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# NATIONAL PROJECTIONS OF GREENHOUSE GASES EMISSIONS

## POLICIES AND MEASURES FOR THE REDUCTION OF GREENHOUSE GASES EMISSIONS

2009 SUBMISSION

Under Article 3(2)  
of Decision No 280/2004/EC of the European Parliament and of the Council  
concerning a mechanism for monitoring Community greenhouse gas emissions and for  
implementing the Kyoto Protocol

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# CYPRUS

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# 1. Introduction

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The Ministry of Agriculture, Natural Resources and Environment and in particular the Environment Service is the co-ordinator for the topic of climate change for Cyprus. Large part of this topic is the program for the reduction of greenhouse emissions. However, jurisdiction for measures to reduce greenhouse gas emissions is distributed among several Ministries of the Cyprus Government.

The highly fragmented responsibilities for climate change mitigation among the different Ministries, still causes difficulties for coherent monitoring and evaluation of policies and measures towards the reduction of greenhouse gases (GHG) emissions. This was due to a lack of complete and comparable information on policies and measures and also to the fact that many measures, e.g. in energy consumption, transport or waste management, are not undertaken primarily for the purpose of climate change mitigation. A variety of other environmental, social and economic needs are responsible for specific action.

Further cooperation and more attention are needed for proper GHG emissions monitoring, that will have a positive, measured and evaluated, side effect. As a consequence, estimation of effects on greenhouse gas emissions is impossible for many individual measures undertaken in the past.

The measures for the reduction of GHG emissions are presented as policy packages.

This report has been prepared by the Environment Service of the Ministry of Agriculture, Natural Resources and Environment, on behalf of the Republic of Cyprus, and is submitted voluntarily, since Cyprus has no obligations under the Kyoto Protocol.

*It should be noted that after the Turkish invasion of 1974, approximately 40% of the island territory is under Turkish occupation. The data presented in this chapter concerns the areas under the effective control of the Government of the Republic of Cyprus.*

Information on:

- Sensitivity analysis,
- Article 2005/166/EC 9(c): Indicators for projections (Annex III),
- Article 2005/166/EC 10(2): Parameters for projections (Annex IV), and
- Further information on the policies and measures and actions planned for their implementation

shall be submitted within one month from the submission of the current document.

## **1.1. Decision No. 280/2004/EC**

**of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol**

### **Article 3(2)**

Member States shall, for the assessment of projected progress, report to the Commission, by 15 March 2005 and every two years thereafter:

- (a) information on national policies and measures which limit and/or reduce greenhouse gas emissions by sources or enhance removals by sinks, presented on a sectoral basis for each greenhouse gas, including:
  - (i) the objective of policies and measure;
  - (ii) the type of policy instrument;
  - (iii) the status of implementation of the policy or measure;
  - (iv) indicators to monitor and evaluate progress with policies and measures over time, including, inter alia, those indicators specified in the implementing provisions adopted pursuant to paragraph 3;
  - (v) quantitative estimates of the effect of policies and measures on emissions by sources and removals by sinks of greenhouse gases between the base year and subsequent years, including 2005, 2010 and 2015, including their economic impacts to the extent feasible; and
  - (vi) the extent to which domestic action actually constitutes a significant element of the efforts undertaken at national level as well as the extent to which the use of joint implementation and the clean development mechanism and international emissions trading, pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, is actually supplemental to domestic actions, in accordance with the relevant provisions of the Kyoto Protocol and the Marrakech Accords;
- (b) national projections of greenhouse gas emissions by sources and their removal by sinks as a minimum for the years 2005, 2010, 2015 and 2020, organised by gas and by sector, including:
  - (i) 'with measures' and 'with additional measures' projections such as mentioned in the guidelines of the UNFCCC and further specified in the implementing provisions adopted pursuant to paragraph 3;
  - (ii) clear identification of the policies and measures included in the projections;
  - (iii) results of sensitivity analysis performed for the projections; and descriptions of methodologies, models, underlying assumptions and key input and output parameters.
- (c) information on measures being taken or planned for the implementation of relevant Community legislation and policies, and information on legal and institutional steps to prepare to implement commitments under the Kyoto Protocol and information on arrangements for, and national implementation of, compliance and enforcement procedures;
- (d) information on institutional and financial arrangements and decision making procedures to coordinate and support activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities.

## **1.2. Decision No. 2005/166/EC**

**laying down rules implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol (notified under document number C(2005) 247)**

**Section 2, Article 9: Reporting under Article 3(2)(a) of Decision No 280/2004/EC**

The information on national policies and measures referred to in Article 3(2)(a) of Decision No 280/2004/EC shall include:

- (a) a list of those policies and measures which expired or were repealed during the reporting period;
- (b) a description of the actual and expected interaction with other relevant policies and measures and with relevant Community policies and legislation;
- (c) indicators for projections for the years 2005, 2010, 2015 and 2020 as listed in Annex III to this Decision.

### **Section 2, Article 10: Reporting under Article 3(2)(b) of Decision No 280/2004/EC**

1. For the purpose of Article 3(2)(b) of Decision No 280/2004/EC Member States shall clearly identify their 'with measures' and 'with additional measures' projections and the policies and measures included therein.

A 'with measures' projection shall include implemented and adopted policies and measures. A 'with additional measures' projection shall include planned policies and measures.

Member States may include information on 'without measures' projections as part of their 'with measures' and 'with additional measures' projections. A 'without measures' projection shall exclude all policies and measures implemented, adopted or planned after the year chosen as the starting year for this projection.

2. The descriptions of methodologies, models, underlying assumptions and key input and output parameters referred to in Article 3(2)(b)(iv) of Decision No 280/2004/EC, shall include, if used, the mandatory parameters set out in point 1 of Annex IV to this Decision.

Member States are encouraged to report the parameters on projections included in the list of recommended parameters set out in point 2 of Annex IV to this Decision.

Member States shall undertake a sensitivity analysis of their projections, focused on the key input variables in their projection models.

Member States are encouraged to define a high, central and low scenario for the key input variables and to quantify projected emissions for these scenarios. Member States are furthermore encouraged to include a measure of robustness of their predictive model and its methods used for their assessments. Member States may consider the use of multi-variant scenarios, using combinations of input variables.

### **Section 2, Article 11: Reporting under Article 3(2)(a)(vi) and Article 3(2)(d) of Decision No 280/2004/EC**

Member States shall provide information on their use of joint implementation, the clean development mechanism and international emissions trading, pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, to meet their quantified emission limitation or reduction commitments pursuant to Article 2 of Council Decision 2002/358/EC (1) and the Kyoto Protocol on the basis of the questionnaire set out in Annex V to this Decision. Member States are encouraged to provide this information on an annual basis as part of their report pursuant to Article 3(1) of Decision No 280/2004/EC.

Member States may limit this information to changes or additions to the information reported on the basis of the questionnaire for the previous year.



## 2. National Policies and Measures

The selection of policies and measures presented below was made by using the following criteria: (a) the technological and commercial maturity of the available technologies, so that their immediate promotion is possible, (b) their direct and measurable performance regarding the reduction of CO<sub>2</sub> emissions and (c) the particular structural features of Cypriot economy and society.

The policies are presented in summary in Table 2.1. Policies and measures are the same for the “with measures” and “with additional measures” scenarios, with only difference being the implementation rate.

**Table 2.1. Policies and measures included in the “with measures” and “with additional measures” scenarios.**

		With measures	With additional measures
<b>Policy A. ELECTRICITY GENERATION</b>			
A1.	RES	Constant 6% from 2010	From 5% in 2010, to gradual increase to 13% by 2020
A2.	NG	Gradual increase of NG in energy from 48% in 2016 to 80% in 2020	Gradual increase of NG in energy from 48% in 2014 to 80% in 2018
A3.	Improvement in distribution system	Improvement of 0.1% annually -> reduction in emissions from 2008	Improvement of 0.2% annually -> reduction in emissions from 2008
<b>Policy B. RESIDENTIAL AND TERTIARY SECTOR</b>			
B1.	Energy savings	5% constant from 2010	From 5% in 2010 to gradual increase to 20% by 2020
<b>Policy C. INDUSTRY</b>			
C1.	Merging of cement factories	Reduction 5% from 2011	Reduction 15% from 2011
C2.	Energy savings	5% constant	From 5% in 2010 to gradual increase to 20% by 2020
C3.	Alternative fuels	Increase by 1% annually	Increase by 2% annually from 2010
<b>Policy D. TRANSPORT</b>			
D1.	Promotion of small cars in urban transport	Constant reduction 0.5%	Annual reduction of 0.5% from 2008
D2.	Promotion of public transport	Constant 2% reduction in emissions	Annual decrease in emissions of 0.5% from 2010
D3.	Biofuels	Constant 0.1% reduction in emissions	Gradual increase from 1.5% in 2008 to 10% in 2020

D4.	Withdrawal of vehicles older than 20 years old	Annual contribution in reduction in emissions of 1%	Annual decrease in emissions of 1% from 2010
Policy E. WASTE			
E1.	Recycling	Constant at 20% of packaging waste	Constant at 20% of packaging waste
E2.	Methane recovery	50% of all controlled (84%) from 2010	50% of all controlled (84%) from 2010
E3.	Management of uncontrolled disposal sites	Annual decrease of GHG by 5% from uncontrolled, from 2010	Annual decrease of GHG by 5% from uncontrolled, from 2010

## 2.1. Policy A. Electricity Generation

The generation of electricity in Cyprus depends almost exclusively on the imports of diesel oil and heavy oil fuel. The contribution of Renewable Energy Sources to the energy balance of 2007 was 3.39%, originating from solar thermal (53,460 toe), biomass (10,048 toe), biofuels in transport (750 toe). The electricity originating from RES was 149 toe from photovoltaic systems and 120 toe from biomass.

Due to mainly the targets set by the climate and energy package for Cyprus (13% RES for electricity production, reduction of CO<sub>2</sub> emissions from electricity production and reduction by 5% of emissions from non-ETS sectors by 2020), the energy production strategy of the country has been recently revised primarily towards achieving the 13% RES. Consequently, the main parts of the policy are three, (1) increase of RES share to 13% by 2020, (2) introduction of natural gas by 2014, and (3) increase efficiency of distribution system.

The energy policy of the Republic of Cyprus, dedicates a large section on the promotion of Renewable Energy Sources, Energy Efficiency and introduction of “cleaner” fuels in the energy balance of Cyprus.

- Categories of the Common Reporting Format affected: 1A1
- Greenhouse Gas affected: CO<sub>2</sub> (almost exclusively)

The measures for reduction of greenhouse gases emissions from the electricity generation and the expected reduction in emissions by 2020 if fully implemented are summarized in Table 2.1.

Very large contribution to all Measures of this policy, except the first, has the Electricity Authority of Cyprus (EAC). EAC is currently the only electricity supplier in Cyprus, and most of the measures are applied in co-ordination of the Energy Service, EAC and Transmission System Operator (TSO).

### **A1. Increase of Renewable Energy Sources for electricity production to 13% by 2020**

The policy of increasing the share of RES in electricity production in Cyprus is prepared and managed by the Energy Service (Ministry of Commerce, Industry and Tourism). The contribution of RES in Cyprus has been planned to reach the target to 13% by 2020 as shown in Table 2.2.

**Table 2.2. Contribution of RES in Cyprus to reach 13% by 2020**

	Large scale (commercial) RES projects (MW)						Target
	Wind	Solar Thermal	PV	Biomass	Biogas	TOTAL	
2009	0	0	2	1	0	3	
2010	0	0	4	1.5	0.5	6	5%*
2011	60	0	6	2	1	69	5%
2012	85	0	8	2.5	1.5	97	
2013	100	25	10	3	2	140	6%
2014	125	25	12	3.5	2.5	168	
2015	165	25	14	4	3	211	7.5%
2016							
2017							9.5%
2018							
2019							13%
2020							

The actions planned for the achievement of the above target are the following:

1. Revision of grant scheme for RES. The scheme has been approved by the Council of Ministers on 30/12/2008, and is currently in the process of approval by the Competition Committee of the EU.
2. Compilation of the 2009-2013 Action Plan on RES.
3. Public awareness campaign on the latest developments related to RES.

Additional information

- Policy instrument: Voluntary, financial
- Involved authorities: Energy Service, Ministry of Commerce, Industry and Tourism
- Relevant legislation/ decisions/ plans:
  - o Decision 2009/28 on the promotion of Renewable Energy Sources
  - o Promotion and encouragement of use of renewable energy sources and energy savings Laws of 2003 to 2006
  - o Grant scheme for promotion on Renewable Energy Sources and Energy Efficiency
- Status: in implementation

*The maximum reduction in emissions that can be achieved if the measure is fully implemented is 1,217 kt CO<sub>2</sub> (2020).*

**A2. Introduction of Natural Gas**

The import of natural gas in Cyprus was up to recently responsibility of the Ministry of Commerce, Industry and Tourism. A decision of the Council of Ministers however, which was a result of the problems faced with the issue (mainly the significant delay of import), gave the responsibility of natural gas to a new authority, called Management Authority of natural gas, of which the main shareholder (44%) is the Electricity Authority of Cyprus; consequently giving the responsibility of import and management to the main user of the fuel for electricity production. The estimation of the Electricity Authority is that by 2014, natural gas shall be used initially at the Vasiliko power plant, and gradually at all electricity producing stations.

The actions taken/ planned for the implementation of the measure are the following:

1. All the new installations for electricity production are of the technology combined cycle, and are therefore suitable to use natural gas. At the moment the new installations are using diesel. So far, one new installation has been installed and in operation in 2008 (at Dekeleia power plant), one installation is in construction and expected to be in operation by summer 2009 (at Vasiliko power plant, no.4) and one more (no. 5 of Vasiliko power plant) is currently at the process of obtaining the necessary permits.
2. Additional installations to be decommissioned in later years (after 2010) at Moni and Dekelia power stations, are also to be replaced by units that will be using natural gas as fuel.

From the data obtained by the EAC, 60% of the electricity production in Cyprus will be able to be produced by combustion of natural gas as soon as natural gas is imported, and 3 years after the import, the total of the electricity production of Cyprus will be from natural gas. The main assumptions made for the estimation of emissions are shown in Table 2.3.

**Table 2.3. Assumptions for Measure A2, import of natural gas**

	With measures	With additional measures
Year of import	2016	2014
First use	80% of Vasiliko Power Plant	80% of Vasiliko Power Plant
60% electricity production from NG (100% of Vasiliko Power Plant)	2017	2015
100% electricity production from NG	2019	2017

Additional information

- Policy instrument: Political
- Involved authorities: Energy Service, Ministry of Commerce, Industry and Tourism
- Status: in progress for implementation/ planned

*The maximum reduction in emissions that can be achieved if the measure is fully implemented is 3,324 kt CO<sub>2</sub> (2020).*

**A3. Increase efficiency of distribution system**

The reduction of losses from the transfer and distribution system is one of the primary aims of the Electricity Authority of Cyprus.

Additional information

- Policy instrument: Voluntary
- Involved authorities: TSO
- Relevant legislation/ decisions/ plans: NE
- Status: in implementation

*The maximum reduction in emissions that can be achieved if the measure is fully implemented is 243 kt CO<sub>2</sub> (2020).*

## **2.2. Policy B. Residential and tertiary sector**

As already mentioned in section 2.1.1, Energy Service, Ministry of Commerce, Industry and Tourism has recently reviewed the Grant scheme for promotion on Renewable Energy Sources and Energy Efficiency. The implementation of the particular scheme, in addition to the energy efficiency of buildings law that has recently been imposed, a maximum reduction of 1873 kt CO<sub>2</sub> can be achieved if the measure is fully implemented (2020).

### Additional information

- Policy instrument: legislation
- Involved authorities: Energy Service, Ministry of Commerce, Industry and Tourism
- Relevant legislation/ decisions/ plans:
  - o Grant scheme for promotion on Renewable Energy Sources and Energy Efficiency
  - o Promotion and encouragement of use of renewable energy sources and energy savings Laws of 2003 to 2006
  - o Law 142(I)/2006 for the regulation of energy efficiency of buildings
- Status: in implementation

## **2.3. Policy C. Industry**

Three measures are currently in progress for implementation for the reduction of emissions from industry.

### **C1. Merging of cement factories**

Cyprus has two cement factories Vassilikos Cement and Cyprus Cement. During 2008, the two factories have announced the merging of the two companies under Vassilikos Cement, and their intention of replacing the two existing installations with a new one. The new installation is currently under construction, and it is expected that it will be in operation by the beginning of 2011. The expected reduction in emissions is that can be reached in full implementation of the measure is 233 kt CO<sub>2</sub>.

### **C2. Energy savings**

Due to the legislation that is in force, industrial installations are obliged to proceed with improvement of their equipment

### **C3. Alternative fuels**

Event though the Ministry of Interior is planning in producing RDF from the new landfill site of Lemesos, the larger cement factory of Cyprus is already used particular waste stream as fuel (e.g. used tires). With the installation of the new plant it is expected that even more alternative fuels can be absorbed. According to the technical characteristics of the new cement plant to be in operation from 2011, the particular technology is suitable for using upto 30% alternative fuels.

*The maximum reduction that can be achieved by 2020 with full implementation of the policy is 947 kt CO<sub>2</sub> equiv.*

## **2.4. Policy D. Transport**

Transport is considered to be one of the most problematic and energy consuming sectors of Cyprus. Currently a very small percentage of the population uses public transport. Currently new measures have been implemented by the Communications and Works. For the promotion of public transport:

- 50% of student population of public school is provided with free transport to and from school with buses provided especially for the particular purpose
- Since June 2008 a new shuttle line is in operation to and from the two airports of the country to the towns
- Tax discount on registration is given for cars with “small” car engines
- Tax discount on registration for cars gradually increasing with decreasing CO2 emissions.
- Financial motives for withdrawal of registered cars older than 15 years old

According to the Competent Authority, no other measures have been planned for the future, and the above-mentioned schemes shall continue until 2020.

The increase of biofuels' share in transport is under the responsibility of Energy Service, Ministry of Commerce, Industry and Tourism. According to the biofuels promotion scheme, it is expected that by 2010 2.55% of transport fuels shall be biofuels.

*The maximum reduction that can be achieved by 2020 with full implementation of the policy is 1,378 kt CO2 equiv.*

## **2.5. Policy E. Waste**

Solid waste management is separated between two ministries in Cyprus; the Ministry of Interior is responsible for municipal solid waste while all the remaining waste streams are under the responsibility of Environment Service of the Ministry of Agriculture, Natural Resources and Environment.

### **E1. Recycling**

Currently, approximately 20% of packaging waste is recycled. The scheme that is in operation covers the approximately 50% of the population and by the end of 2009 it is expected to cover 75% of the population.

### **E2. Methane recovery**

Currently there is in construction a new landfill site for the management of waste from the districts of Ammochostos and Larnaca. A new landfill is at the stage of design for the district of Lemesos. While there is a new landfill in operation for the district of Pafos since 2005.

According to the competent authority on the management of landfills there are plans for:

- Collection of biogas from Pafos landfill and Lefkosia (in design stage)
- Production of RDF from the landfill of Lemesos

### **E3. Management of uncontrolled disposal sites**

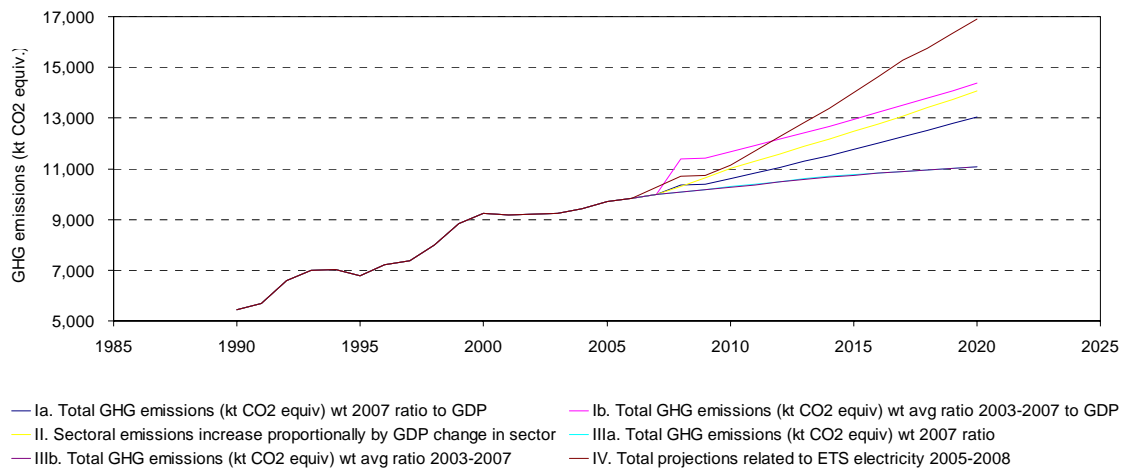
Currently, a considerable amount of waste are disposed in uncontrolled landfills. The ministry of interior has launched a project to close the uncontrolled landfills within 2008.

*The maximum reduction that can be achieved by 2020 with full implementation of the policy is 829 kt CO2 equiv.*

### 3. Article 3(2)(b) National Projections

#### 3.1. Baseline Scenario (Business as Usual) projections

The baseline projections were made after considering a number of options described in Annex I. The findings are presented in Figure 3.1. The most trusted option was considered to be the scenario based on correlation of the ETS verified emissions for 2005-2008 to the total of GHG emissions.



**Figure 3.1. Summary of base line scenarios of GHG for 2007-2020**

The projections (Table 3.1) were made using the ETS verified electricity emissions 2005 – 2008 in relation to the projections for the electricity production of the Electricity Authority of Cyprus to project the GHG emissions up-to 2020.

The National Allocation Plan for 2008-2012 estimations for emissions were used for the projections, since the 2008 ETS verified report for electricity production shows a difference of approximately 30% when compared without the set-aside.

The main parameters and steps were:

- (a) Correlation of ETS electricity emissions to total GHG emissions from the inventory; the average ratio for 2005-2007 is 0.370.
- (b) The CO2 emissions per MWh coefficient used, was 0.732 kt CO2/MWh produced; based on the 2007 ETS verified emissions report for Electricity Authority of Cyprus (EAC).
- (c) The projected electricity production was provided by the EAC until 2017; it should be noted that is currently under revision due to the changes in the issue of natural gas. The electricity production until 2020 was extrapolated on the basis of the previous trend (2007-2017).
- (d) The total GHG emissions were obtained by:
 
$$0.732 \text{ kt/ MWh} \times \text{MWh electricity production} / 0.370$$

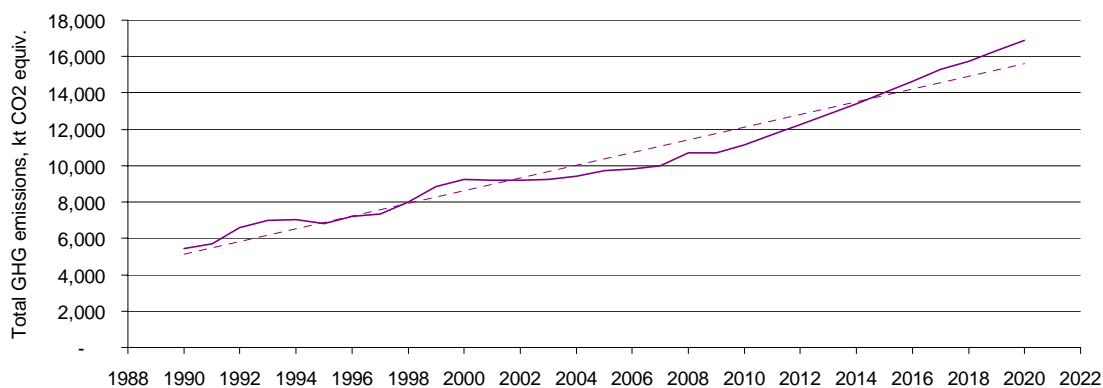


**Table 3.1. BaU scenario based on ETS relation between verified emissions of 2005-2007 for electricity production and total GHG emissions**

	Production projection (EAC), MWh	ETS ele CO2 for projection (using 2007 verified), kt CO2	Extrapolation of ETSelec to total GHG, kt CO2	Increase compared to 2007 emissions	Increase compared to 1990 emissions
2008		3,967*	10,719	7.40%	96.8%
2009	5,422	3,969	10,724	7.44%	96.8%
2010	5,637	4,126	11,149	11.7%	104.6%
2011	5,919	4,333	11,707	17.3%	114.9%
2012	6,194	4,534	12,251	22.7%	124.9%
2013	6,477	4,741	12,810	28.3%	135.1%
2014	6,775	4,959	13,400	34.3%	146.0%
2015	7,080	5,183	14,003	40.3%	157.0%
2016	7,399	5,416	14,634	46.6%	168.6%
2017	7,732	5,660	15,293	53.2%	180.7%
2018	7,967	5,832	15,758	57.9%	189.2%
2019	8,258	6,045	16,333	63.6%	199.8%
2020	8,548	6,257	16,907	69.4%	210.3%

\* from 2008 verified emissions for electricity production

The total GHG emissions for the BaU projections show an increase of 210.9% compared to 1990 and 69.4% compared to 2007 (last inventory submitted). The projections are presented in Figure 3.2.



**Figure 3.2. Business as usual scenario, 1990-2007 in kt CO2 equiv.**

### 3.1.1. Emissions per sector

For the GHG emissions per sector (Table 3.2), the sectoral breakdown for 2007 was used:

1. Energy (except transport) 55.4%
2. Transport 22.6%
3. Industry 9.2%
4. Solvents 0.03%
5. Agriculture 7.6%
6. LULUCF -1.5%
7. Waste 6.6%

**Table 3.2. Business as Usual Projections for total GHG emissions per sector**

	1990	1995	2000	2005	2007	2010	2015	2020
Energy	2,970	3,837	5,896	5,322	5,527	6,174	7,755	9,363
Transport	784	1,180	1,324	2,106	2,259	2,523	3,169	3,827
Industry	667	599	806	1,026	917	1,024	1,286	1,553
Solvents	2	3	3	3	3	3	4	5
Agriculture	647	761	773	767	761	850	1,067	1,288
LULUCF	-19	-72	-11	-147	-148	-165	-208	-251
Waste	397	482	542	633	662	740	929	1,122
<b>TOTAL</b>	<b>5,448</b>	<b>6,789</b>	<b>9,231</b>	<b>9,710</b>	<b>9,981</b>	<b>11,149</b>	<b>14,003</b>	<b>16,907</b>

**3.1.2. Emissions per gas**

For the projections of GHG emissions per gas (Table 3.4), the breakdown for 2007 was used (Table 3.3). The projections per gas and sector are shown in Table 3.6 based on the assumptions shown in Table 3.5.

**Table 3.3. Contribution of each GHG per gas in GHG emissions of 2007**

	2007 emissions (kt)	2007 emissions (kt CO <sub>2</sub> equiv.)	
CO <sub>2</sub>	8,176	8,176	81.9%
CH <sub>4</sub>	59.9	1,258	12.6%
N <sub>2</sub> O	1.7	526	5.3%
HFCs*		20.9	0.2%
PFCs*	-	-	
SF <sub>6</sub> *	-	-	
<b>TOTAL (kt CO<sub>2</sub> equiv.)</b>		<b>9,981</b>	

\* HFCs, PFCs and SF<sub>6</sub> contribution to the annual NIR for Cyprus show large inconsistency between submissions

**Table 3.4. Business as Usual Projections for total GHG emissions per gas, kt CO<sub>2</sub> equiv.**

	1990	1995	2000	2005	2007	2010	2015	2020
CO <sub>2</sub>	4,168	5,297	7,613	7,829	8,176	9,133	11,471	13,850
CH <sub>4</sub>	890	1,040	1,115	1,228	1,258	1,405	1,764	2,130
N <sub>2</sub> O	390	453	503	517	526	588	739	892
HFCs	NA,NO	NA,NO	0.4	136.1	20.9	23.4	29.3	35.4
<b>TOTAL</b>	<b>5,448</b>	<b>6,789</b>	<b>9,231</b>	<b>9,710</b>	<b>9,981</b>	<b>11,149</b>	<b>14,003</b>	<b>16,907</b>

**Table 3.5. Assumptions for gas production per sector**

	CO2	CH4	N2O	HFCs	TOTAL
Energy (except transport)	94.7%	2.9%	2.4%	0.0%	94.7%
Transport	97.1%	0.4%	2.5%	0.0%	97.1%
Industry	97.7%	0.0%	0.0%	2.3%	97.7%
Solvents	100.0%	0.0%	0.0%	0.0%	100.0%
Agriculture	0.0%	55.7%	44.3%	0.0%	0.0%
LULUCF	102.3%	-1.5%	-0.7%	0.0%	102.3%
Waste	0.0%	100.0%	0.0%	0.0%	0.0%
TOTAL GHG emissions	81.9%	12.6%	5.3%	0.2%	81.9%

**Table 3.6. Projection per gas and per sector for 2010, 2015 and 2020 in kt CO2 equiv.**

<b>2010</b>	CO2	CH4	N2O	HFCs	TOTAL
Energy (except transport)	5848.0	178.7	147.7	0.0	6174.4
Transport	2450.5	10.3	62.7	0.0	2523.4
Industry	1000.5	0.0	0.0	23.4	1023.8
Solvents	3.3	0.0	0.0	0.0	3.3
Agriculture	0.0	473.1	376.5	0.0	849.6
LULUCF	-169.1	2.5	1.2	0.0	-165.4
Waste	0.0	739.9	0.0	0.0	739.9
TOTAL GHG emissions	9133.0	1405.0	588.0	23.4	11149.1

<b>2015</b>	CO2	CH4	N2O	HFCs	TOTAL
Energy (except transport)	7345.0	224.5	185.5	0.0	7754.9
Transport	3077.7	13.0	78.7	0.0	3169.4
Industry	1256.6	0.0	0.0	29.3	1285.9
Solvents	4.2	0.0	0.0	0.0	4.2
Agriculture	0.0	594.2	472.8	0.0	1067.0
LULUCF	-212.4	3.2	1.5	0.0	-207.8
Waste	0.0	929.4	0.0	0.0	929.4
TOTAL GHG emissions	11471.0	1764.0	739.0	29.3	14003.1

<b>2020</b>	CO2	CH4	N2O	HFCs	TOTAL
Energy (except transport)	8868.3	271.0	223.9	0.0	9363.3
Transport	3716.1	15.7	95.0	0.0	3826.7
Industry	1517.2	0.0	0.0	35.4	1552.6
Solvents	5.1	0.0	0.0	0.0	5.1
Agriculture	0.0	717.4	570.9	0.0	1288.3
LULUCF	-256.5	3.9	1.8	0.0	-250.8
Waste	0.0	1122.1	0.0	0.0	1122.1
TOTAL GHG emissions	13850.0	2130.0	892.0	35.4	16907.3

### 3.2. With measures

The “with measures” scenario includes implementation of policies and measures as shown in Table 3.9. The reduction in the GHG that can be achieved if the presented policies and measures are fully implemented is from 9% in 2008 to 40% in 2020. The impact of the reductions to the total emissions is shown in Figure 3.3.

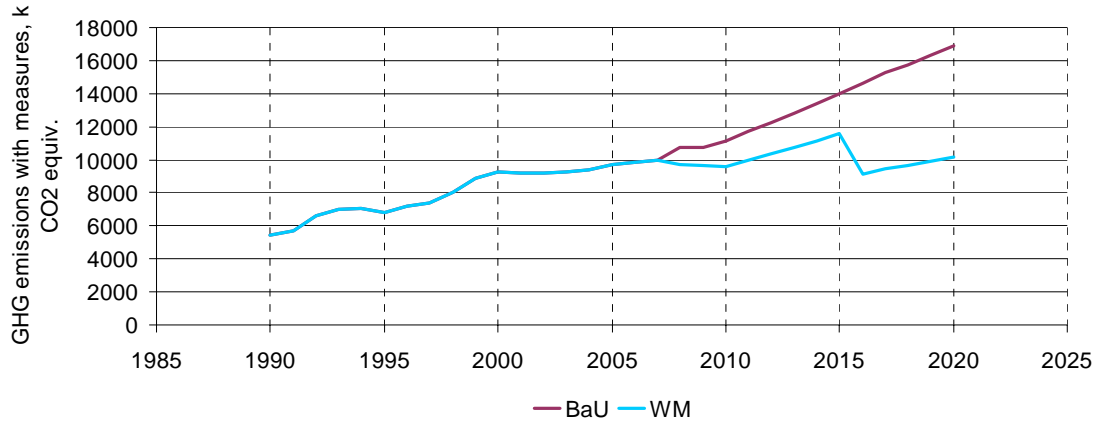


Figure 3.3. Impact of WM scenario on baseline projections

The GHG emissions if the WM scenario is fully achieved are shown in Table 3.7.

Table 3.7. WM projections deviation from baseline scenario

	BaU	WM	Difference from BaU	Change from 1990	Change from 2005
1990	5448	5448			
2000	9231	9231			
2005	9710	9710			
2007	9981	9981			
2010	11149	9603	-14%	76%	-1%
2015	14003	11587	-17%	113%	19%
2020	16907	10155	-40%	86%	5%

#### 3.2.1. Sensitivity analysis

The change in total of with measures scenario at 1% change of each measure is presented in Table 3.8 for 2010, 2015 and 2020.

Table 3.8. Change in total of with measures scenario at 1% change of each measure

			2010	2015	2020
<b>A1</b>	<b>RES</b>	<b>Constant 6% from 2010</b>	<b>0.240%</b>	<b>0.193%</b>	<b>0.083%</b>
<b>A2</b>	<b>NG</b>	<b>Gradual increase of NG in energy from 48% in 2016 to 80% in 2020</b>			<b>0.492%</b>
A3	Improvement in distribution system	Improvement of 0.1% annually -> reduction in emissions from 2008	0.012%	0.026%	0.018%
<b>B1</b>	<b>Energy savings</b>	<b>5% constant from 2010</b>	<b>0.200%</b>	<b>0.160%</b>	<b>0.069%</b>
C1	Merging of cement factories	Reduction 5% from 2011		0.027%	0.011%
C2	Energy savings	5% constant	0.033%	0.027%	0.011%

C3	Alternative fuels	Increase by 1% annually	0.020%	0.043%	0.030%
D1	Promotion of small cars in urban transport	Constant reduction 0.5%	0.008%	0.007%	0.003%
D2	Promotion of public transport	Constant 2% reduction in emissions	0.033%	0.026%	0.011%
D3	Biofuels	Constant 0.1% reduction in emissions	0.049%	0.105%	0.074%
D4	Withdrawal of vehicles older than 20 years old	Annual contribution in reduction in emissions of 1%	0.049%	0.105%	0.074%
E1	Recycling	Constant at 20% of packaging waste	0.144%	0.097%	0.036%
<b>E2</b>	<b>Methane recovery</b>	<b>50% of all controlled (84%) from 2010</b>	<b>0.201%</b>	<b>0.162%</b>	<b>0.070%</b>
E3	Management of uncontrolled disposal sites	Annual decrease of GHG by 5% from uncontrolled, from 2010	0.011%	0.025%	0.017%

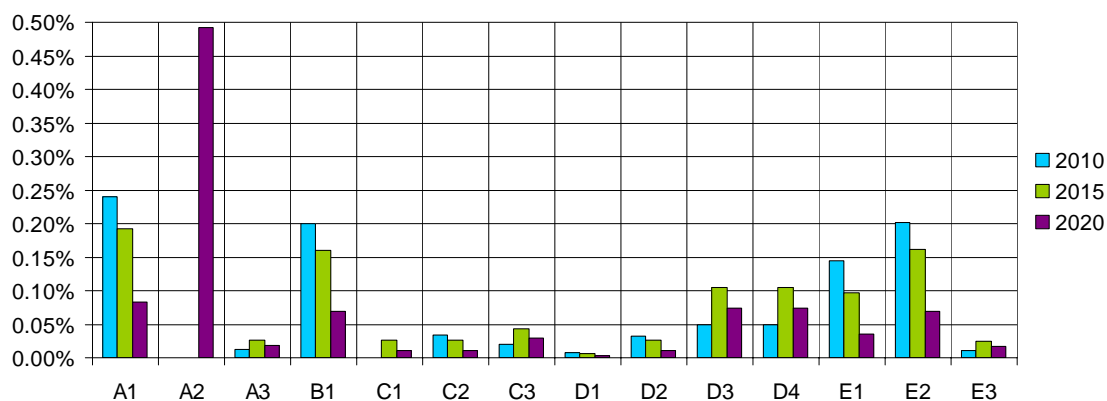


Figure 3.4. Change in total of with measures scenario at 1% change of each measure

**Table 3.9. Reduction in emissions that can be achieved with “With measures” scenario**

			Reduction of total GHG emissions by		
			2010	2015	2020
<b>Policy A. ELECTRICITY GENERATION</b>			389.0	527.3	4007.5
A1.	RES	From 5% in 2010, to gradual increase to 13% by 2020	370.5	465.3	561.8
A2.	NG	Gradual increase of NG in energy from 48% in 2014 to 80% in 2020			3324.0
A3.	Improvement in distribution system	Improvement of 0.2% annually -> reduction in emissions from 2008	18.5	62.0	121.7
<b>Policy B. RESIDENTIAL AND TERTIARY SECTOR</b>			308.7	387.7	468.2
B1.	Energy savings	5% in 2010 to 20% by 2020	308.7	387.7	468.2
<b>Policy C. INDUSTRY</b>			81.9	231.5	357.1
C1.	Merging of cement factories	Reduction 15% from 2011	0.0	64.3	77.6
C2.	Energy savings	5% in 2010 to 20% by 2020	51.2	64.3	77.6
C3.	Alternative fuels	Increase by 2% annually from 2010	30.7	102.9	201.8
<b>Policy D. TRANSPORT</b>			214.5	586.3	1090.6
D1.	Promotion of small cars in urban transport	Annual reduction of 0.5% from 2008	12.6	15.8	19.1
D2.	Promotion of public transport	Annual decrease in emissions of 0.5% from 2010	50.5	63.4	76.5
D3.	Biofuels	Gradual increase from 1.5 in 2008 to 10% in 2020	75.7	253.6	497.5
D4.	Withdrawal of vehicles older than 20 years old	Annual decrease in emissions of 1% from 2010	75.7	253.6	497.5
<b>Policy E. WASTE</b>			551.6	683.4	828.6
E1.	Recycling	Constant at 20% of packaging waste	223.1	233.5	240.6
E2.	Methane recovery	50% of all controlled from 2010	310.8	390.3	471.3
E3.	Management of uncontrolled disposal sites	Annual decrease of GHG by 5% from uncontrolled, from 2010	17.8	59.5	116.7
<b>TOTAL reduction from WM scenario</b>			<b>1545.7</b>	<b>2416.2</b>	<b>6752.0</b>

### 3.3. With additional measures

The “with additional measures” scenario includes implementation of policies and measures as shown in Table 3.10. The reduction in the GHG that can be achieved if the presented policies and measures are fully implemented is from 6% in 2008 to 58% in 2020. The impact of the reductions to the total emissions is shown in Figure 3.5.

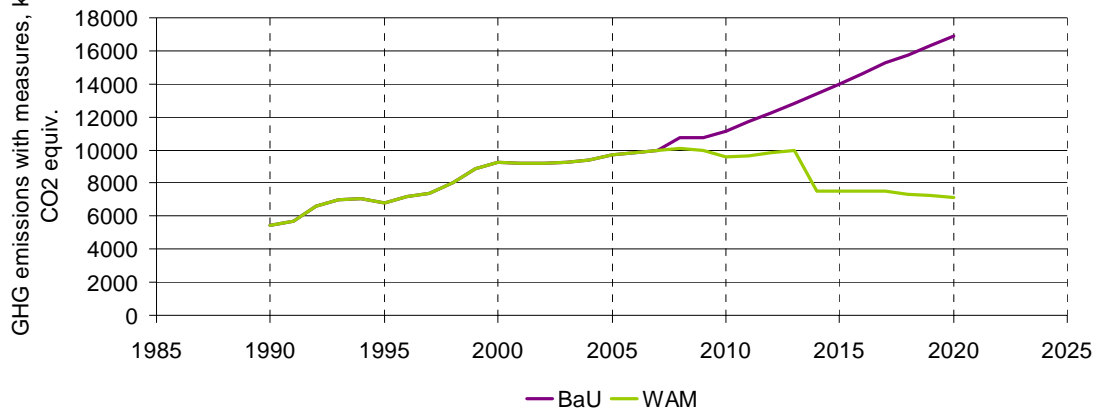


Figure 3.5. Impact of WAM scenario on baseline projections

The GHG emissions if the WAM scenario is fully achieved are shown in Table 3.10.

Table 3.10. WAM projections deviation from baseline scenario

	BaU	WAM	Difference from BaU	Change from 1990	Change from 2005
1990	5448	5448			
2000	9231	9231			
2005	9710	9710			
2007	9981	9981			
2010	11149	9605	-14%	76%	-1%
2015	14003	7504	-46%	38%	-23%
2020	16907	7097	-58%	30%	-27%

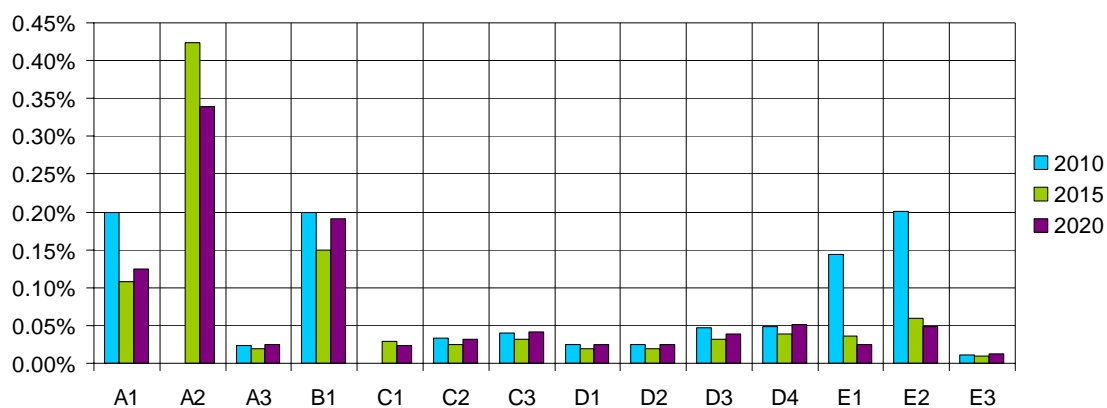
#### 3.3.1. Sensitivity analysis

The change in total of with additional measures scenario at 1% change of each measure is presented in Table 3.11 for 2010, 2015 and 2020.

Table 3.11. Change in total of with additional measures scenario at 1% change of each measure

			2010	2015	2020
A1	RES	From 5% in 2010, to gradual increase to 13% by 2020	0.200%	0.107%	0.124%
A2	NG	Gradual increase of NG in energy from 48% in 2014 to 80% in 2018	0.000%	0.424%	0.339%
A3	Improvement in distribution system	Improvement of 0.2% annually -> reduction in emissions from 2008	0.024%	0.019%	0.025%
B1	Energy savings	From 5% in 2010 to gradual increase to 20% by 2020	0.200%	0.149%	0.191%

C1	Merging of cement factories	Reduction 15% from 2011	0.000%	0.030%	0.024%
C2	Energy savings	From 5% in 2010 to gradual increase to 20% by 2020	0.033%	0.025%	0.032%
C3	Alternative fuels	Increase by 2% annually from 2010	0.040%	0.032%	0.041%
D1	Promotion of small cars in urban transport	Annual reduction of 0.5% from 2008	0.025%	0.020%	0.025%
D2	Promotion of public transport	Annual decrease in emissions of 0.5% from 2010	0.025%	0.020%	0.025%
D3	Biofuels	Gradual increase from 1.5% in 2008 to 10% in 2020	0.048%	0.031%	0.039%
D4	Withdrawal of vehicles older than 20 years old	Annual decrease in emissions of 1% from 2010	0.049%	0.039%	0.051%
E1	Recycling	Constant at 20% of packaging waste	0.145%	0.036%	0.025%
E2	Methane recovery	50% of all controlled (84%) from 2010	0.201%	0.060%	0.048%
E3	Management of uncontrolled disposal sites	Annual decrease of GHG by 5% from uncontrolled, from 2010	0.012%	0.009%	0.012%



**Figure 3.6. Change in total of with additional measures scenario at 1% change of each measure**



**Table 3.12. Reduction in emissions that can be achieved with “With additional measures” scenario for 2010, 2015 and 2020**

			Reduction of total GHG emissions by		
			2010	2015	2020
<b>Policy A. ELECTRICITY GENERATION</b>			345.8	527.3	4007.5
A1.	RES	From 5% in 2010, to gradual increase to 13% by 2020	370.5	465.3	561.8
A2.	NG	Gradual increase of NG in energy from 48% in 2014 to 80% in 2020		2753.0	3324.0
A3.	Improvement in distribution system	Improvement of 0.2% annually -> reduction in emissions from 2008	37.0	124.1	243.4
<b>Policy B. RESIDENTIAL AND TERTIARY SECTOR</b>			308.7	969.4	1872.7
B1.	Energy savings	5% in 2010 to 20% by 2020	308.7	969.4	1872.7
<b>Policy C. INDUSTRY</b>			81.9	231.5	357.1
C1.	Merging of cement factories	Reduction 15% from 2011	0.0	64.3	77.6
C2.	Energy savings	5% in 2010 to 20% by 2020	51.2	64.3	77.6
C3.	Alternative fuels	Increase by 2% annually from 2010	30.7	102.9	201.8
<b>Policy D. TRANSPORT</b>			214.5	586.3	1090.6
D1.	Promotion of small cars in urban transport	Annual reduction of 0.5% from 2008	12.6	15.8	19.1
D2.	Promotion of public transport	Annual decrease in emissions of 0.5% from 2010	50.5	63.4	76.5
D3.	Biofuels	Gradual increase from 1.5 in 2008 to 10% in 2020	75.7	253.6	497.5
D4.	Withdrawal of vehicles older than 20 years old	Annual decrease in emissions of 1% from 2010	75.7	253.6	497.5
<b>Policy E. WASTE</b>			551.6	683.4	828.6
E1.	Recycling	Constant at 20% of packaging waste	223.1	233.5	240.6
E2.	Methane recovery	50% of all controlled from 2010	310.8	390.3	471.3
E3.	Management of uncontrolled disposal sites	Annual decrease of GHG by 5% from uncontrolled, from 2010	17.8	59.5	116.7
<b>TOTAL reduction from WAM scenario</b>			<b>1545.7</b>	<b>2416.2</b>	<b>6752.0</b>

### 3.4. 2005/166/EC 9(c): Indicators for projections (Annex III)

The available data on indicators for projections is presented in Table 3.13. The sectoral emissions were based on the assumption that their contribution is the same as 2007.

**Table 3.13. Indicators for projections (Annex III)**

Indicator	Description	2010		2015		2020	
MACRO	Total CO2 emissions, kt	9,133		11,471		13,850	
	GDP, Bio Euro	14.674	622.4	16.281	704.6	18.064	766.7
TRANSPORT CO	CO2 emissions from passenger cars, kt		NE		NE		NE
	Number of kilometres by passenger cars, Mkm		NA		NA		NA
TRANSPORT D0	CO2 emissions from freight transport (all modes), kt		NE		NE		NE
	Freight transport (all modes), Mtkm		NA		NA		NA
INDUSTRY A1	CO2 emissions from fossil fuel consumption industry, kt	1,295.1		1,626.6		1,964.0	
	Gross value-added total industry, Bio EUR (Chain Volume Measures of 2000)	1.0344	1,252.0	1.1616	1,400.3	1.2488	1,572.7
HOUSEHOLDS A1	CO2 emissions from fossil fuel consumption households, kt	223.8		281.1		339.4	
	Stock of permanently occupied dwellings, 1 000	NA		NA		NA	
SERVICES A0	CO2 emissions from fossil fuel consumption services, kt	90.7		113.9		137.5	
	Gross value-added — services, Bio Euro (EC95)	NA		NA		NA	
TRANSFORMATION B0	CO2 emissions from public and autoproducer thermal power stations, kt	4,186.4		5,258.0		6,348.5	
	All products — output by public and autoproducer thermal power stations, MWh	5,637	0.74	7,080	0.74	8,548	0.74
AGRICULTURE	N2O emissions from synthetic fertiliser and manure use, kt	0.26		0.32		0.39	
	Use of synthetic fertiliser and manure, kt nitrogen	NA		NA		NA	
AGRICULTURE	CH4 emissions from cattle, kt	5.46		6.86		8.28	
	Cattle population, 1 000 head	NA		NA		NA	
WASTE	CH4 emissions from landfills, kt	23.26		29.22		35.28	
	Municipal solid waste going to landfills, kt	381.3	0.06	452.6	0.06	530.4	0.07

### 3.5. 2005/166/EC 10(2): Parameters for projections (Annex IV)

The only parameter used for the projections of GHG emissions for baseline scenario is the projection of electricity production (Table 3.14), and its relation of CO2 emissions as deducted from the ETS reports for 2005-2007. The contribution of the different sectors to the total was assumed to be the same as 2007 (Table 3.15).

**Table 3.14. BaU scenario based on ETS relation between verified emissions of 2005-2007 for electricity production and total GHG emissions**

	Production projection (EAC), MWh	ETS ele CO2 for projection (using 2007 verified), kt CO2	Extrapolation of ETSelec to total GHG, kt CO2	Increase compared to 2007 emissions	Increase compared to 1990 emissions
2008		3,967*	10,719	7.40%	96.8%
2009	5,422	3,969	10,724	7.44%	96.8%
2010	5,637	4,126	11,149	11.7%	104.6%
2011	5,919	4,333	11,707	17.3%	114.9%
2012	6,194	4,534	12,251	22.7%	124.9%
2013	6,477	4,741	12,810	28.3%	135.1%
2014	6,775	4,959	13,400	34.3%	146.0%
2015	7,080	5,183	14,003	40.3%	157.0%
2016	7,399	5,416	14,634	46.6%	168.6%
2017	7,732	5,660	15,293	53.2%	180.7%
2018	7,967	5,832	15,758	57.9%	189.2%
2019	8,258	6,045	16,333	63.6%	199.8%
2020	8,548	6,257	16,907	69.4%	210.3%

\* from 2008 verified emissions for electricity production

**Table 3.15. Contribution of sector to total national GHG emissions**

Sector	Contribution to total emissions
8. Energy (except transport)	55.4%
9. Transport	22.6%
10. Industry	9.2%
11. Solvents	0.03%
12. Agriculture	7.6%
13. LULUCF	-1.5%
14. Waste	6.6%

The growth of all sectors is assumed the same as the energy sector, shown in Section 3.1. Baseline Scenario (Business as Usual) projections. Several of the mandatory parameters have been used in the different scenarios for baseline projections (Annex I) but due to the associated large uncertainty, particularly on the availability of data on projections, the relation of ETS with total GHG emissions was chosen to be used.

## 4. International Commitments

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### 4.1. Article 3(2)(c) Community legislation and policies

#### 4.1.1. Legal and institutional steps for implementation of commitments

To enforce the provisions of Directive 2001/77/EC of the European Parliament, Cyprus has introduced relevant legislation for the implementation and monitoring of the announced energy policy, and the new targets set for Renewable energy sources for Cyprus in the climate and energy package, the Special fund for promotion of renewable energy sources and energy efficiency (Laws 2003 to 2006) has been revised. Its implementation is monitored by the Energy Service of the Ministry of Commerce, Industry and Tourism.

The Energy Service operates its own Applied Energy Centre (AEC), which in close collaboration with the Cyprus Institute of Energy (CIE), serves as the focal point for all efforts in the field of energy conservation and renewable energy sources.

The Cyprus Institute of Energy was established in 2000 by the Minister of Commerce Industry and Tourism and its primary objectives are to promote Renewable Energy Sources utilisation and energy saving/conservation. It shares the facilities with the AEC and it has the flexibility to cooperate with the private sector. Both the AEC and the CIE play a significant role during the implementation phase of the national grant scheme for the promotion of RES.

The Law provides for the financing mechanism for programs for renewable energy sources and energy conservation. The Electricity Authority of Cyprus will be purchasing all electricity generated from renewable energy sources at the price of 3.7 Cyprus cents per kWh. Provision of grants and subsidies of about £42 million CY Pounds by 2010 for the implementation of programmes for renewable energy sources and energy conservation.

The Government of Cyprus, with the cooperation of all competent authorities and bodies has established the legal framework and prepared the necessary infrastructure for the liberalization of the electricity market. As a result 35% of the electricity market has been opened to competition, as from the date of accession (1/5/2004), thus terminating the monopoly status that the previous law was providing to the Electricity Authority of Cyprus.

Following a decision by the Council of Ministers, the Cyprus government has created the Cyprus Energy Regulatory Authority (CERA) as an independent authority, with the aim of securing competition and for the protection of all consumers, responsible for the regulation of the electricity and gas market with exclusive rights to issue licenses for all activities relating to electricity and gas, to approve tariffs, to dissolve disputes, to protect consumers and to secure a reliable electricity system.

Grants and/or subsidies are provided for investments by companies, households and public sector bodies in energy conservation and in renewable energy systems such as wind, solar thermal, photovoltaic, small hydro, biomass and desalination. Table 3.1 presents the Grant Schemes that have been applied so far.

## 4.2. Kyoto Protocol

The European Union is an Annex I signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and an Annex B signatory to its Kyoto Protocol (KP). The KP sets quantified targets for reducing greenhouse gas emissions for those signatories that are included in its Annex B. Cyprus ratified the UNFCCC as a non-Annex I party on 15th October 1997, and on the same basis, subsequently ratified the Kyoto Protocol on 16th July 1999; i.e. *Cyprus has no emissions limitation commitments.*

The competent authority for the implementation of commitments made through the Kyoto Protocol is the Environment Service of the Ministry of Agriculture, Natural Resources and Environment.

### 4.2.1. Participation of legal entities

The European Union, representing the 15 pre-May 2004 Member States, is an Annex I signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and an Annex B signatory to its Kyoto Protocol. The Kyoto Protocol (KP) sets quantified targets for reducing greenhouse gas emissions for those signatories that are included in its Annex B. Cyprus ratified the UNFCCC as a non-Annex I party on 15th October 1997, and on the same basis, subsequently ratified the Kyoto Protocol on 16th July 1999.

Although Cyprus does not have any individual reduction limitation commitments, the target of reduction of 5% for the non-ETS sectors in comparison to 2005 and -21% for ETS installations by 2020 has been set for the country with the new climate and energy package.

Another issue that is unique to Cyprus and Malta is their isolation as energy markets. At present neither country is connected to any other country in energy terms, whether through gas or oil pipelines or through interconnection between the electricity grids. It follows that both countries rely almost exclusively on imported oil (plus, in the case of Cyprus, small quantities of coal and other fuels that are used in the cement industry). The small size of both countries also makes it difficult for them to benefit from economies of scale in the energy sector.

## 4.3. Questionnaire on the use of the Kyoto Protocol mechanisms in meeting the 2008-2012 targets (Decision 2005/166/EC, Annex V)

5. Does your Member State intend to use joint implementation (JI), the clean development mechanism (CDM) and international emissions trading (IET) under the Kyoto Protocol (the Kyoto mechanisms) to meet its quantified emission limitation or reduction commitment pursuant to Article 2 of Decision 2002/358/EC and the Kyoto Protocol? If so, what progress has been made with the implementing provisions (operational programmes, institutional decisions) and any related domestic legislation?

Even though the Republic of Cyprus has no commitments under the Kyoto Protocol, CDM of the Kyoto Protocol has been introduced as a Non-Annex I country. Moreover, the emissions trading as set by the EC has been adopted into the legislation of the country.

6. Has your Member State established and notified to the UNFCCC a designated national authority for clean development mechanism projects and a designated focal point for joint implementation projects? If so, please provide details.

Cyprus has designated the Environment Service as competent authority for clean development mechanism projects and joint implementation projects. Responsible person is Theodoulos Mesimeris ([tmesimeris@environment.moa.gov.cy](mailto:tmesimeris@environment.moa.gov.cy), tel: +357 22 408948).

7. Which of the three Kyoto mechanisms is your Member State using or does it plan to use?

Cyprus has approved applications for hosting CDM projects

8. What quantitative contributions to the fulfilment of the quantified emission limitation or reduction commitment pursuant to Article 2 of Decision 2002/358/EC and the Kyoto Protocol does your Member State expect from the Kyoto mechanisms during the first quantified emission limitation and reduction commitment period, from 2008 to 2012 (please use Table 1)?

One important issue for Cyprus is the situation regarding new entrants. This is particularly relevant in the energy sector, where market liberalisation is opening up EAC to competition and promoting wider developments within the Cyprus electricity market.

A significant new entrants reserve will therefore need to be set aside to facilitate these developments without hindering market liberalisation. However, this should not result in an overall increase in CO<sub>2</sub> emissions, because new units (inside or outside EAC) will effectively replace older units with higher specific emissions.

The situation in the cement and the ceramics' sectors is different. The rapid growth experienced in Cyprus' construction sector in recent years is expected to continue, and demand for cement, bricks and tiles is therefore expected to continue to grow. Although the companies will become more efficient, there are other factors to be taken into account. In the cement sector, both companies have plans to increase capacity by installing new, larger and (in CO<sub>2</sub> terms) more efficient kilns (units), both to meet growing national demand and to provide scope for exporting. In the brick industry output (in tonnes) will need to increase significantly in order to provide heavier bricks that will be needed to meet new building standards linked to the requirement for improved energy efficiency (COM 2002/91/EC: Directive on the Energy Performance of Buildings), and also provide for exports in areas such as Lebanon (reconstruction in Lebanon as a significant factor here).

There is therefore the potential for a significant increase in capacity and emissions from this sector, despite the achievement of improved efficiency and tighter environmental standards.

9. Specify the budget in euro for the total use of the Kyoto mechanisms and, where possible, per mechanism and initiative, programme or fund, including the time over which the budget will be spent.

See previous chapter

10. With which countries has your Member State closed bilateral or multilateral agreements, or agreed memorandums of understanding or contracts for the implementation of project based activities?

Contracts for the implementation of project based activities between Belgium and private sector.

11. For each planned, ongoing and completed clean development mechanism and joint implementation project activity in which your Member State participates, provide the following information (Table 6.1.)

Cyprus is a non-Annex I country and therefore can host CDM projects. Table 6.1 presents the projects for which project design documents have been approved by the competent authority. The projects fall within the categories of energy and agriculture. It should be noted that:

- 11.1.1. host country is replaced in the table by Annex I country involved;
- 11.1.2. category is for all projects CDM
- 11.1.3. first/ second track approval is not included – no JI projects

It should be noted that all information are according to the project design documents submitted to the national competent authority.

Table 6.1. CDM projects for which PDDs have been approved by the Competent Authority to be hosted in Cyprus

	(a) Project Title	Annex I country involved	(c) Financing	(d) Project type	(e) Status	(f) Lifetime	(h) Projected total emissions reduction that accrue until the end of the first commitment	(i) Amount of ERUs or CERS generated	(j) Credits accrued until the end of 2007
1	Anaerobic digestion at Armenis Farm Ltd	The Netherlands	Private	Agriculture	Under construction (construction phase)	PDD submitted: 29/01/08 Letter of approval: 02/05/08 Start of operation: 01/05/08 Project termination: 2018 Crediting period: from 01/07/08 Date of issue: NA	73,166	2008: 7,71 2009: 15,552 2010: 16,280 2011: 16,768 2012: 17,095 2013: 17,315 2014: 17,462 2015: 17,560 2016: 17,626 2017: 17,670 2018: 11,277 Total: 172,076	None
2	Wind Park at Orites Archimandritas		Private	Energy and power	Under construction (construction)	PDD submitted: Letter of approval: 08/01/08 Start of operation: 01/01/10 Project termination: 2019 Crediting period: from 01/01/10 Date of issue: NA	702,444	234,148/ year 10 year total: 2,341,480	None
3	Kambi Wind Farm Project	The Netherlands	Private	Energy and power	Under construction (start up)	PDD submitted: 19/11/08 Letter of approval: 21/11/08 Start of operation: 01/01/10 Project termination: 2019 Crediting period: from 01/01/10 Date of issue: NA	38,100	12,700/ year 10 year total: 12,7001	None
4	30 MW TSP Aeolian Dynamics Wind Power Project	The Netherlands	Private	Energy and power	Under construction (start up)	PDD submitted: 22/01/09 Letter of approval: 26/01/09 Start of operation: 01/01/11 Project termination: 2020 Crediting period: from 01/01/11	119,706	59,853/ year 10 year total: 598,530	None



	<b>(a) Project Title</b>	<b>Annex I country involved</b>	<b>(c) Financing</b>	<b>(d) Project type</b>	<b>(e) Status</b>	<b>(f) Lifetime</b>	<b>(h) Projected total emissions reduction that accrue until the end of the first commitment</b>	<b>(i) Amount of ERUs or CERS generated</b>	<b>(j) Credits accrued until the end of 2007</b>
						Date of issue: NA			
5	Orounda Biogas plant in Cyprus	United Kingdom	Private	Agriculture	Under construction (start up)	PDD submitted: 06/04/09 Letter of approval: not issued Start of operation: 01/04/09 Project termination: 2020 Crediting period: from 01/04/09 Date of issue: NA	103,098	34,366/ year 10 year total: 343,659	None

## Annex I: Business as usual scenarios considered

**Table I1. 2010, 2015 and 2020 projections according to the Scenarios for BaU**

BaU Scenarios	2010	2015	2020
Ia. Total GHG emissions (kt CO2 equiv) wt 2007 ratio to GDP	10,599	11,760	13,048
Ib. Total GHG emissions (kt CO2 equiv) wt avg ratio 2003-2007 to GDP	11,671	12,948	14,366
II. Sectoral emissions increase proportionally by GDP change in sector	11,010	12,473	14,066
IIIa. Total GHG emissions (kt CO2 equiv) wt 2007 ratio	10,283	10,765	11,092
IIIb. Total GHG emissions (kt CO2 equiv) wt avg ratio 2003-2007	10,269	10,750	11,077

### Scenario I: Total emissions increase proportionally to predicted GDP growth

For Scenario I, it was assumed that the emissions increase proportionally to predicted GDP growth. Expected GDP growth has not yet been estimated by the Planning Bureau of Cyprus for 2010-2020 on the basis of the “economic crisis”. The data for projections came from the International Monetary Fund, published in April 2009 “World Economic Outlook”, which contained data on real GDP growth for 2006-2010 (Table I2). Concerning the later years, i.e. 2011-2020 it was assumed that the growth is constant at the 2010 levels.

**Table I2. Real GDP growth for Cyprus as published by IMF (World Economic Outlook, 2009)**

Year	2006	2007	2008	2009	2010
Real GDP growth	4.1%	4.4%	3.7%	0.3%	2.1%

The ratio of CO2 emissions per GDP million euro was obtained by the latest inventory submitted by Cyprus to the EC for Decision 280/2004/EC, i.e. 2007 (Cyprus national greenhouse gas inventory 1990 – 2007). For the projections of GHG for 2008-2020 two values have been used:

- (a) 2007: 0.72 kt CO2 equiv /GDP mn euro
- (b) Average 2003 – 2007: 0.80 kt CO2 equiv /GDP mn euro

The resulting estimations for the projections with the GDP are presented in Table I3.

**Table I3. Total emissions increase proportionally to predicted GDP growth**

Year	Estimated GDP	Total GHG emissions (kt CO2 equiv.) using 2007 GDP to GHG emissions ratio	Total GHG emissions (kt CO2 equiv.) using 2003-2007 GDP to GHG emissions ratio
2008	14,329	10,350	11,396
2009	14,372	10,381	11,430
2010	14,674	10,599	11,671
2011	14,982	10,822	11,916
2012	15,297	11,049	12,166
2013	15,618	11,281	12,421
2014	15,946	11,518	12,682
2015	16,281	11,760	12,948
2016	16,623	12,007	13,220
2017	16,972	12,259	13,498
2018	17,328	12,516	13,781
2019	17,692	12,779	14,071
2020	18,064	13,048	14,366

**Scenario II: Sectoral emissions increase proportionally by GDP change in sector**

For scenario II, the sectoral increase in activity of the sector was assumed directly proportional to the emissions of the sector. The increase assumed for the projections is presented in Table I4. No change in the activity of the sector is assumed for solvents, LULUCF and waste. The respective emissions obtained per sector are presented in Table I5.

**Table I4. Increase in sectoral activity assumed for projections, 2008-2020**

	1. Energy	2. Industry	3. Solvents	4. Agriculture	5. LULUCF	6. Waste
2008	3.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2009	3.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2010	3.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2011	2.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2012	2.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2013	2.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2014	2.7%	2.7%	0.0%	2.5%	0.0%	0.0%
2015	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%
2016	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%
2017	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%
2018	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%
2019	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%
2020	2.7%	1.5%	0.0%	2.0%	0.0%	0.0%

**Table 15. Projections of sectoral emissions based on BaU scenario II, 2008-2020**

	1. Energy	2. Industry	3. Solvents	4. Agriculture	5. LULUCF	6. Waste	TOTAL
2008	8074.6	940.9	3.0	779.2	-148.1	662.4	10311.9
2009	8373.3	965.8	3.0	798.3	-148.1	662.4	10654.7
2010	8683.1	991.4	3.0	817.8	-148.1	662.4	11009.7
2011	8917.6	1017.7	3.0	837.9	-148.1	662.4	11290.4
2012	9158.3	1044.6	3.0	858.4	-148.1	662.4	11578.7
2013	9405.6	1072.3	3.0	879.4	-148.1	662.4	11874.7
2014	9659.6	1100.7	3.0	901.0	-148.1	662.4	12178.6
2015	9920.4	1116.7	3.0	919.0	-148.1	662.4	12473.4
2016	10188.2	1132.9	3.0	937.4	-148.1	662.4	12775.8
2017	10463.3	1149.3	3.0	956.1	-148.1	662.4	13086.1
2018	10745.8	1166.0	3.0	975.2	-148.1	662.4	13404.4
2019	11036.0	1182.9	3.0	994.7	-148.1	662.4	13730.9
2020	11333.9	1200.0	3.0	1014.6	-148.1	662.4	14065.9

**Scenario III: Total emissions relate directly to population**

For Scenario III, it was assumed that the emissions increase proportionally to the change in population. For the ratio of CO<sub>2</sub> emissions per capita for the projections of GHG for 2008-2020 two values have been used:

- (c) 2007: 12.65 kt CO<sub>2</sub> equiv /capita
- (d) Average 2003 – 2007: 12.63 kt CO<sub>2</sub> equiv /capita

Population increase for 2008-2014 was assumed 1%, and for 2015-2020 0.6%. The resulting estimations for the projections based on population are presented in Table 16.

**Table 16. Total emissions increase proportionally to predicted population**

	Population	Total GHG emissions (kt CO <sub>2</sub> equiv) with 2007 per capita emissions	Total GHG emissions (kt CO <sub>2</sub> equiv) with average 2003-2007 per capita emissions
2008	797,193	10,081	10,067
2009	805,165	10,182	10,167
2010	813,217	10,283	10,269
2011	821,349	10,386	10,372
2012	829,562	10,490	10,476
2013	837,858	10,595	10,580
2014	846,236	10,701	10,686
2015	851,314	10,765	10,750
2016	856,422	10,830	10,815
2017	861,560	10,895	10,880
2018	866,730	10,960	10,945
2019	871,930	11,026	11,011
2020	877,162	11,092	11,077

## **Annex II: Annual reduction in emissions for WM projections**

**Table II. Annual reduction in GHG emissions per measure of the WM scenario, kt CO2 equiv.**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BaU	10719	10724	11149	11707	12251	12810	13400	14003	14634	15293	15758	16333	16907
A1			370	389	407	426	445	465	486	508	524	543	562
A2									2877	3007	3098	3211	3324
A3	6	12	19	26	34	43	52	62	73	85	96	109	122
B1	297	297	309	324	339	355	371	388	405	423	436	452	468
C1				54	56	59	62	64	67	70	72	75	78
C2	49	49	51	54	56	59	62	64	67	70	72	75	78
C3	10	20	31	43	56	71	86	103	121	140	159	180	202
D1	12	12	13	13	14	14	15	16	17	17	18	18	19
D2	49	49	50	53	55	58	61	63	66	69	71	74	77
D3	24	49	76	106	139	174	212	254	298	346	392	444	497
D4	24	49	76	106	139	174	212	254	298	346	392	444	497
E1	219	221	223	225	228	230	232	234	235	236	238	239	241
E2	299	299	311	326	341	357	374	390	408	426	439	455	471
E3	6	11	18	25	33	41	50	59	70	81	92	104	117
Total reduction	994	1067	1546	1744	1897	2059	2233	2416	5489	5826	6101	6423	6752
WM projection	9725	9657	9603	9962	10354	10751	11167	11587	9145	9466	9657	9910	10155
Difference from BaU	-9%	-10%	-14%	-15%	-15%	-16%	-17%	-17%	-38%	-38%	-39%	-39%	-40%

## **Annex III: Annual reduction in emissions for WAM projections**

**Table III. Annual reduction in GHG emissions per measure of the WAM scenario, kt CO2 equiv.**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BaU	10719	10724	11149	11707	12251	12810	13400	14003	14634	15293	15758	16333	16907
A1			309	376	448	525	609	698	794	898	995	1104	1217
A2							2634	2753	2877	3007	3098	3211	3324
A3	12	24	37	52	68	85	104	124	146	169	192	217	243
B1			308.7176	421	543	674	816	969	1135	1313	1484	1673	1873
C1				161	169	176	185	193	202	211	217	225	233
C2			51	70	90	112	135	161	188	218	246	277	311
C3	20	39	61	86	113	141	172	206	242	281	318	360	404
D1	12	24	38	53	69	87	106	127	149	173	196	222	249
D2	12	24	38	53	69	87	106	127	149	173	196	222	249
D3	36	54	74	96	120	146	174	205	237	273	306	343	383
D4	24	49	76	106	139	174	212	254	298	346	392	444	497
E1	219	221	223	225	228	230	232	234	235	236	238	239	241
E2	299	299	311	326	341	357	374	390	408	426	439	455	471
E3	6	11	18	25	33	41	50	59	70	81	92	104	117
Total reduction	640	745	1544	2051	2429	2835	5910	6499	7130	7804	8410	9097	9811
WM projection	10080	9979	9605	9656	9822	9975	7490	7504	7504	7488	7348	7236	7097
Difference from BaU	-6%	-7%	-14%	-18%	-20%	-22%	-44%	-46%	-49%	-51%	-53%	-56%	-58%