering applications, as implemented by CTSO, the procedures for securing all other permits are carried out parallel to the consideration of an application, thus avoiding any additional delays in licensing. Moreover, in order to inform the public about the connection procedures for RES power plants, the CTSO has posted the following on its website:

- **A template of the connection terms. The template includes the typical connection terms applicable to RES power plants, including inter alia the operating requirements applicable to such plants.**
- **Technical guide describing the terms and requirements for the connection of RES power plants to the transmission/distribution grid.**

All competent authorities responsible for the authorisation and licensing of RES power plants operate websites providing all necessary information to potential applicants, such as application forms, the licensing procedure, a list of applications already submitted, rejected. etc. Moreover, there are certain competent licensing authorities, such as the Town Planning and Housing Department, which uses its website (www.publicaccess.tph.moi.gov.cy) to allow people to follow up on the main progress stages for issuing town planning permits by entering the civil identification number.
All the aforementioned measures have helped to improve the administrative procedures, to directly and timely inform the public and to accelerate the licensing process.

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

The EAC is obliged[21]to purchase the entire energy fed into the distribution/transmission grid and produced from RES plants that are granted support or subsidy at the rates set by CERA, provided that the technical specifications laid down in the Purchase Agreement between the EAC and the producer and in the transmission and distribution rules applicable each time are met[22].

Moreover, under applicable legislation, priority is given by the CTSO to RES power plants in production dispatch. Specifically, RES power plants enjoy preferential treatment in production dispatch and feed all the energy they produce into the system, provided that the safe and reliable operation of the electricity system is not adversely affected.

As regards the requisite new infrastructure and/or improvement of the existing transmission network, the CTSO is preparing a 10-year transmission system development plan. The 10-year plan, which will be updated annually, includes all grid development projects considered necessary in order to maintain a safe and reliable system taking into consideration the new RES projects. The CTSO applies the instructions/guidelines of the European Union in order to ensure that the new infrastructure projects are designed and planned to facilitate the optimal financial and functional connection of RES projects.

To encourage the use of RES and the production of electricity from RES, CERA has issued a decision determining the policy pertaining to the charges made for RES producers to connect to the system, which is posted on the CTSO website. On the basis of the existing charging policy, the following apply:

[21] Decision of the Council of Ministers No 55.734 dated 30/5/2002 and Decision of the Council of Ministers No 68.201 dated 30/12/2008

[22] http://www.dsm.org.cy

Expenditure commitment: **The cost estimation is mainly based on the shallow connection methodology. The connection cost is calculated on the basis of the technically acceptable solution with the minimum cost. The connection cost is paid entirely by the applicant.**

Cost sharing: **TSO encourages wind farm applicants who wish to be connected in the same area to apply for their connection to the grid simultaneously, to share the grid connection costs. Otherwise, the cost is shared on the basis of repayable expenditure, meaning that the first applicant assumes the connection cost 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 repayment by subsequent applicants of part of the expenditure he has incurred.**

3. Please describe the support schemes and other measures currently in place that are applied to promote energy from renewable sources and report on any development 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 4 Support Schemes, set out in detail in the National Action Plan, were implemented in 2013:

1. **Support schemes for financial incentives in the form of state grants and/or subsidies in the sector to encourage the use of renewable energy sources and energy saving.**
2. **Cost of ancillary services**
3. **Use of system tariffs and losses**
4. **Provision of support for investments for the improvement of competitiveness and management of waste in farms**

Schemes 2, 3 and 4 have been implemented without any modification compared to 2012 (Analytical description of the support schemes is given in the National Action Plan). The tables below provide a detailed presentation of the support schemes under number 1 which were implemented in 2013 and pertained to (a) natural persons and organisations not engaged in economic activity (Table 3a), (b) natural and legal persons, as well as public bodies, engaged in economic activity (Table 3b), and (c) subsidisation of electricity from RES (Table 3c).

Table 3: *Support schemes in 2013 for natural persons and organisations not engaged in economic activity.*

Technology	Grant for 2013
Small-scale independent wind farms generating electricity with a capacity of up to 30 kW.	The subsidy is **55%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 50 000.**
Central solar active domestic hot water systems with minimum of a minimum capacity of 2560W (pertains to a new installation and/or replacement new installation or replacement).	The subsidy is **45%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 20 000.**
Central solar heating and cooling systems. (Pertains to a new installation and/or replacement)	The subsidy is **55%** of the eligible budget with restrictions on the maximum eligible expenditure. The maximum grant amount is **EUR 15 000** for heating systems and **EUR 50 000** for heating and cooling systems.
Domestic solar systems (pertains to the replacement of systems in existing private residential units)	The subsidy will be **EUR 350** per residential unit for installation or replacement of a solar system, and **EUR 175** per residential unit for installation or replacement of solar panels
Utilisation of biomass - Central heating/cooling generation systems	The subsidy is **55%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 19 000.**
Small domestic photovoltaic systems of a capacity of up 3kW, to be installed on roofs of houses owned by vulnerable groups of domestic consumers and to be operated using the “net-metering” method.	A subsidy of EUR 900 will be granted to vulnerable groups of domestic consumers for each installed kW, with a maximum grant amount of **EUR 2 700** per system.
Stand-alone photovoltaic systems of a total capacity of up to 7kW.	The subsidy is **55%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 20 000.**

Heat pump with a geothermal heat exchanger for private residential heating/cooling	The subsidy is **55%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 20 000.**
Heat pump with geothermal heat exchanger for heating/cooling in non-profit organisations, municipalities, communities, churches, associations and state agencies	The subsidy is **40%** of the eligible budget with restrictions of the maximum eligible expenditure. The maximum grant amount is **EUR 50 000.**

Table 3b: Support schemes in 2013 for natural and legal persons, as well as for public entities, engaged in economic activity.

Technology	**Grant for 2013**	
	Regional Support	De minimis support
Small-scale independent wind farms generating electricity with a capacity of up to 30 kW.	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 15 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 15 000.**
Windmills for pumping water	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 15 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 15 000.**
Central solar active domestic hot water systems with minimum of a minimum capacity of 2560W (pertains to a new installation and/or replacement new installation or replacement).	The subsidy is **15%** or **25%** or **30%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 20 000.**	The subsidy is **30%** of the eligible budget with restrictions on the maximum eligible expenditure. The maximum grant amount is **EUR 20 000.**

Central solar heating/cooling systems (pertains to a new installation and/or replacement new installation or replacement).	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 75 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 75 000.**
Utilisation of biomass - Production of biofuels for transport / district heating and/or cooling	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 200 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 200 000.**
Utilisation of biomass - Heating/cooling generation	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 200 000.**	
Stand-alone photovoltaic systems of a total capacity of up to 20kW.	Not applicable	The subsidy is **40%** of the eligible budget with restrictions of the maximum eligible expenditure. The maximum grant amount is **EUR 15 000.**
Stand-alone photovoltaic systems used to pump water, up to 20kW	Not applicable	The subsidy is **40%** of the eligible budget with restrictions of the maximum eligible expenditure. The maximum grant amount is **EUR 15 000.**
Desalination using RES	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR50 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR50 000.**

Small-scale hydroelectric projects in rivers and waterways in general Small-scale hydroelectric projects in existing plumbing networks	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR50 000.**	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 50 000.**
Heat pump with a geothermal heat exchanger for heating/cooling.	The subsidy is **15%** or **25%** or **35%** of the eligible budget, according to the type of undertaking. The maximum grant amount is **EUR 100 000**.	The subsidy is **35%** of the eligible budget with restrictions on maximum eligible expenditure. The maximum grant amount is **EUR 100 000**.

Table 3c: *Support-subsidy schemes in 2013 for electricity generation from RES*

Technology	**Subsidy for kilowatt/hour fed into the grid for 2010**
Large-scale commercial power wind farms	**EUR 0.145 kWh**
Commercial photovoltaic systems of a capacity of up to 150kW.	**EUR 0.138 kWh**
Electricity generation from landfill biogas	**EUR 0.1145 kWh (Subsidy= 0.0974 + 0.0171 bonus - purchase price by the EAC or any other provider)**

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

Currently, as mentioned above under Question 2b, the EAC, which is currently the sole supplier of electricity in Cyprus, is obliged, by order of the Council of Ministers and the support schemes, to purchase the entire energy fed into the distribution/transmission grid and produced from RES plants that are granted support or subsidy, at the rates determined by CERA, provided that the conditions set out in the purchase agreement

between the EAC and the producer, and in the transmission and distribution rules applicable each time, are met. The EAC sends to the Ministry of Energy, Commerce, Industry and Tourism the monthly quantity of electricity produced from supported RES plants and publishes in its Annual Report the share of electricity from RES in total electricity generation for consumer information purposes. In addition, to be granted a subsidy, all plants producing electricity from RES must submit to the Special Fund for Renewable Energy Sources and Energy Saving a certificate of the quantity of electricity financially supported. The Ministry of Energy, Commerce, Industry and Tourism publishes these data annually.

Please note that a methodology and regulations are currently being prepared for disclosing the energy mix to be maintained by suppliers under 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 waste, residues, non-food cellulosic material, and lingo-cellulosic material. ***(Article 22(1)(c) of Directive 2009/28/EC).***

Currently, support schemes do not take into account RES applications that may give additional benefits but are potentially more expensive, such as, for example, biofuels from waste whose contribution to the target is considered to be twice that made by other biofuels. The practice applied for calculating 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,**
- **safe network operation and the potential of each technology with respect to stocks.**

Specifically, for RES technologies used in electricity generation, the subsidy amount is calculated in a way the takes into account the cost of each technology, the borrowing rates, the land purchase or lease prices, the inflation rate and other parameters, so that the investment has an internal return rate of approximately 12%.

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

The Republic of Cyprus operates a system of guarantees of origin for electricity from RES but there are currently no plans to create a system of guarantees of origin for heating and cooling from RES.

Pursuant to the Law Promoting and Encouraging the Use of Renewable Energy Sources and Energy Saving of 2013[23], as well as the new Regulatory Decision of Cyprus Energy Regulatory Authority[24], the Cypriot legislation has fully transposed Article 15 on the guarantees of origin for electricity produced from RES.
From December 2010 the Transmission System Operator, as the authorised issuer of guarantees of origin, has had in operation an electronic register for both the guarantees of origin from RES and the guarantees of origin from high-efficiency cogeneration of electricity and heat. On 1 February 2011, the CTSO issued the first guarantee of origin for the first wind farm constructed in Cyprus.

The CTSO has taken a series of measures to ensure the system's reliability and protection against fraud, in addition to those described in the directive (creation of an electronic register, issue of guarantees of origin with unique identification number). First, the electronic register has been designed so as to integrate the actual measurements, as received through remote measurement, from the electricity meters installed at the RES electricity production plants. Two meters (a main meter and a control meter), certified, checked and sealed according to the applicable law, are installed in each plant producing electricity from RES. Moreover, measures have been taken in each RES plant to prevent

[23] Law 112(I)/2013
[24] Regulatory Decision 02/2010 by virtue of Article 21 of Law 162(I)/2006

the injection of electricity from conventional sources in the grid or through other connections . In addition, each plant producing electricity from RES is inspected on a regular basis to ensure that the production recorded comes exclusively from RES. Lastly, the TSO has drawn up a technical manual comprising the entire electronic register operating procedure, and all necessary measures have been taken to ensure the controlled access to the electronic register (only by entering the authorised user's name and password), the provision of relevant documentation and a detailed control over each phase of the guarantee of origin issue procedure.

6. Please describe the developments <u>in the preceding 2 years</u> 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 TONS (tn)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU and non EU		Primary energy in amount of imported raw material from EU and non EU (ktoe)	
	Year N-2 (2011)	Year N-1 (2012)	Year N-2 (2011)	Year N-1 (2012)	Year N-2 (2011)	Year N-1 (2012)	Year N-2 (2011)	Year N-1 (2012)
Biomass supply for heating and electricity:								
Direct supply of wood biomass from forests and other wooded land for energy generation (felling, etc.)	6042 wood biomass	7311 wood biomass	2.17	2.63	60 wood biomass	2096 wood biomass	0.02	0.75
Indirect supply of wood biomass (residues and by-products from wood industry, etc.)	664 wood waste 689 Processed wood-fuel 0	664 wood waste 1267 Processed wood-fuel 0	0.24 0.25 0	0.24 0.46 0	0 11 028 Processed wood-fuel 0 Wood pellets (pellets)	0 11 268 Processed wood-fuel 137 Wood pellets (pellets)	0 3.97 0	0 4.06 0.05
Energy crops (grasses, etc.) and short rotation trees (please specify)	0	0	0	0	0	0	0	0
Agricultural by-products/processed residues and fishery by-products**	1662 Meat flours	1691 Meat flours	0.73	0.68	0	0	0	0
Biomass from waste (municipal, industrial etc.)	0	0	0	0	20000 municipal waste;	9313 municipal waste;	6.60	3.07

Others (please specify)			**8.72 Biogas from animal and urban waste**	**8.62 Biogas from animal and urban waste**	**0**	**0**	**0**	**0**
Biomass supply for transport:								
Common arable crops for biofuel (please specify main types)	**0**	**0**	**0**	**0**	**17895 Biofuels from rapeseed oil, soya bean oil, palm oil, corn oil**	**19006 Biofuels from rapeseed oil, soya bean oil, palm oil, corn oil**	**15.93**	**16.92**
Energy crops (grasses, etc.) and short rotation trees (please specify main types)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Others (please specify)	**96 Biofuels from waste cooking oil**	**96 Biofuels from waste cooking oil**	**0.09**	**0.09**	**0**	**0**	**0**	**0**

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

Land use	Surface area (ha)	
	Year N-1 (2011)	**Year N-2 (2012)**
1. Land used for common arable crops (wheat, sugar beet, etc.) and oil seeds (rapeseed, sunflower etc.) (Please specify main types)	*	*
2. Land used for short rotation trees (willows, poplars). (Please specify main types)	*	*
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, miscanthus), sorghum. (Please specify main types)	*	*

*** Agricultural land was not used for dedicated energy production in 2011 and 2012**

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).

The is no information of any changes in commodity prices and land use associated with the increased use of biomass and other forms of energy from RES in 2011 and 2012, because no agricultural land was used in Cyprus for energy crops or crops exclusively dedicated to energy purposes. The reason is that the agricultural sector of Cyprus cannot support the energy exploitation of significant amounts of products or by-products from agriculture and forestry, mainly due to the water problem the island is confronted with and the lack of multi-segmentation of agricultural land. In addition, the absence of large quantities of forest biomass does not leave much room for exploiting forest biomass for energy purposes. Therefore, it is a fact that, in Cyprus, the majority of domestic agricultural products and by-products are used in food and feed and not for energy purposes.

Moreover, the Republic of Cyprus promotes the use of, as a raw material for producing energy from biomass, animal, urban and industrial waste and, therefore, there has not been, nor is there expected to be in the near future, any significant impact on other sectors that are based on agriculture and forestry due to the energy needs of Cyprus, which could lead to a change in the commodity prices or land uses.

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

Very small amounts of biofuels were produced in Cyprus in 2011 and 2012 from waste vegetable oils included in the list of waste, whose contribution to the target is considered to be twice that made by the other biofuels, pursuant to Article 21(2) of Directive, 2009/28/EC. The said quantities are presented in the Table below.

Table 5: **Total production and consumption of Article 21(2) biofuels (ktoe)**

Article 21(2) biofuels[25]	**Year N-2 (2011)**	**Year N-1 (2012)**
Production – **biofuel from waste vegetable oils**	**0.09**	**0.09**
Consumption – **biofuel from waste vegetable oils**	**0.09**	**0.09**
Total production of Article 21(2) biofuels	**0.09**	**0.09**
Total consumption of Article 21(2) biofuels	**0.09**	**0.09**
% share of Article 21(2) biofuels in total RES-T	**0.53**	**0.5%**

9. Please provide information on the estimated impact of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within your country <u>in the preceding 2 years.</u>

No biofuels and bioliquids were produced in Cyprus in 2011-2012 from domestic biomass and, therefore, no impact on biodiversity, water resources, water quality and soil quality has been identified. The production depended exclusively on imported raw materials processed in Cyprus and a small quantity of domestic waste vegetable oils.

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

Annex I describes analytically the methodology used for calculating the net greenhouse gas emission savings due to the use of renewable energy in the sectors of electricity, heating/cooling and transports.

[25] Biofuels made from waste, residues, non-food cellulosic material and lignocellulosic material.

Table 6: Estimated GHG emission saving from the use of renewable energy (t CO2 eq)

Environmental aspects	Year N-2 (2011)	Year N-1 (2012)
Total estimated net GHG emission saving from using renewable energy	***345856***	***363962***
- Estimated net GHG saving from the use of renewable electricity	**49796**	**72165**
- Estimated net GHG saving from the use of renewable energy in heating and cooling	**273681**	**266374**
- Estimated net GHG saving from the use of renewable energy in transport	**22379**	**25423**

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 the estimated potential for joint projects until 2020. (Article 22(1)(m) of Directive 2009/28/EC).

The Republic of Cyprus aims to achieve its binding targets on renewable energy sources using only domestic production and is not expected to use the cooperation mechanisms. However, it does not exclude mainly the possibility of participating in joint projects with other Member States and third countries.

Table 7: **Actual and estimated excess and/or deficit (-) production of renewable energy compared to the indicative trajectory which could be transferred to/ imported from other Member States and/or third countries in the Republic of Cyprus (ktoe)[26], [27]**

	Year N-2 (2009)	**Year N-1 (2010)**	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual/estimated excess or deficit production (Please distinguish per type of renewable energy and per origin/destination of import/export)	**0**	**-11.43**	**-4.11**	**-4.95**	**34**	**46**	**30**	**42**	**57**	**34**	**21**	**0**

The small deficit in ktoe recorded in Table 7 for 2011 and 2012 results from the comparison of the actual RES ktoe rates for these years against the ktoe rates stated in Table 4a of the National Action Plan, not against the indicative trajectory set out in Annex I to the directive. As shown in Table 1 of this report, however, the RES share in the gross final consumption of Cyprus exceeded the indicative trajectory set out the basis of Annex I to the Directive, as the actual gross consumption (in ktoe) was much lower than that predicted in the National Action.

[26] Please use actual figures to report on the excess production in the two years preceding submission of the report, and estimates for the following years up 2020. In each report 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).

The estimated surplus recorded for the years 2013-2019 coincides with that of Table 9 of the National Action Plan, since, at this phase, the estimates made by Cyprus as regards to the calculation and production of energy from renewable sources as compared to the National Action Plan have not changed.

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

Articles 15 to 18 on the Law Promoting and Encouraging the Use of Renewable Energy Sources and Energy Saving of 2013 (Law 112(I)/2013) set out the national procedures on regulations relating to a statistical transfer or joint projects and/or joint support schemes.
Based on national legislation, the competent authority to decide and set out statistical transfers, joint projects and joint support schemes is the Council of Ministers, upon proposal from the Minister for Energy, Commerce, Industry and Tourism.
Private entities and local authorities may recommend to the Minister for Energy, Commerce, Industry and Tourism the technology to be developed for joint projects, the installed capacity and location of the project, subject to the conditions specified in the agreements to be approved by the Council of Ministers.

12. Please provide information on how the share of 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).*

No electricity is currently produced in Cyprus from household waste.

Please note that in the first progress report (2011 report) Member States are invited to outline their intentions with regard to the questions addressed in Article 22(3)(a) to (c). In addition, Member States are also welcome to provide any other information considered relevant to the specific situation of developing renewable energy of each Member State.

13. <u>Article 22(3)(a):</u> The Member State shall outline whether it intends to establish a single administrative body responsible for processing authorisation, certification and licensing applications for renewable energy installations and providing assistance to applicants.

Currently, there are no plans for the creation of a single administrative body responsible for processing authorisation, certification and licensing applications for renewable energy installations. However, a committee was established in 2002, by order of the Council of Ministers[28], comprising all services / departments / independent authorities that are competent to issue all necessary authorisations, which is generally coordinated by the Ministry of Energy, Commerce, Industry and Tourism, responsible for energy issues.

14. <u>Article 22(3)(b):</u> The Member State shall outline whether it intends to provide for automatic approval of planning and permit applications for renewable energy installations where the authorising body has not responded within the set time limits.

The Republic of Cyprus does not currently intend to adopt such a measure.

15. <u>Article 22(3)(c):</u> The Member State shall outline whether it intends to indicate geographical locations suitable for exploitation of energy from renewable sources in land-use planning and for the establishment of district heating and cooling.

The Town and Land-Use Planning Law was amended in 1982 by the adoption of the Statement of Policy, which constitutes a generalised land-use and town planning framework.

The Statement of Policy currently consists of a written text, with attached explanatory maps and diagrams, which includes general and specific policies per thematic unit and type of development (including renewable energy sources). Additionally, the detailed town planning zone plans and other special documents published in administrative regions are also an integral part of the Statement of Policy. In certain administrative regions only the development limit is specified and not the planning zones, while in other regions the development limit arises through interpretation of the provisions of the written text of the Statement of Policy.

[28] Decision of the Council of Ministers No 55.734 dated 30/5/2002

Moreover, by virtue of Article 6 of the Town and Land-Use Planning Law, the Minister for the Interior issued Order No [29], relating to the siting of RES plants, while, in 2009 an amended text of the Statement of Policy[30] and an amendment to the aforementioned order[31] were adopted.

Furthermore, the Town Planning and Housing Department has prepared a recommendatory/indicative map for wind farm development.

[29] Order No 2 dated 2006 of the Minister for the Interior.
[30] http://www.moi.gov.cy/MOI/tph/tph.nsf/All/5510F83A5EF3B394C225783E00495030/$file/ Tropopoiisi_ keimenoy_Dilosis_Politikis_2009.pdf
[31] Amendment to Order No 2 dated 19/03/2009

ANNEX I

Description of methodology applied for estimating the net greenhouse gas emission saving due to the use of (a) electricity from renewable energy sources, (b) renewable energy sources for heating and cooling and (c) renewable energy sources in transports.

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1. Introduction

The estimate of the net greenhouse gas emission saving due to use of (a) electricity from renewable energy sources and (b) renewable energy sources for heating and cooling has been made by the department that is competent to calculate greenhouse gas emissions, the Department of the Environment of the Ministry of Agriculture, Natural Resources and Environment. The estimate of the net greenhouse gas emission saving due to the use of renewable energy in transports have been made by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism.

2. Methodology

The steps applied for calculating (a) and (b) are as follows:

(a) Collection of consumption data for renewable energy.
(b) Collection of data for energy sources that would be used if no renewable energy sources were used.
(c) Collection of greenhouse gas emission co-efficients for energy sources that would be 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 tons of carbon dioxide equivalent.
(g) Calculation of the total.

Transport

The net greenhouse gas emission reduction (saving) due to the use of biofuels in road transports was calculated as the difference between the emissions produced if the biofuel quantity was diesel and if the said quantity was a biodiesel mixture in specific proportions, by using the typical greenhouse gas emission reduction values listed in Annex V, Parts A and B, to Directive 2009/28/EC.

Following is a detailed presentation of the steps followed to calculate the net reduction (savings) in greenhouse gas emissions due to the use of biofuels in road transport:

(a) The quantity of biofuels consumed in transports was converted from toe into TJ.
(b) The greenhouse gas emissions from the aforementioned quantity were estimated as if this quantity were a conventional fuel (petrol or diesel). Currently in Cyprus, only biodiesel is mixed into diesel and, therefore, the said quantity was considered to be diesel.
(c) After calculating the greenhouse gas emissions from the aforementioned diesel quantity, the net greenhouse gas emission reduction was calculated, as if this quantity were a mixture of biofuels in a specified proportion, using for each biofuel the typical greenhouse gas emission reduction value listed in Annex V, Parts A and B, to Directive 2009/28/EC.

3. Results

(a) Collection of consumption data for renewable energy.

The source of renewable energy consumption data is the national energy balance, which is annually calculated by the Energy Service of the Ministry of Energy Commerce, Industry and Tourism[32]. The data for the years 2011 and 2012 are presented in Table 1.

With regard to biomass, the following are noted:
- **The biomass consumed by the cement plant is solid and liquid waste.**
- **The biomass used for heating purposes in houses and services is made from wood and wood waste.**
- **The biomass used for cooking purposes was charcoal.**
- **The biomass in agriculture comes from heat and electricity cogeneration from the anaerobic livestock waste processing stations.**
- **The biomass in industry comes from wood residues.**

[32] Energy Service, 2013, National Energy Balance 2011/ 2012, Ministry of Commerce, Industry and Tourism.

Table 1. Consumption of renewable energy in 2011 and 2012 in toe.

Electricity (toe)	2011	2012
Electricity from biomass	4438	4301
- Consumption in agriculture	1023	1065
- Fed into the electricity grid	3415	3237
Electricity from photovoltaic	1027	1853
- Consumed in the domestic sector	101	102
- Consumption in the tertiary sector	46	46
- Fed into the electricity grid	880	1705
Electricity from wind power	9831	15951
- Consumption in the tertiary sector	5	37
- Fed into the electricity grid	9826	15914
Total	15296	22105

Thermal energy (toe)	2011	2012
Solar	62991	64477
- Residential sector (hot water)	53542	54805
- Tertiary sector (space heating)	9449	9672
Geothermal	1045	1477
- Residential sector	1045	1477
Biomass	19548	15995
- Cement industry	6953	3367
- Household sector (cooking)	5493	5750
- Other industries	210	210
- Tertiary sector	2615	2351
- Agriculture	4277	4317
Total	83584	81949

(b) Collection of data for energy sources that would be used if no renewable energy sources were used.[33]

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 facility under Law 110(I)/201133 for the years 2011 and 2012.

[33] The Law on the Establishment of a Scheme for Greenhouse Gas Emission Allowances Trading of 2011 (No 110(I)/2011)

Table 2. Sources of energy that would be used if no renewable energy sources were used in 2011 and 2012 in %.

Electricity	Electr.	Diesel	Pet-coke	RFO	LPG	Coal
Agriculture, domestic sector, industry, services	100%					

Thermal energy (toe)						
Solar – hot water	100%					
Solar – space heating		100%				
Geothermal		100%				
Biomass						
Cement industry (2011)		0.03%	82.49%	8.06%	1.33%	8.09%
Cement industry (2012)		0.05%	96.86%	2.27%	0.82%	
Domestic sector (cooking)	100%					
Agriculture, domestic sector (heating), industry, services		100%				

(c) Collection of greenhouse gas emission co-efficients for energy sources that would be used if no renewable energy sources were used.

The greenhouse gas emission co-efficients that have been used for calculating emissions are presented in Table 3.

Table 3. Greenhouse gas emission co-efficients per gas, 2011 and 2012 in kg/TJ.

Emission co-efficient (kg/TJ)	2011	2012	Source
Electricity generation			
CO2	77507		Annual ETS report by facility a
CH4	3	3	IPCC 1996 GHG guidelines b
N2O	0.6	0.6	IPCC 1996 GHG guidelines c
Cement production			
Liquid fuel			
CO2 Diesel	74067	74100	Annual ETS report by facility d
CO2 Petcoke	95050	92969	Annual ETS report by facility d
CO2 RFO	77495	77400	Annual ETS report by facility d
CO2LPG	63067	63100	Annual ETS report by facility d
CH4	2	2	IPCC 1996 GHG guidelines e

N2O	0.6	0.6	IPCC 1996 GHG guidelines c
Coal			
			Annual ETS report by facility d
CO2 Coal	93553		
CH4	10		IPCC 1996 GHG guidelines e
N2O	1.4		IPCC 1996 GHG guidelines c
Other industries (diesel)			
CO2	73326	73326	IPCC 1996 GHG guidelines f
CH4	3	3	IPCC 1996 GHG guidelines e
N2O	0.6	0.6	IPCC 1996 GHG guidelines c
Services, households, agriculture			
CO2	73326	73326	IPCC 1996 GHG guidelines f
CH4	10	10	IPCC 1996 GHG guidelines g
N2O	0.6	0.6	IPCC 1996 GHG guidelines c

a According to the reports submitted as part of the implementation of the Law on the Establishment of a Scheme for Greenhouse Gas Emission Allowance Trading of 2011 (Law 110(I)/2011). It was calculated by dividing the total CO2 emissions by the total electricity production for the year, from the three electricity production facilities.

b IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, reference manual, pg. 1.35, oil, energy industries.

c IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, reference manual, pg. 1.36, oil.

d According to the reports submitted as part of the implementation of the Law on the Establishment of a Scheme for Greenhouse Gas Emission Allowance Trading of 2011 (Law 110(I)/2011). The co-efficients used by the cement facility that uses biomass.

e IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, reference manual, pg. 1.35, oil, manufacturing industries and construction.

f IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, reference manual, pg 6, table 1-2 gas/diesel oil multiplied by default fraction of carbon oxidised of 0.99 and by 44/12, table 1-4 pg. 1.8.

g IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, reference manual, pg. 1.35, oil, other sectors (stationary).

(d) Conversion of energy consumption into TJ.

Energy consumption has been converted from toe to TJ by applying the following formula:

$$ECTJ = ECtoe \times 41.868 / 1000$$

where ECTJ is energy consumption in TJ, ECtoe is energy consumption in toe and 41.868 is the conversion co-efficient from ktoe to TJ34.

(e) Calculation of greenhouse gas emissions

Greenhouse gas emissions have been calculated by applying the following formula:

GHGx = EFx x ECTJ / 1000

where GHGx is the emissions of the greenhouse gas x in tons, EFx is the co-efficient of the greenhouse gas x in kg/TJ and ECTJ is energy consumption in TJ.[34]

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

Table 4. Greenhouse gas emission saving due to use of renewable energy in 2011 and 2012 in CO2 tons, CH4 tons, and N2O tons.

	2011 (t)			2012 (t)		
Electricity	**CO2**	**CH4**	**N2O**	**CO2**	**CH4**	**N2O**
Electricity from biomass	14 402	0.56	0.11	13 999	0.54	0.11
- Consumption in agriculture	3 320	0.13	0.03	3 466	0.13	0.03
- Fed into the electricity grid	11 082	0.43	0.09	10 533	0.41	0.08
Electricity from photovoltaic	3 333	0.13	0.03	6 030	0.23	0.05
- Consumption in the domestic sector	328	0.01	0.00	332	0.01	0.00
- Consumption in the tertiary sector	149	0.01	0.00	150	0.01	0.00
- Fed into the electricity grid	2 856	0.11	0.02	5 548	0.21	0.04
Electricity from wind power	31 902	1.23	0.25	51 906	2.00	0.40
- Consumption in the tertiary sector	16	0.00	0.00	120	0.00	0.00
- Fed into the electricity grid	31 886	1.23	0.25	51 785	2.00	0.40
Total	49 636	1.92	0.38	71 934	2.78	0.56
Thermal energy (toe)						
Solar	202 756	10.68	1.58	208 032	10.93	1.62
- Domestic sector (hot water)	173 747	6.73	1.35	178 339	6.88	1.38
- Tertiary sector (space heating)	29 009	3.96	0.24	29 693	4.05	0.24

[34] IPCC, 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, introduction, pg 5

Geothermal	3 208	0.44	0.03	4 534	0.62	0.04
- Residential sector	3 208	0.44	0.03	4 534	0.62	0.04
Biomass	66736	4.37	0.51	52 846	3.82	0.40
- Cement industry	27 107	0.77	0.19	13 020	0.28	0.08
- Domestic sector (cooking)	17 825	0.69	0.14	18 711	0.72	0.14
- Other industries	645	0.03	0.01	645	0.03	0.01
- Tertiary sector	8 028	1.09	0.07	7 218	0.98	0.06
- Agriculture	13 130	1.79	0.11	13 253	1.81	0.11
Total	272 700	15.49	2.12	265 413	15.38	2.06

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

To calculate greenhouse gas emission saving due to use of renewable energy in 2011 and 2012 in tons of CO2 equivalent, CH4 and N2O emissions were multiplied by the global warming potential of each gas. The co-efficient of methane is 21 and for dinitrogen monoxide is 31 035. Table 5 presents greenhouse gas emission saving due to the use of renewable energy in 2011 and 2012 in tons of CO2 equivalent for each gas.[35]

Table 5. Greenhouse gas emission saving due to use of renewable energy in 2011 and 2012 in tons of CO2 equivalent.

	2011 (t CO2 eq.)			2012 (t CO2 eq.)		
Electricity	CO2	CH4	N2O	CO2	CH4	N2O
Electricity from biomass	14 402	11.7	34.6	13 999	11.3	33.5
- Consumption in agriculture	3 320	2.7	8.0	3 466	2.8	8.3
- Fed into the electricity grid	11 082	9.0	26.6	10 533	8.5	25.2
Electricity from photovoltaic	3 333	2.7	8.0	6 030	4.9	14.4
- Consumption in the domestic sector	328	0.3	0.8	332	0.3	0.8
- Consumption in the tertiary sector	149	0.1	0.4	150	0.1	0.4
- Fed into the electricity grid	2 856	2.3	6.9	5 548	4.5	13.3
Electricity from wind power	31 902	25.9	76.6	51 906	42.1	124.2
- Consumption in the tertiary sector	16	0.0	0.0	120	0.1	0.3

[35] IPCC, 1996, Climate Change 1995: A report of the Intergovernmental Panel on Climate Change, Second Assessment Report of the Intergovernmental Panel on Climate Change, IPCC

- Fed into the electricity grid	31 886	25.9	76.5	51 785	42.0	123.9
Total	49 636	40.3	119.1	71 934	58.3	172.1

Thermal energy (toe)						
Solar	202 756	224.3	490.5	208 032	229.6	502.1
- Domestic sector (hot water)	173 747	141.2	417.0	178 339	144.6	426.8
- Tertiary sector (space heating)	29 009	83.1	73.6	29 693	85.0	75.3
Geothermal	3 208	9.2	8.1	4 534	13.0	11.5
-Domestic sector	3 208	9.2	8.1	4 534	13.0	11.5
Biomass	66 736	91.7	157.4	52 846	80.3	124.5
- Cement industry	27 107	16.1	59.3	13 020	6.0	26.1
- Domestic sector (cooking)	17 825	14.5	42.8	18 711	15.2	44.8
- Other industries	645	0.6	1.6	645	0.6	1.6
- Tertiary sector	8 028	23.0	20.4	7 218	20.7	18.3
- Agriculture	13 130	37.6	33.3	13 253	38.0	33.6
Total	272 700	325.2	656.1	265 413	322.9	638.1

(g) Calculation of the total.

Greenhouse gas emission saving due to use of renewable energy in 2011 and 2012 was as follows:

- **From the use of electricity produced from renewable sources: 49.8 t CO2 eq. in 2011 and 72.2 t CO2 eq. in 2012.**
- **From the use of renewable energy sources for heating and cooling: 273.7 t CO2 eq. in 2011 and 266.4 t CO2 eq. in 2012.**

The aforementioned data are presented in detail in Table 6.

Table 6. Total greenhouse gas emission saving due to use of renewable energy in 2011 and 2012 in tons of CO2 equivalent.

	2011 (t CO2 eq.)	2012 (t CO2 eq.)
Electricity		
Electricity from biomass	14 448	14 044
- Consumption in agriculture	3 330	3 477
- Fed into the electricity grid	11 117	10 567
Electricity from photovoltaic	3 343	6 049
- Consumed in the domestic sector	329	333
- Consumption in the tertiary sector	150	150
- Fed into the electricity grid	2 865	5 566
Electricity from wind power	32 005	52 072
- Consumption in the tertiary sector	16	121

- Fed into the electricity grid	**31 988**	**51 951**
Total	**49 796**	**72 165**
Thermal energy (toe)		
Solar	**203 471**	**208 764**
- Domestic sector (hot water)	**174 305**	**178 910**
- Tertiary sector (space heating)	**29 165**	**29 854**
Geothermal	**3 225**	**4 559**
-Domestic sector	**3 225**	**4 559**
Biomass	**66 985**	**53 051**
- Cement industry	**27 183**	**13 052**
- Domestic sector (cooking)	**17 882**	**18 771**
- Other industries	**647**	**647**
- Tertiary sector	**8 071**	**7 257**
- Agriculture	**13 201**	**13 325**
Total	**273 681**	**266 374**

Transport

The quantities of other greenhouse gases produced in transports are considered to be negligible and, therefore, only the saving of CO2 quantities has been calculated.

(a) For 2011:

16 012 toe of biofuels were consumed in 2011, which consisted, according to information provided to the Energy Service, of soya bean oil biodiesel (20%), palm oil biodiesel (4.5%), rapeseed oil biodiesel (65%), sunflower oil biodiese (10%) and waste cooking oil biodiesel (0.5%).

16012 toe x 41.868/1000 = 670.4 TJ

and 670.4 TJ x 74 t CO2/TJ = 49610 t CO2

However, given that, instead of the diesel producing 49610 t CO2 emissions, biofuels have been used, the emissions from the mixture of biofuels is the sum of reductions resulting from each biofuel, taking into account the typical average reduction in the greenhouse gas emissions for the said biofuel (Annex V, Parts A and B, to Directive 2009/28/EC) and its proportion in the mixture, i.e.

49610 x biofuel percentage in the mixture x typical greenhouse gas emission reduction value = t CO2,

Soya bean oil biodiesel 49610 x 20% x 40%= 3969 t CO2
Palm oil biodiesel 49610 x 4.5% x 36%= 804 t CO2
Rapeseed oil biodiesel 49610 x 65% x 45%= 14511 t CO2
Sunflower oil biodiesel 49610 x 10% x 58%= 2877 t CO2
Biodiesel from waste cooking oil 49610 x 0.5% x 88%= 218 t CO2

Total reduction in greenhouse gas emissions in transport = 22379 t CO2

(b) For 2012:

17001 toe of biofuels were consumed in 2012, which consisted, according to information provided to the Energy Service, of soya bean oil biodiesel (4.5%), palm oil biodiesel (7%), rapeseed oil biodiesel (58%), sunflower oil biodiesel (30%) and waste cooking oil biodiesel (0.5%).

17001 toe x 41.868/1000 = 711.8 TJ

711.8 TJ x 74 t CO2/TJ = 52673 t CO2

However, given that, instead of diesel, biofuels have been used, the greenhouse gas emission reduction from the mixture of biofuels is:

Soya bean oil biodiesel 52673 x 4.5% x 40%= 948 t CO2
Palm oil biodiesel 52673 x 7 % x 36% = 1330 t CO2
Rapeseed oil biodiesel 52673 x 58% x 45%= 13748 t CO2
Sunflower oil biodiesel 52673 x 30% x 58%= 9165 t CO2
Biodiesel from waste cooking oil 52673 x 0.5% x 88%= 232 t CO2

Total greenhouse gas emission reduction = 25423 t CO2