

# Portugal

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## **1.**

## SUMMARY

Portugal's Kyoto Protocol burden sharing commitment is for emissions to rise by no more than 27% above base year emissions. Based on projections in Portugal's 2007 submission under the Monitoring Mechanism ('MM submission'), and excluding LULUCF, the 'with existing measures' scenario projects that greenhouse gas emissions will increase 44% above the base year in 2010 reducing to 40% for the 'with additional measures' scenario.

Portugal intends to make use of the flexible mechanisms under articles 6, 12 and 17 of the Kyoto Protocol in order to reduce its emissions by 5.8 MtCO<sub>2</sub> eq. Accounting for the effect of all measures included in the projections plus reductions from carbon sinks (4.7 MtCO<sub>2</sub> eq.) and flexible mechanisms, emissions are projected to be 22.7% above the base year and thus Portugal would meet and indeed overachieve its Kyoto target.

Portugal's policies and measures introduced in 2007 are estimated to contribute a further 1.56 MtCO<sub>2</sub>eq to emission reductions in 2010. However these additional measures were not modelled in the general emission projections.

Emissions are expected to remain fairly static in the agriculture sector and to increase in all other sectors. The most significant increases are expected in the transport, energy and industrial process sectors. In terms of policy impacts, the greatest reductions are expected to occur through the enhancement of forest sinks as well as a variety of policies in the energy supply and transport sectors.

## 2. GHG PROJECTIONS AND PROGRESS TO KYOTO TARGETS

Reference-year emissions of greenhouse gases are calculated using 1990 emissions for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) and 1995 emissions for fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

Table 1 shows, for all gases and main sectors:

- GHG emission projections for the two scenarios “with existing measures” (WEM) and “with additional measures” (WAM), as reported by Portugal;
- Historic emissions (in the “reference year”) as reported together with projections. For Portugal, the reference year is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for fluorinated gases<sup>1</sup>.

Table 2 shows, for all gases and main sectors:

- 1990 GHG emissions as reported in the latest (2008) GHG emissions inventory (1990-2006);
- Adjusted GHG emission projections for the WEM and WAM scenarios. This adjustment of the projections reported in Table 1 is carried out to allow consistency and comparability between projections and the latest (2008) GHG inventory data<sup>2</sup>.

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<sup>1</sup> Reference year emissions do not include the Article 3.7 value of 0.97 Mt CO<sub>2</sub>-eq., their purpose is solely to create the adjustment factor for Table 2. All Kyoto base year figures include the Article 3.7 value of 0.97 Mt CO<sub>2</sub>-eq.

<sup>2</sup> The adjustment consists in applying an adjustment factor to projections from Table 1. This factor is the ratio between total emissions in the reference year as reported in the 2008 GHG inventory report (or, if the reference year is the base-year under the Kyoto Protocol, in the report of the review of the initial report under the Kyoto Protocol) and total emissions in the reference year as reported by the country with projections (Table 1).

**Table 1. Summary of reported projections by sector and by gas in 2010 (Mt CO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	29.3	43.4	42.0	0.5	0.7	0.7	0.4	0.4	0.4	NO	NO	NO	30.1	44.6	43.2
Energy supply	16.1	24.1	23.1	0.1	0.4	0.4	0.1	0.1	0.1	NO	NO	NO	16.2	24.6	23.6
Energy – industry, construction	9.2	11.8	11.5	0.0	0.0	0.0	0.1	0.1	0.1	NO	NO	NO	9.3	11.9	11.6
Energy – other (commercial, residential, agriculture)	4.0	7.6	7.4	0.3	0.3	0.3	0.2	0.2	0.2	NO	NO	NO	4.6	8.1	7.9
<b>Transport (energy)</b>	9.8	20.4	19.8	0.1	0.1	0.0	0.2	0.7	0.7	NO	NO	NO	10.1	21.2	20.5
<b>Industrial processes</b>	4.0	5.8	5.8	0.0	0.0	0.0	0.6	0.6	0.6	0.0	0.7	0.7	4.6	7.2	7.2
<b>Waste</b>	0.0	0.5	0.5	6.6	4.9	4.9	0.5	0.7	0.7	NO	NO	NO	7.1	6.1	6.1
<b>Agriculture</b>	NE	NE	NE	4.1	4.7	4.2	3.8	4.0	4.0	NO	NO	NO	7.9	8.6	8.2
<b>Other</b>	0.2	0.3	0.3	0.0	0.0	0.0	NE	0.0	0.0	NO	NO	NO	0.2	0.3	0.3
<b>Total (excl. LULUCF)</b>	43.4	70.5	68.5	11.2	10.4	10.0	5.4	6.3	6.3	0.0	0.7	0.7	60.0	88.0	85.5

**Key:**

Reference year: 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for F-gases.

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Portugal's MM submission, May 2007, with corrections provided in July 2007.

**Table 2. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (MtCO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	29.4	42.8	41.4	0.5	0.7	0.7	0.4	0.4	0.4	NO	NO	NO	30.2	44.0	42.6
Energy supply	16.1	23.7	22.8	0.1	0.4	0.4	0.1	0.1	0.1	NO	NO	NO	16.2	24.2	23.3
Energy – industry, construction	9.2	11.6	11.3	0.0	0.0	0.0	0.1	0.1	0.1	NO	NO	NO	9.3	11.7	11.4
Energy – other (commercial, residential, agriculture)	4.1	7.5	7.3	0.3	0.3	0.3	0.2	0.2	0.2	NO	NO	NO	4.7	8.0	7.8
<b>Transport (energy)</b>	9.8	20.1	19.5	0.1	0.1	0.0	0.2	0.7	0.7	NO	NO	NO	10.1	20.8	20.2
<b>Industrial processes</b>	4.0	5.8	5.8	0.0	0.0	0.0	0.6	0.6	0.6	NE,NO	0.7	0.7	4.6	7.1	7.1
<b>Waste</b>	0.0	0.5	0.5	5.5	4.9	4.9	0.4	0.6	0.6	NO	NO	NO	5.9	6.0	6.0
<b>Agriculture</b>	NE	NE	NE	4.1	4.6	4.2	4.0	3.9	3.9	NO	NO	NO	8.1	8.5	8.1
<b>Other</b>	0.2	0.3	0.3	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.2	0.3	0.3
<b>Total (excl. LULUCF)</b>	43.4	69.5	67.5	10.1	10.3	9.8	5.6	6.3	6.2	0.0	0.7	0.7	59.1	86.7	84.3

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Sources:** Portugal's MM submission, May 2007, with corrections provided in July 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 15 April 2008.

**Table 3. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (index 100 = 1990)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	100	145.8	141.1	100	150.2	148.0	100	111.8	111.5	100	NO	NO	100	145.5	140.9
Energy supply	100	147.6	141.9	100	374.3	364.2	100	204.7	201.6	100	NO	NO	100	149.3	143.5
Energy – industry, construction	100	126.6	123.4	100	113.1	113.1	100	148.3	148.3	100	NO	NO	100	126.7	123.5
Energy – other (commercial, residential, agriculture)	100	181.8	177.5	100	86.4	86.3	100	77.6	77.9	100	NO	NO	100	169.5	165.7
<b>Transport (energy)</b>	100	204.8	198.8	100	68.3	67.0	100	443.7	436.8	100	NO	NO	100	207.4	201.4
<b>Industrial processes</b>	100	142.9	142.9	100	119.1	119.1	100	103.8	103.8	100	NE	NE	100	154.0	154.0
<b>Waste</b>	100	4717.9	4717.9	100	88.9	88.9	100	146.2	146.2	100	NO	NO	100	101.1	101.1
<b>Agriculture</b>	100	NE	NE	100	113.1	102.7	100	97.6	97.6	100	NO	NO	100	105.4	100.2
<b>Other</b>	100	130.1	130.1	100	NE	NE	100	NE	NE	100	NO	NO	100	130.1	130.1
<b>Total (excl. LULUCF)</b>	100	159.9	155.3	100	101.5	97.2	100	112.5	112.3	100	NE	NE	100	146.7	142.6

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Sources:** Portugal's MM submission, May 2007, with corrections provided in July 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 15 April 2008.

**Table 4. Summary of projections in 2010 compared to base year emissions under the Kyoto Protocol**

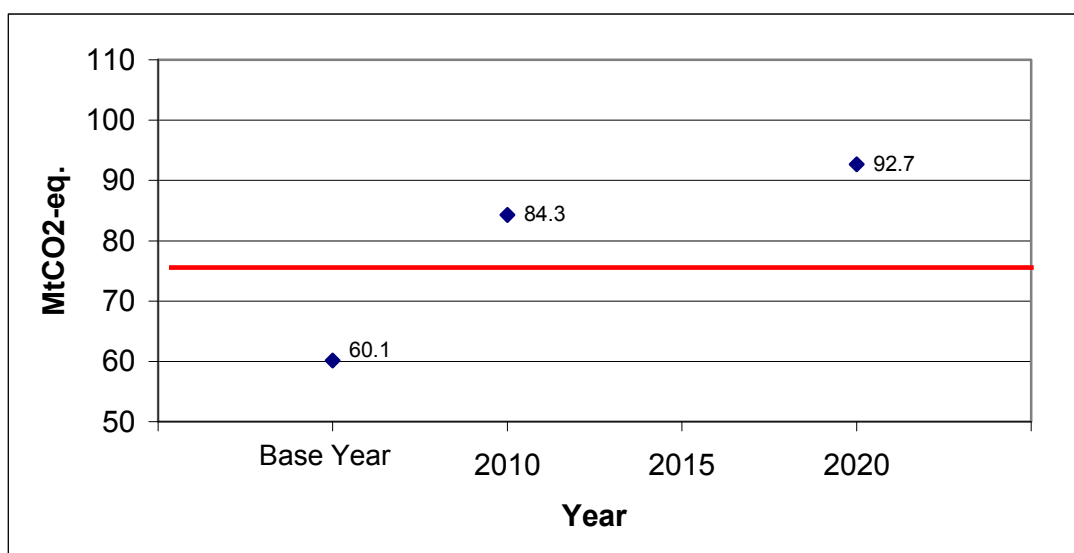
	Unit	Base-year emissions under the Kyoto Protocol	2010 projections 'with existing measures'	2010 projections 'with additional measures'
Total GHG emissions (excluding LULUCF)	Mt CO <sub>2</sub> -eq.	60.15	86.71	84.28
	Index (base-year emissions = 100)	100	144.2	140.1

**Sources:** Portugal's MM submission, May 2007, with corrections provided in July 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 15 April 2008.

In Figure 1, the same correction factor used in Table 2 has been applied to the projections for 2010 and 2020. Figure 1 presents the "with additional measures" scenario.

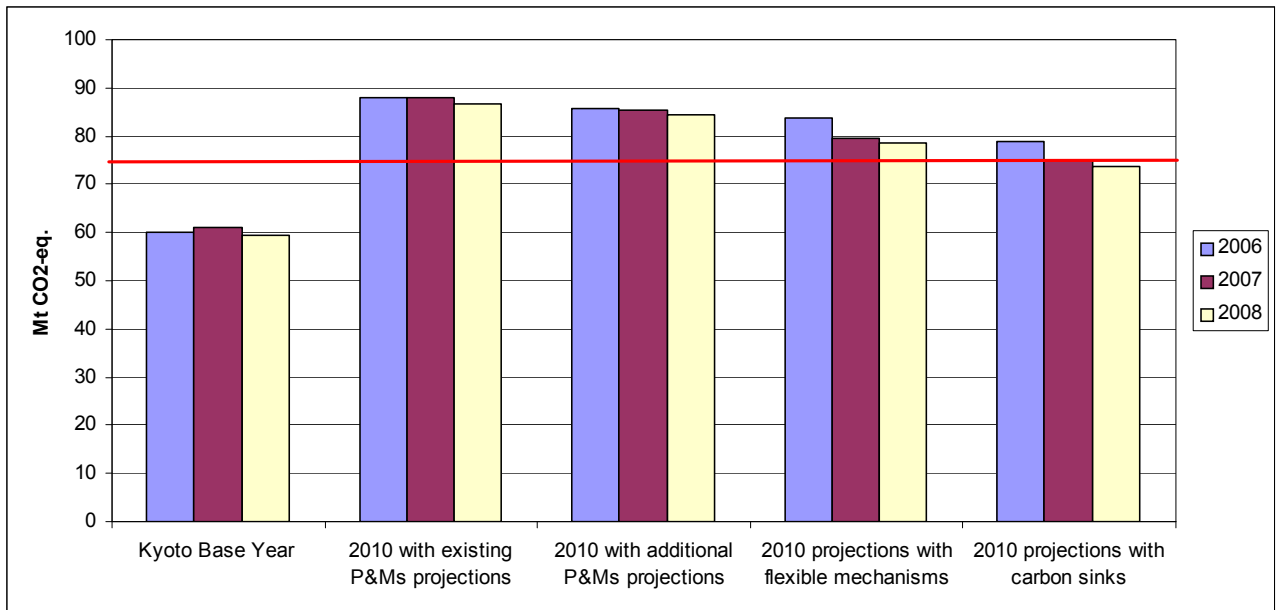
The red lines in Figure 1 and 2 indicate Portugal's Kyoto target of 76.4 Mt CO<sub>2</sub>-eq.

**Figure 1. Greenhouse gas projections in 2010, 2015 and 2020 (Mt CO<sub>2</sub>-eq.)**



**Sources:** Portugal's MM submission, May 2007, with corrections provided in July 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 15 April 2008.

**Figure 2. Comparison of 2010 projections reported in 2006, 2007 and 2008**



Source for 2006 data is Portugal's National Climate Change Programme (2006). Source for 2007 and 2008 data is Portugal's MM submission, May 2007, with corrections provided in July 2007.



### 3. CLIMATE CHANGE MITIGATION POLICIES AND MEASURES

**Table 5. Summary of the effect of policies and measures included in the 2010 projections (Mt CO<sub>2</sub>-eq.)**

	Top down calculation		Bottom Up calculation	
	Existing Measures	Planned Measures	Existing Measures	Planned Measures
<b>Energy (total, excluding transport)</b>	0.38	1.42	1.37	2.27
Energy supply	0.28	0.94	1.37	2.27
Energy – industry, construction	0.00	0.30	NE	NE
Energy – other (commercial, residential, agriculture)	0.10	0.18	NE	NE
<b>Transport (energy)</b>	0.00	0.61	1.56	1.26
<b>Industrial processes</b>	0.00	0.00	NE	0.03
<b>Waste</b>	0.00	0.00	1.26	0.00
<b>Agriculture</b>	0.00	0.43	NE	0.43
<b>Cross-sectoral</b>	0.00	0.00	3.74	1.30
<b>Total (excluding LULUCF)</b>	0.38	2.46	7.93	5.29

Note: The effects of measures detailed above are calculated firstly by determining the difference between total projections in each scenario ('top down calculation') and secondly by summing the reported effect of individual measures ('bottom up calculation').

Source: Portugal's MM submission, May 2007, with corrections provided in July 2007.

**Table 3. Detailed information on Existing Policies and measures**

Sector	Name	Type	GHG	Status	Estimated savings (ktCO <sub>2</sub> -eq.)		Costs (EUR/t)
					2010	2020	
Agriculture	MRg1. IPPC Directive (Integrated Prevention and Pollution Control)	Regulatory		implemented	NE		
Agriculture	MAG1. Evaluation and promotion of carbon sequestration in agricultural soil	Economic	CO2	adopted	500		
Agriculture	MAG2. Treatment and energy recovery of livestock waste	Economic	CH4, N2O	implemented	429	507	
Cross-cutting	Emission Trading	Economic	CO2	implemented			
Energy supply	MRe3. Solar Hot Water for Portugal Programme (AQSpP)	Economic	CH4, CO2, N2O	implemented	101	312	
Energy supply	MRe2. Energy Efficiency in Buildings	Regulatory	CH4, CO2, N2O	implemented	90	331	
Energy supply	MRe1. "E4, E-RES" Programme	Economic	CH4, CO2, N2O	implemented	280	893	
Energy supply	MAe2. Energy efficiency improvement in the energy supply systems, considering electricity generation from co-generation	Economic	CH4, CO2, N2O	implemented	200	103	
Energy supply	MAe3. Improvement in energy efficiency from the electricity demand-side	Regulatory	CH4, CO2, N2O	implemented	795	340	
Energy supply	MAe4. Promotion of electricity produced from renewable energy sources	Economic	CH4, CO2, N2O	implemented	320	0	
Energy supply	MAe5. Introduction of natural gas in the Autonomous Region of Madeira	Regulatory	CH4, CO2, N2O	implemented	5		
Energy supply	MAR1. Realignment of the tax burden on diesel fuel for heating (residential sub-sector)	Economic, Fiscal	CH4, CO2, N2O	implemented	14	53	
Energy supply	MAS1 Realignment of the tax burden on diesel fuel for heating (services sub-sector)	Economic, Fiscal	CH4, CO2, N2O	implemented	59	323	

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Sector	Name	Type	GHG	Status	Estimated savings (ktCO <sub>2</sub> -eq.)		Costs (EUR/t)
					2010	2020	
Energy supply, Industrial Processes	MAi3. Incentives to the substitution of fuel oil co-generation by natural gas generation	Economic, Fiscal	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	189	196	
Industrial Processes	MAi2. Review of the Regulation on the Management of Energy Consumption (RGCE)	Voluntary/negotiated agreement	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	32	54	
Forestry	MRf1. Programme for the Sustainable Development of Portuguese Forests (in the context of IIIFSP)	Economic	CO <sub>2</sub>	implemented	3743	4300	
Transport	MRT1. Auto-Oil Programme – Voluntary agreement with the car manufacturing associations (ACEA, JAMA, KAMA)	Voluntary/negotiated agreement	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	175		
Transport	MRT3. Construction of the South of the Tagus River Metro (MST)	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	13		
Transport	MRT2. Expansion of the Lisbon Metro (ML)- extension of the Blue Line; extension of the Yellow Line; Red Line	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	15		
Transport	MRT4. Construction of the Oporto Metro (MP)	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	30		
Transport	MRT5. Construction of the Mondego Light Metro (MLM)	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	NE		
Transport	MRT7. Enlargement of the fleet of vehicles powered by natural gas of CARRIS and of the STCP	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	1		
Transport	MRT8. Incentive Programme for the dismantling of End-of-Life Vehicles	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	9		
Transport	MRT9. Reduction of motorway speeds	Education, Regulatory	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	other	0.6		
Transport	MRT10. Biofuels Directive	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	1243		
Transport	MAt8. Railway connection to Aveiro Sea Port	Economic	CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O	implemented	40		
Transport	MAAt6. Incentive Programme for the	Economic	CH <sub>4</sub> , CO <sub>2</sub>	implemented	0.4		

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Sector	Name	Type	GHG	Status	Estimated savings (ktCO <sub>2</sub> -eq.)		Costs (EUR/t)
					2010	2020	
	dismantling of End-of-Life Vehicles (further objectives)		,N2O				
Waste	MRr1. Directive on Packaging and Packaging Waste	Economic	CH4, CO2 ,N2O	implemented	900		
Waste	MRr2. Landfill Directive	Economic	CH4	implemented	363		
Waste	MRr3. IPPC Directive (Integrated Prevention and Pollution Control)	Regulatory	CH4, CO2	implemented			

Source: Öko Institut, (accessed 16/06/2008), ECCP Policies and Measures database, <http://www.oeko.de/service/pam/index.php>

**Table 4. Detailed information on Planned Policies and measures**

Sector	Name	Type	GHG	Status	Estimated savings (ktCO <sub>2</sub> -eq.)		Costs (EUR/t)
					2010	2020	
Cross-cutting	Fluorinated gases directive		HFC, PFC, SF6	planned			
Cross-cutting	Green Procurement	Regulatory	CO2	planned			
Energy supply, Industrial Processes	MAi1. Increase in tax on industrial fuels	Economic, Fiscal	CH4, CO2, N2O	planned	78	93	
Energy supply	MAe1. Energy efficiency improvement in the electricity generation sector	Regulatory	CH4, CO2, N2O	other	146	113	
Energy supply	Renewable energies	Economic, Other	CO2	planned	Cluster value		
Energy supply	Operational start of new natural gas combined power plants	Regulatory	CO2	planned	Cluster value		
Energy supply	Substitution of coal in thermic power plants		CO2	planned	Cluster value		
Energy supply	Combined emission reduction of PT-ENS-12, PT-ENS-13, PT-ENS-14	Economic, Other, Regulatory	CO2	planned	901		
Forestry	MAf1. Promotion of carbon sink capacity of forests	Economic	CO2	other	800		
Transport	MAt3. Review of the current tax regime on private vehicles	Economic, Fiscal	CH4, CO2, N2O	planned	8		
Transport	MRT6. Supply changes (reduction in travel time) between Lisbon-Oporto; Lisbon-Castelo Branco; Lisbon-Algarve	Economic	CH4, CO2, N2O	Planned	78		
Transport	MA7. Regulation on Energy Management in the Transport Sector	Regulatory	CH4, CO2, N2O	other	18		
Transport	MA10. Logistical Platforms	Economic		other	Under evaluation		
Transport	MA1. Reduction of Taxis' service days	Regulatory	CH4, CO2, N2O	Other	4		
Transport	MA2. Enlargement of the fleet of taxi vehicles powered by natural gas	Economic	CH4, CO2, N2O	planned	0.2		

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Sector	Name	Type	GHG	Status	Estimated savings (ktCO <sub>2</sub> -eq.)		Costs (EUR/t)
					2010	2020	
Transport	MAt4. Metropolitan Authority of Lisbon Transports	Economic, Regulatory	CH4, CO2, N2O	planned	245		
Transport	MAt9. Shipping routes	Economic	CH4, CO2, N2O	other	150		
Transport	MAt11. Restructuring of supply of CP (national railway) service	Economic	CH4, CO2, N2O	planned	44		
Transport	MAt5. Metropolitan Authority of Oporto Transports	Economic, Regulatory	CH4, CO2, N2O	planned	101		
Transport	Biofuels	Fiscal	CO2	planned	655		

Source: Öko Institut, (accessed 16/06/2008), ECCP Policies and Measures database, <http://www.oeko.de/service/pam/index.php>

**Table 5. Status of national policies and measures (PAM) in relation to European common and coordinated policies and measures (CCPM)**

<b>Status</b>	<b>CCPM</b>	<b>Sector</b>
National policies and measures already in force <b>before</b> CCPM was adopted	Promotion of cogeneration 2004/8/EC	Energy supply
Existing national policies and measures <b>reinforced</b> by CCPM	Promotion of electricity from RE sources 2001/77/EC	Energy supply
	Energy performance of buildings 2002/91/EC	Energy consumption
<b>New</b> national policies and measures implemented after CCPM was adopted	Emissions trading 2003/87/EC	Cross-cutting
	Taxation of energy products 2003/96/EC	Energy supply
	Efficiency of hot water boilers 92/42/EEC	Energy consumption
	Directives on energy labelling of appliances	Energy consumption
	Eco-management & audit scheme (EMAS) EC 761/2001	Energy consumption
	Promotion of biofuels for transport 2003/30/EC	Transport
	Consumer information on cars 1999/94/EC	Transport
	Agreement with car manufacturers ACEA etc.	Transport
	Landfill directive 1999/31/EC	Waste
Status of national policy or measure <b>not reported</b>	Kyoto Protocol project mechanisms 2004/101/EC	Cross-cutting
	Integrated pollution prevention and control 96/61/EC	Cross-cutting
	Internal electricity market 2003/54/EC	Energy supply
	Internal market in natural gas 98/30/EC	Energy supply
	End-use efficiency and energy services 2006/32/EC	Energy consumption
	Energy labelling for office equipment 2422/2001	Energy consumption
	Efficiency fluorescent lighting 2000/55/EC	Energy consumption
	Integrated European railway area (COM(2002)18 final)	Transport
	Transport modal shift to rail 2001/12/EC etc.	Transport
	Marco Polo programme on freight transport	Transport
	Motor challenge, voluntary EC programme	Energy consumption
	HFCs in mobile air conditioning 2006/40/EC	Transport
	F-gas regulation (842/2006)	Industrial Process

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	Support under CAP (1782/2003)	Agriculture
	Support under CAP - amendment (1783/2003)	Agriculture
	Rural development support and CAP(2603/1999, 1698/2005 and 1290/2005)	Agriculture
	Support scheme for energy crops under CAP (795/2004)	Agriculture
	Support for rural development from EAGGF (1257/1999)	Agriculture
	Pre-accession measures for agriculture and rural development (1268/1999)	Agriculture
	Nitrates directive 91/676/EEC	Agriculture
	Packaging and packaging waste (94/62/EC, 2004/12/EC, 2005/20/EC)	Waste
	Directive on waste 2006/12/EC	Waste

Source: MS responses to the CCPMs questionnaire, 2005. Personal communications.

Portugal has implemented a number of new measures after the CCPMs especially in the energy and transport sector, while two measures were reinforced by CCPMs (promotion of renewable energy on the supply side and energy performance of buildings).

Only one measure in the energy supply sector (promotion of cogeneration) was implemented before the CCPM.

For the majority of measures it is not clear whether the national measures were implemented before or after the associated CCPMs.



## 4. METADATA

### Sources of information

Portugal's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC ('MM submission'), May 2007, and with corrections provided in July 2007.

Annual greenhouse gas inventory 1990 - 2006 and inventory report, 15 April 2008

Base-year emissions from the UNFCCC website,  
[http://unfccc.int/ghg\\_data/kp\\_data\\_unfccc/base\\_year\\_data/items/4354.php](http://unfccc.int/ghg_data/kp_data_unfccc/base_year_data/items/4354.php)

European Climate Change Programme (ECCP), Database on Policies and Measures in Europe <http://www.oeko.de/service/pam/index.php>

### Kyoto base-year emissions

Kyoto base-year emissions are presented throughout, except Table 1 which presents projections reference year emissions (see below). Kyoto base year emissions of greenhouse gases were calculated using 1990 emissions for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) and 1995 emissions for fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

Portugal's Kyoto base year includes emissions from LULUCF under Art. 3.7.

### Projections reference year emissions

Projections reference year emissions are presented in Table 1.

Projections reference year emissions are defined as projections-consistent emissions data for a given historic year, as chosen by the Member State. Inventory recalculations from year to year may mean that latest inventory data cannot be compared with projections based on older inventory data. Where such an inconsistency has arisen, MS projections have been corrected by applying the following formula:

Corrected projection = reported projections \* latest inventory total GHG emissions / Table 1 reported total GHG emissions for the same reference year

### Quality of Reporting

Member State reporting in the sources detailed above was assessed semi-qualitatively. Scoring was attributed according to the level of detail and clarity: from 0 (representing no reported) to +++ (representing very detailed and/or clear reporting). Guidance used for this assessment included the reporting requirements laid down in:

- EU legislation: Monitoring Mechanism (280/2004/EC) and Implementing Provisions (2005/166/EC)
- UNFCCC reporting guidelines for national communications available in English, French, Spanish (“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications - FCCC/CP/1999/7”)

The following tables detail reporting considered to be best practice for the purposes of this assessment.

Information provided	Example of good practice
Policy names	Clear names and description provided with unique identifier.
Objectives of policies	Good description of objectives
Types of policies	Type of policy instrument specified e.g. regulatory, fiscal
Which greenhouse gases?	Specifies which gases each PAM affects
Status of Implementation	Clear for each PAM: planned, adopted, implemented, expired
Implementation body	Clear which authorities are responsible for implementation
Quantitative assessment of emission reduction effect and cost of policies	Almost all PAMs are actually quantified. Total effect of all PAMs specified. WOM projection provided.
Interaction with other national and EU level policies	Detailed discussion and analysis of policy interactions.
Measures implementing community legislation	Report details which national policies are implementing individual pieces of EU legislation.
Arrangements for flexible mechanisms	Details arrangements for use of flexible mechanisms.
Balance between domestic action and flexible mechanisms	Regarding reductions required to meet Kyoto target, details proportion to result from domestic action and flexible mechanisms.

Category of Information	Example of good practice
Projection scenarios	"with existing measures" and "with additional measures" projections required. "without measures projection" optional.
Policies included in each projection	Clear presentation of the policies included in each projections scenario.
Expressed relative to historic reference year data	Projections are presented alongside consistent historic emissions.
Starting year	Starting year and emissions used as basis for for projections is detailed.
Split of projections	Projection split by all 6 gases (or F-gases together), all sectors and years
Presentation of results	Clear, both tables and graphs provided and/or used excel reporting template.
Description of methodologies	Description of approach, model and assumptions

Sensitivity analysis	Was an analysis carried out to determine the sensitivity of projections to variance in the input parameters? Are high medium and low scenarios presented?
Discussion of uncertainty	Is an uncertainty range for the projections provided?
Details of parameters and assumptions	Are parameters as required under Monitoring Mechanism 280/2004/EC reported?
Indicators for projections	Are indicators for projections as required under Monitoring Mechanism 280/2004/EC reported?

**Table 6. Information provided on policies and Kyoto flexible mechanisms**

Information provided	Level of information provided	Comments
Policy names	+++	Policy names and objectives were reported to a good level of detail, with the information clearly presented in a table.
Objectives of policies	+++	Good description of objectives
Types of policies	+++	Type of policy instrument specified e.g. regulatory, fiscal
Which greenhouse gases?	++	Emission projections split by gas and by sector were provided correctly
Status of Implementation	+	Clear, although not for all PAMs
Implementation body	++	Clear which authorities are responsible for implementation
Quantitative assessment of emission reduction effect and cost of policies	++	Almost all PAMs are actually quantified. Total effect of all PAMs specified.
Interaction with other national and EU level policies	+	Not provided
Measures implementing community legislation	++	Report details which national policies are implementing individual pieces of EU legislation.
Arrangements for flexible mechanisms	++	Portugal intends to make use of the flexible mechanisms in order to reduce its emissions by 5.8 MtCO <sub>2</sub> eq, which would result in emissions 2.3 MtCO <sub>2</sub> eq. greater than the Kyoto burden sharing agreement
Balance between domestic action and flexible mechanisms	o	Not discussed

**Table 7. Information provided on projections**

Category of Information	Level of information provided	Comments
Projection scenarios	++	"with existing measures" and "with additional measures"
Policies included in each projection	+	Policies not clearly presented
Expressed relative to base year	++	Provided

Starting year	+	Not specified (Base-year emissions of greenhouse gases are calculated using 1990 emissions for CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O and 1995 emissions for other gases)
Split of projections	+++	Provided by gas and sector
Presentation of results	+++	Clear, both tables and graphs provided and/or used excel reporting template.
Description of methodologies (approach, model and assumptions)	++	The type of model used was not specified, however the sources of all inputs and assumptions for all the different sub-sectors were specified in great detail.
Sensitivity analysis	+	There is no direct mention in the report of sensitivity analyses being carried out, however many of projection parameters have both High and Low scenario values (listed in Annex II).
Discussion of uncertainty	+	Again there is no mention of an uncertainty assessment, however as described above the sources of all inputs are listed in detail.
Details of parameters and assumptions	+++	Around half of the mandatory parameters are reported, typically for the years 2010, 2015 and 2020. General economic parameters not provided are population and population growth rates. Considering the energy parameters, demand is not reported for the transport sector.
Indicators for projections	++	Where indicators are reported, numerators and denominators are provided.

Policy names and objectives were reported to a good level of detail, with the information clearly presented in a table.

The effect of key policies was quantified for the majority of policies. Information was provided on the effect of individual key policies rather than overall emissions reductions due to all PAMS.

Emission projections split by gas and by sector were provided correctly.

**Table 8. Parameters for Projections**

Around half of the mandatory parameters are reported, typically for the years 2010, 2015 and 2020. General economic parameters not provided are population and population growth rates. Considering the energy parameters, demand is not reported for the transport sector.

Almost all assumptions are reported for the industry sector, except for the production index. The level of private consumption and the rate of change of floor space are missing from the buildings assumptions. Finally assumptions in the waste sector are only provided for municipal waste disposed to landfills.

No recommended parameters are provided, except for GDP growth rates split by industrial sectors in relation to 2000.

<b>1. Mandatory parameters on projections</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Units</b>
<b>Assumptions for general economic parameters</b>				
GDP (value at given years or annual growth rate and base year)	140.93	163.00	185.00	Value (Euro 2000 basis)
Population (value at given years or annual growth rate and base year)	1.02	1.03	1.04	% of 2005 value
International coal prices at given years in euro per tonne or GJ (Gigajoule)	NE	NE	NE	NE
International oil prices at given years in euro per barrel or GJ	NE	NE	NE	NE
International gas prices at given years in euro per m <sup>3</sup> or GJ	NE	NE	NE	NE
<b>Assumptions for the energy sector</b>				
Total gross inland consumption (PJ) (split by oil, gas, coal, renewables, nuclear, other)	1,082.60	1,182.50	1,263.80	Petajoule (PJ)
6a. - Oil (fossil)	547.60	547.50	573.90	Petajoule (PJ)
6b. - Gas (fossil)	178.90	267.80	355.80	Petajoule (PJ)
6c. - coal	142.50	142.50	95.60	Petajoule (PJ)
6d. - Renewables	213.60	224.70	238.50	Petajoule (PJ)
6e. - Nuclear (IEA definition for energy calc.)	0.00	0.00	0.00	Petajoule (PJ)
6f. Net Electricity import (-+)	9.00	0.00	0.00	Petajoule (PJ)
6g. - Other	NE	NE	NE	Petajoule (PJ)
Total electricity production by fuel type (oil, gas, coal, renewables, nuclear, other)	186.30	224.70	261.30	Petajoule (PJ)
7. - Oil (fossil)	12.70	4.00	5.00	Petajoule (PJ)
8. - Gas (fossil)	38.50	75.80	115.40	Petajoule (PJ)
9. - coal	50.40	50.40	33.50	Petajoule (PJ)
10. - Renewable	84.70	94.50	107.40	Petajoule (PJ)

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11. Nuclear (IEA definition for energy calc.)	0.00	0.00	0.00	Petajoule (PJ)
12. - Other Please Specify in Column I	NE	NE	NE	
Energy demand by sector split by fuel (delivered)	661.80	787.20	779.90	Petajoule (PJ)
13. Energy Industries	429.10	488.70	531.70	Petajoule (PJ)
13a. Oil (fossil)	59.40	35.90	37.60	Petajoule (PJ)
13b. Gas (fossil)	104.00	177.10	252.30	Petajoule (PJ)
13c. coal	139.60	139.60	92.80	Petajoule (PJ)
13d. Renewables	126.10	136.10	149.00	Petajoule (PJ)
13e. -- Nuclear (IEA definition for energy calc.)	NE	NE	NE	Petajoule (PJ)
13e. - Other Please Specify in Column I 2	1.40	1.40	1.40	Petajoule (PJ)
14. Industry	143.20	152.30	159.80	Petajoule (PJ)
14a. Oil (fossil)	66.10	64.40	63.60	Petajoule (PJ)
14b. Gas (fossil)	52.50	64.00	73.20	Petajoule (PJ)
14c. coal	2.90	2.90	2.80	Petajoule (PJ)
14d. Renewables	21.70	21.00	20.20	Petajoule (PJ)
14e. - Other Please Specify in Column I 2	124.40	134.30	140.90	Petajoule (PJ)
15. Commercial (Tertiary)	0.00	57.00	0.00	Petajoule (PJ)
15a. Oil (fossil)	52.7	57.00	62.1	Petajoule (PJ)
15b. Gas (fossil)	8.4	10.5	13.1	Petajoule (PJ)
15c. coal	NE	NE	NE	Petajoule (PJ)
15d. Renewables	0.7	0.9	1.2	Petajoule (PJ)
15e. - Other Please Specify in Column I	0.25	0.31	0.39	Petajoule (PJ)
16. Residential	89.50	89.20	88.40	Petajoule (PJ)
16a. Oil (fossil)	28.50	26.40	25.00	Petajoule (PJ)
16b. Gas (fossil)	12.60	14.10	14.50	Petajoule (PJ)
16c. coal	0.00	0.00	0.00	Petajoule (PJ)
16d. Renewables	48.40	48.70	48.90	Petajoule (PJ)
16e. - Other Please Specify in Column I	NE	NE	NE	Petajoule (PJ)
17. Transport	0.00	0.00	0.00	Petajoule (PJ)
17a. Oil (fossil)	NE	NE	NE	Petajoule (PJ)
17b. Gas (fossil)	NE	NE	NE	Petajoule (PJ)
17d. Renewables	NE	NE	NE	Petajoule

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				(PJ)
Assumptions on weather parameters, especially heating or cooling degree days	NE	NE	NE	NE
<b>Assumptions for the industry sector</b>				
<i>For Member States using macroeconomic models:</i>				
The share of the industrial sector in GDP and growth rate	19.60	18.80	17.70	Value (Euro 2000 basis)
<i>For Member States using other models:</i>				
The production index for industrial sector	NE	NE	NE	
<b>Assumptions for the transport sector</b>				
<i>For Member States using macroeconomic models:</i>				
The growth of transport relative to GDP	NE	NE	NE	
<i>For Member States using other models:</i>				
The growth of passenger person kilometres	120,018.00	134,868.00	146,265.00	Million passenger km
The growth of freight tonne kilometres	25,980.00	29,412.00	31,028.00	Million tonne km
<b>Assumptions for buildings (in residential and commercial or tertiary sector)</b>				
<i>For Member States using macroeconomic models:</i>				
The level of private consumption (excluding private transport)	NE	NE	NE	Value (Euro 2000 basis)
The share of the tertiary sector in GDP and the growth rate	63.00	63.90	64.70	Value (Euro 2000 basis)
<i>For Member States using other models:</i>				
The rate of change of floor space for tertiary buildings and dwellings				
The number of dwellings and number of employees in the tertiary sector	3,950.00	4,130.00	4,300.00	1000 dwellings
<b>Assumptions in the agriculture sector</b>				
<i>For Member States using macroeconomic models:</i>				
The share of the agriculture sector in GDP and relative growth	NE	NE	NE	%
<i>For Member States using other models:</i>				
Livestock numbers by animal type (for enteric fermentation beef, cows, sheep, for manure management pigs and poultry)	1,484.00	1,415.00	1,347.00	1000 heads
The area of crops by crop type:	1,176,497.00	1,146,045.00	1,131,983.00	Hectares
Vineyard	0	0	0	Hectares
Fresh Fruit	220,286.00	220,286.00	220,286.00	Hectares
Dry Fruit	82,570.00	85,632.00	88,694.00	Hectares
Olive grove	73,448.00	73,997.00	74,545.00	Hectares
Wheat	404,474.00	419,474.00	434,474.00	Hectares
Corn	101,967.00	76,856.00	51,745.00	Hectares
Triticale	95,125.00	89,841.00	84,556.00	Hectares
Rice	11,926.00	9,575.00	7,224.00	Hectares
Oats	23,724.00	25,319.00	26,914.00	Hectares
Barley	58,852.00	57,330.00	55,807.00	Hectares
Potato	19,475.00	19,475.00	19,475.00	Hectares
Tomato	41,273.00	41,273.00	41,273.00	Hectares
Hop	12,925.00	12,925.00	12,925.00	Hectares
	0.00	0.00	0.00	Hectares

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Tobacco	0.00	0.00	0.00	Hectares
Emissions factors by type of livestock for enteric fermentation and manure management (t)				
40. enteric fermentation Dairy cattle	2.37	2.37	2.37	Tonnes CO2e /Thousand Heads
41. enteric fermentation Non-dairy cattle	1.22	1.22	1.22	Tonnes CO2e /Thousand Heads
42. enteric fermentation sheep	0.21	0.21	0.21	Tonnes CO2e /Thousand Heads
43. manure management Dairy cattle	0.06	0.06	0.06	Tonnes CO2e /Thousand Heads
44. manure management Non-dairy cattle	0.04	0.04	0.04	Tonnes CO2e /Thousand Heads
45. manure management sheep	0.00	0.00	0.00	Tonnes CO2e /Thousand Heads
46. manure management Swine	0.97	0.97	0.97	Tonnes CO2e /Thousand Heads
47. manure management Poultry	0.00	0.00	0.00	Tonnes CO2e /Thousand Heads
<b>Assumptions in the waste sector</b>				
Waste generation per head of population or tonnes of municipal solid waste		NE		kt
The organic fractions of municipal solid waste	NE	NE	NE	%
Municipal solid waste disposed to landfills,	1,070.00	NE	615.00	Kt
<b>Assumptions in the forestry sector</b>				
Forest definitions				Text.
Areas of:				
managed forests	1,136,000.0 0	1,164,000.0 0	1,185,000.0 0	Hectares
unmanaged forests	2,224,000.0 0	2,280,000.0 0	2,320,000.0 0	Hectares

<b>2. Recommended parameters on projections</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Units</b>
					Annual growth rate
<b>Assumptions for general economic parameters</b>	1.1	3	2.9	2.64	
GDP growth rates split by industrial sectors in relation to 2000	NE	NE	NE	NE	NE
Comparison projected data with official forecasts	NE	NE	NE	NE	NE
<b>Assumptions for the energy sector</b>	NE	NE	NE	NE	NE
National coal, oil and gas energy prices per sector (including taxes)	NE	NE	NE	NE	NE
National electricity prices per sector as above (may be model output)	NE	NE	NE	NE	NE
Total production of district heating by fuel type	NE	NE	NE	NE	NE
<b>Assumptions for the industry sector</b>	NE	NE	NE	NE	NE
Assumptions fluorinated gases:	NE	NE	NE	NE	NE
Aluminium production and emissions factors	NE	NE	NE	NE	NE
Magnesium production and emissions factors	NE	NE	NE	NE	NE
Foam production and emissions factors	NE	NE	NE	NE	NE
Stock of refrigerant and leakage rates	NE	NE	NE	NE	NE
<i>For Member States using macroeconomic models:</i>	NE	NE	NE	NE	NE
Share of GDP for different sectors and growth rates	NE	NE	NE	NE	NE



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Rate of improvement of energy intensity (1990 = 100)	NE	NE	NE	NE	NE
<i>For Member States using other models:</i>	NE	NE	NE	NE	NE
Index of production for different sectors	NE	NE	NE	NE	NE
Rate of improvement or index of energy efficiency	NE	NE	NE	NE	NE
<b>Assumptions for buildings (in residential and commercial / tertiary sector)</b>	NE	NE	NE	NE	NE
<i>For Member States using macroeconomic models:</i>	NE	NE	NE	NE	NE
Share of tertiary and household sectors in GDP	NE	NE	NE	NE	NE
Rate of improvement of energy intensity	NE	NE	NE	NE	NE
<i>For Member States using other models:</i>	NE	NE	NE	NE	NE
Number of households	NE	NE	NE	NE	NE
Number of new buildings	NE	NE	NE	NE	NE
Rate of improvement of energy efficiency (1990 = 100)	NE	NE	NE	NE	NE
<b>Assumptions for the transport sector</b>	NE	NE	NE	NE	NE
<i>For Member States using econometric models:</i>	NE	NE	NE	NE	NE
Growth of transport relative to GDP split by passenger and freight	NE	NE	NE	NE	NE
Improvements in energy efficiency split by vehicle type	NE	NE	NE	NE	NE
Improvements in energy efficiency split by vehicle type, whole fleet/new cars	NE	NE	NE	NE	NE
Rate of change of modal split (passenger and freight)	NE	NE	NE	NE	NE
Growth of passenger road kilometres	NE	NE	NE	NE	NE
Growth of passenger rail kilometres	NE	NE	NE	NE	NE
Growth of passenger aviation kilometres	NE	NE	NE	NE	NE
Growth of freight tonne kilometres on road	NE	NE	NE	NE	NE
Growth of freight tonne kilometres by rail	NE	NE	NE	NE	NE
Growth of freight tonne kilometres by navigation	NE	NE	NE	NE	NE
<b>Assumptions for the agriculture sector</b>	NE	NE	NE	NE	NE
<i>For Member States using econometric models:</i>	NE	NE	NE	NE	NE
Agricultural trade (import/export)	NE	NE	NE	NE	NE
Domestic consumption (e.g. milk/beef consumption)	NE	NE	NE	NE	NE
<i>For Member States using other models:</i>	NE	NE	NE	NE	NE
Development of area of crops, grassland, arable, set-aside, conversion to forests etc	NE	NE	NE	NE	NE
Macroeconomic assumptions behind projections of agricultural activity	NE	NE	NE	NE	NE
Description of livestock (e.g. by nutrient balance, output/animal production, milk production)	NE	NE	NE	NE	NE
Development of farming types (e.g. intensive conventional, organic farming)	NE	NE	NE	NE	NE
Distribution of housing/grazing systems and housing/grazing period	NE	NE	NE	NE	NE
Parameters of fertiliser regime:	NE	NE	NE	NE	NE
Details of fertiliser use (type of fertiliser, timing of application, inorganic/organic ratio)	NE	NE	NE	NE	NE
Volatilisation rate of ammonia, following spreading of manure on the soil	NE	NE	NE	NE	NE
Efficiency of manure use	NE	NE	NE	NE	NE
Parameters of manure management system:	NE	NE	NE	NE	NE
Distribution of storage facilities (e.g. with or without cover):	NE	NE	NE	NE	NE
Nitrogen excretion rate of manures	NE	NE	NE	NE	NE
Methods of application of manure	NE	NE	NE	NE	NE
Extent of introduction of control measures (storage systems, manure application), use of best available techniques	NE	NE	NE	NE	NE
Parameters related to nitrous oxide emissions from	NE	NE	NE	NE	NE

agricultural soils					
Amount of manure treatment	NE	NE	NE	NE	NE