Turkey

Contents

Figures and tables

1. **SOURCES OF INFORMATION**

Turkey's First National Communication under the United Nations Framework Convention on Climate Change, 2007 (hereinafter 1st NC)

Base-year emissions

Turkey is a Party to the United Nations Framework Convention on Climate Change; however, it is not a Party to the Kyoto Protocol. Therefore, Turkey <u>does not</u> have a target for GHG emission reductions. Decision 26 of the 7th Conference of the Parties removed Turkey from Annex II of the Convention and invited parties to the Convention to "recognize the special circumstances of Turkey, which place Turkey, after becoming a Party, in a situation different from that of other Parties included in Annex I to the Convention".

For the purposes of the EEA's *Greenhouse gas emission trends and projections in Europe 2007* report, historic emissions data for 1990 (1996 for F-gases) is used as 'reference year' data, against which projections can be compared in the absence of 'base year' data. Historic and projected GHG emissions are provided in Turkey's 1st NC.

Emissions in the reference year were **170.439 Mt of CO_2 eq.** for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases. These emissions exclude emissions from LULUCF under Art. 3.7 of the Kyoto Protocol.

2. SUMMARY

TURKEY

|	
Emissions 1990	170.1 Mt
Emissions 2005	312.9 Mt
Emissions 1990 (for projections)	170.4 Mt
Projections with existing measures	340.3 Mt.
No projections with additional measures	n.a.
No Kyoto target	n.a.
Change 1990 to 2005	+ 84.0 %
Change 2004–05	+ 6.5 %
Change base year to 2010 with existing measures	+99.7 %
No projections with additional measures	n.a.
Distance to linear target path 2005	n.a.
Use of Kyoto mechanisms	n.a.
Sinks (Articles 3.3 and 3.4)	n.a.
Emissions in 1990 (Article 3.7)	n.a.

GHG emissions
(Base-year level = 100)
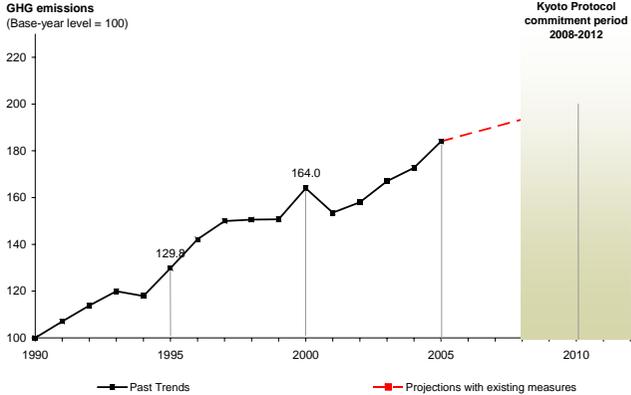
Past emissions: Turkey's GHG emissions were 84.0 % above base-year levels and 6.5 % above those of 2004 in 2005. Emission in all sectors increased., most for sector waste. The main factor for increasing emissions with regard to 1990 was increased fuel consumption in energy industries and transport. Increasing emissions between 2003 and 2004 were mainly due to decreasing fuel consumption in energy industries.

Emission projections: Turkey does not have a Kyoto target.. The 'with existing measures' scenario projects a further increase to 100 % above base year levels by 2010.

Emissions by sectors (2005)
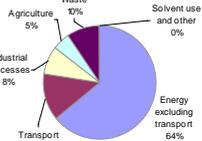
Energy excluding transport
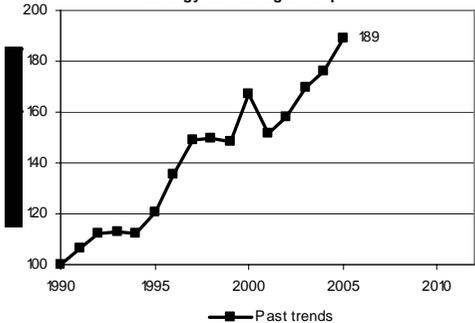
Transport

Industrial processes

Agriculture

Waste

3. COMPLETENESS OF REPORTING

Turkey provided information on policies and measures through its 1st NC. The implementation status of some policies and measures is provided. The 1st NC considers not only policies and measures related to Climate Change mitigation and adaptation but also policies and measures from other fields that have a climate change component or an ancillary effect on GHG emissions. The information contained in the 1st NC is extensive and thorough. The level of information is summarized in Table 1.
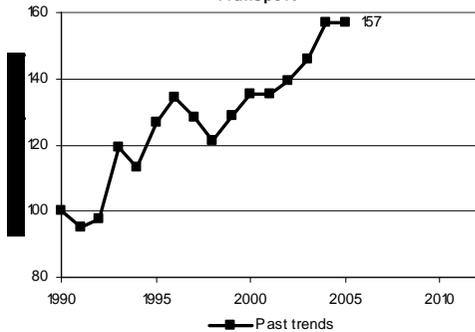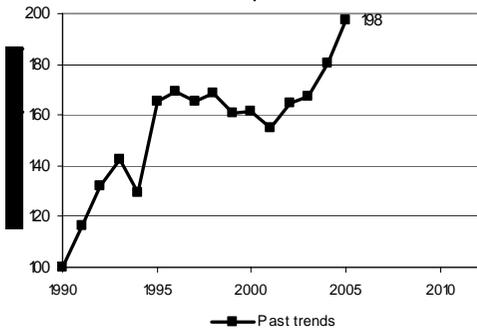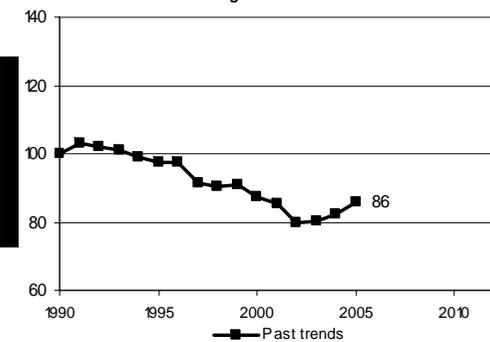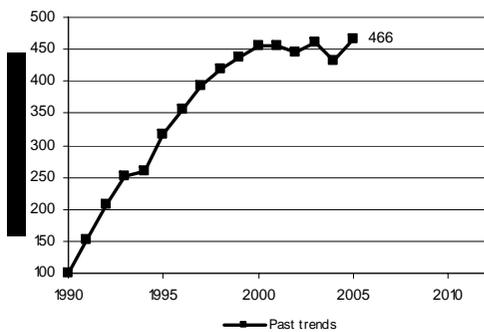
Table 1: Information provided on policies and measures

Information provided	Level of information provided	Comments
Policy names	+++	
Objectives of policies	++	Described in the text and in overview tables
Which greenhouse gases?	++	CO_2, CH_4, N_2O
Status of Implementation	++	Status of implementation is given for some policies and measures
Implementation body specified	+	Implementation bodies are specified for clusters of policies and measures
Quantitative assessment of implementation	o	Assessment is not provided
Interaction with other policies and measures discussed	++	Relationship with other policies under other Conventions is discussed

Projections are presented for 6 sectors (electric sector, industry, transport, residential sector, supply sector, and agriculture), which are not consistent with the IPCC template. Projections are not disaggregated by sub-sectors. Projections are presented for the gases CO_2, CH_4 and N_2O and are split by sector. The measurement units used are "metric tonnes", not tonnes of CO_2 equivalent.

Table 2: Information provided on projections

Category of Information	Level of information provided	Comments
Scenarios considered	++	With Measures and Without Measures projections are provided. For the energy sector there are two different energy demand scenarios.
Expressed relative to base year		N/A
Starting year	+++	2003
Split of projections	++	6sectors for CO_2, CH_4, N_2O
Presentation of results	+++	The results are presented in the form of graphs and sometimes in the form of numerical tables.
Description of model (level of detail, approach and assumptions)	++	Information on the models used is provided. Modules, assumptions and key inputs of the model are described.
Sensitivity analysis (key inputs to model /	+	List of important uncertain factors and

high, central and low projections scenarios / robustness of model)		correlation.
Discussion of uncertainty	+	Drivers of uncertainty are provided in the energy sector.
Details of parameters and assumptions	+	A list of parameters is provided in the energy sector

4. ASSESSMENT OF POLICIES AND MEASURES

Table 4 provides an overview over all policies and measures included in the projections, as reported by Turkey in their 1st NC. It lists Policies and Measures under WM scenario.

Table 3 presents the effects of policies and measures in the sectors considered (electricity sector, transport, industry, residential sector, agriculture, and supply side) under the With Measures scenario. The overall effect of implemented policies and measures under WM scenario are estimated with reference to a hypothetical scenario in which no policies are implemented for the year 2010 (WOM scenario).

Table 3: Summary of the effect of policies and measures included in the 2010 projections (Mt CO_2–eq.)

	With measures	With additional measures
Electricity	1.83	NE
Industry	-0.006	NE
Transport	2.23	NE
Residential	0.80	NE
Agriculture	0.0	NE
Supply	0.40	NE
Total	4.9	NE

Note: Industry sector only covers the emissions generated from fuel combustion used in this sector. This issue is also valid for transportation sector.

Table 4: Detailed information on policies and measures

Policies and measures in the "with measures" projection

Sector	Name	Objective	GHG	Type	Status	Implementing body
Cross-cutting	Law of Accession of Turkey to the UNFCCC	Law 4990	CH_4, CO_2 N_2O, HFC, PFC, SF_6	Policy	May 2004	National Government
Energy	Promotion of wide use of natural gas	Emission reduction	CO_2	Policy	2001	MENR
Energy	Natural gas substitution: policy in Industry	Emission reduction	CO_2	Policy	2001	MENR
Energy	Rehabilitation of existing coal fired power plants	Emission reduction	CO_2	Policy	1998	MENR
Energy	Construction of new nuclear power unit	Meeting the increased demand for electricity	CO_2	Economic Regulatory	2015	MENR
Energy	Energy Conservation Programme	Reduced energy consumption	CO_2	Regulatory Economic Technical	1992	MENR. MoIT
Energy	Labelling household appliances	Energy efficiency	CO_2	Economic Regulatory	2002	MoIT, MENR
Energy	Labelling Project-CEF	Project Proposal	CO_2	Efficiency	2006	EIE-UNDP
Energy	Building Insulation Regulations	EIE is in charge	CO_2	Regulatory, economic	2000	MENR
Energy	Building Code Project-GEF	Project Proposal	CO_2	Efficiency	2006	EIE-UNDP
Energy	Energy Audits	Energy efficiency	CO_2	Efficiency	1998	EIE
Energy	Building Insulation Regulations	Energy efficiency	CO_2	Regulatory	2000	EIE
Energy	SME Strategy and Action Plan (Decree No. 2000/1822)	Productivity	CO_2	Policy	2004	MoIT, MENR
Energy	Market liberalization Privatisation Law No. 4046 (Amended by Law 5496)	Efficient production, emission reduction	CO_2	Economy	2002 2004	EMRA
Energy	Natural Gas Market Law 4646 Privatization of gas	Better service	CO_2	Economy	2001	EMRA
Energy	Law on RES No. 5346 Promoting Renewable Energy Sources	Reduced GHG emissions	CO_2	Policy	2005	MoIT, MENR

Sector	Name	Objective	GHG	Type	Status	Implementing body
Transport	Transportation Master Plan preparation			Policy	2005	
Transport	Promotion of vehicles using unleaded gasoline equipped with catalytic converters		CO_2	Policy	2001	
Transport	Promotion of taxi cabs using LPG	Law 5307	CO_2	Fiscal Information	2005	
Transport	Promotion of diesel fuel	Law 5015	CO_2	Fiscal	2005	
Transport	Quality increase of fuel used in heating sector and transportation		CO_2	Regulatory	2005	
Transport	Promotion of the natural gas in public buses		CO_2	Fiscal		Municipalities
Transport	Expansion of urban rail transit network	Law 3348	CO_2	Policy		
Agriculture	Agricultural Strategy paper	Promotion of environmentally sound agricultural production	CO_2 CH4, N2O	Economic	2006-2010	MARA
Agriculture	Livestock Decree 8503	Improving biodiversity	CH4	Regulatory		MARA
Waste	Harmonization of national and European waste legislation	Transposition of EU Directive stipulations into the national legislation	CO2 CH4 N2O	Policy, Regulatory		

Source: 1st NC

Policies and measures in the "with additional measures" projection

No policies and measures reported in the "with additional measures" projection.

5. EVALUATION OF PROJECTIONS

Table 5 provides the results of the projections for the year 2010 for the reference year and the WM scenarios. The results are aggregated by greenhouse gas. The same information aggregated by sectors is presented in the Tables 6 and 7. Please note that the figures in Table 7 are indicative since there is no CO_2 projection data for the Supply sector, Agriculture and Waste. Figure 1 demonstrates the share of greenhouse gas emissions by sector for the year 2010 according to the WM scenario projections.

In the Table 9 the total emissions of the projections for the years 2010, 2015 and 2020 for the WM variant are summarised.

Table 5: Summary of projections by gas in 2010 (Mt CO_2–eq.)

	Reference Year	With measures	With additional measures
Carbon dioxide (excl. LULUCF)	139.594	322.18	NE
Methane	29.207	6.851	NE
Nitrous oxide	1.264	1.294	NE
F-gases	0.374	NE	NE
Total (excl. LULUCF)	170.439	340.325	NE
% change relative to Reference Year (excl. LULUCF)		0.997	NE

Reference year is 1990 for C02, CH4, and N2O. Reference year for F-gases is 1996.
Source: 1st NC (Table 3.2 and Table 5.6)

Table 6: Summary of projections (6 gas basket) by sector in 2010 (Mt CO_2–eq.)

	Reference Year	With measures	% change relative to base year
Electric sector	132.128	110.211	-17%
Transport (energy)	NE	107.653	NE
Industrial processes	13.444	60.706	352%
Residential Sector	NE	45.963	NE
Agriculture	18.473	12.055	-35%
Waste	6.386	NE	NE
Supply sector	NE	3.737	NE
Total (excl. LULUCF)	170.439	340.325	100%

Source: 1st NC (Table 3.3 and Table 5.6)

Table 7: Summary of projections by sector and by gas in 2010 (Mt of CO_2eq)

	Carbon dioxide			Methane			Nitrous oxide			F gases
	BY	WM	WAM	BY	WM	WAM	BY	WM	WAM	BY
Electric	NE	109.84	NE	NE	0.03276	NE	NE	0.33821	NE	NE
Transport (energy)	NE	107.32	NE	NE	0.15414	NE	NE	0.17856	NE	NE
Industrial processes	NE	60.12	NE	NE	0.1995	NE	NE	0.38657	NE	0.374
Residential	NE	42.91	NE	NE	2.69325	NE	NE	0.35991	NE	NE
Agriculture	NE	11.99	NE	NE	0.03465	NE	NE	0.03069	NE	NE
Supply	NE	NE	NE	NE	3.73674	NE	NE	NE	NE	NE
Total (excl. LULUCF)	139.594	332.18	NE	29.207	6.85104	NE	1.264	1.29394	NE	0.374

Source: 1ˢᵗ NC (Table 5.6)

Figure 1: Share by sector of 2010 greenhouse gas emissions according to the "With Measures" projections
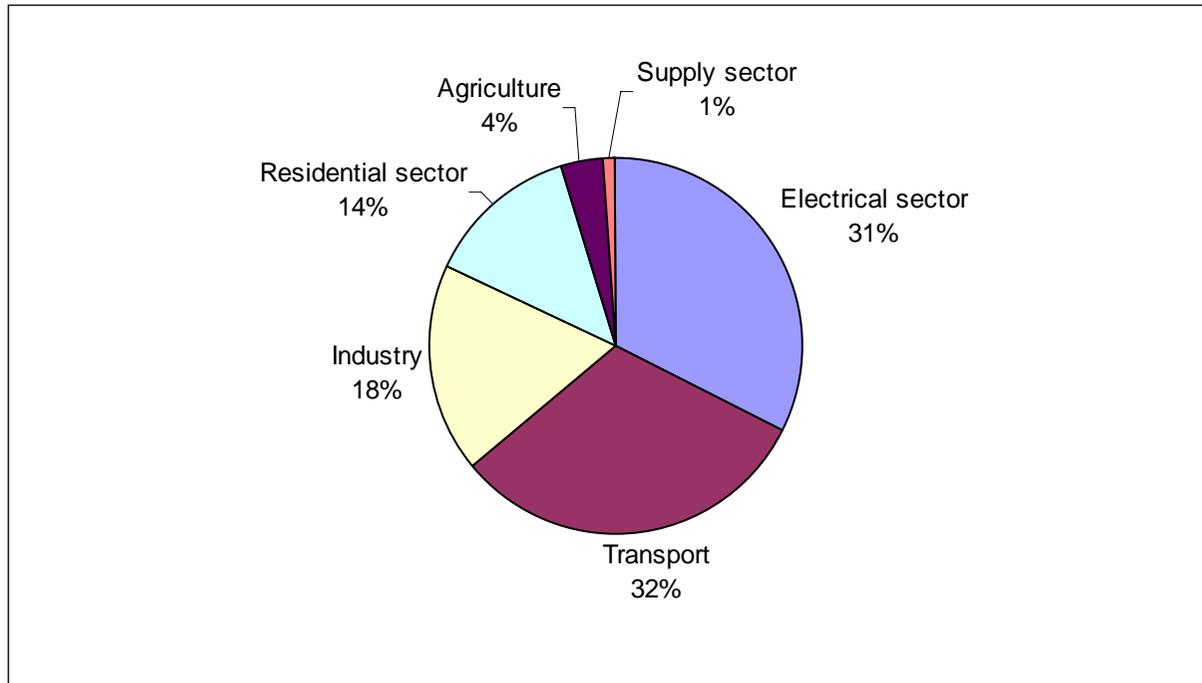
Table 8:Summary of projections (6 gas basket) in 2010, 2015 and 2020 for the "With additional measures" projections (Mt CO_2–eq.)

	Reference Year*	2010**	2010, % of Reference Year level	2015**	2015, % of Reference Year level	2020**	2020, % of Reference Year level
Total (excluding LULUCF)	170.439	340.325	199.7%	423.749	248.6%	539.022	316.3%

*Reference Year for CO_2, CH_4 and N_2O is 1990. The Reference Year for the F-gases is 1996.
** 2010, 2015 and 2020 projections exclude F-gases
Source: 1st NC (Table 3.3 and Table 5.6)

Table 9: Assessment of the target (6 gas basket), with a comparison of 2010 projections in 2005, 2006 and 2007 national reports

	2010 projections from 2005	2010 projections from 2006	2010 projections from 2007*	2010 projections from 2007, % of Reference Year level
Reference Year emissions used for projections	NE	NE	170.4	100%
Kyoto Commitment/burden sharing	NA	NA	NA	NA
With existing P&Ms projections	NE	NE	340.3	200.1%
Gap (-ve means overachievement of target)	NA	NA	NA	NA
With additional P&Ms projections	NE	NE	NE	NE
Remaining gap	NA	NA	NA	NA
Effect of flexible mechanisms	NE	NE	NE	NE
Remaining gap (with use of flexible mechanisms)	NA	NA	NA	NA

Source: 1st NC
Above table excludes LULUCF

Since Turkey is not a Party to the Protocol, it is not eligible to implement CDM.

Table 10 Comparison with projections for the trading sector (EU ETS)

Since Turkey is at the moment a Candidate country EU ETS is not applicable for the country.

6. DESCRIPTION OF MODELLING APPROACH

A description of the model used is provided for the energy sector. There are also descriptions for the models used for the transport and industrial sectors. However, future emissions were assessed based on the energy sector model.

The main software for scrutinizing the interrelationships between macroeconomic development, sectoral development (including the energy sector), and GHG emissions projecting is the **ENPEP package**. The following program modules of ENPEP were used: MAED, BALANCE, WASP and IMPACTS.

The MAED module was used for projection of energy demand in the country as well as for the demand of electricity.

The BALANCE module is a non-linear equilibrium model that matches the demand for energy with available resources and technologies. The purpose of the BALANCE module is to determine the equilibrium of the supply/demand balance for the study period. Its basic part is the energy network.

The WASP module (Vienna Automatic System Planning Package) is used to determine the least-cost generating system expansion, which adequately meets the demand for electrical power, subject to a number of user-defined constraints. The present value of total system costs, including the capital cost of new generating units, fixed and variable operation and maintenance (O&M) costs, fuel costs, and costs of undelivered energy, is used to measure the economic performance of alternative expansion plans.

The VALORAGUA model has been used to evaluate the hydropower share of the whole electricity supply system.

The time horizon of the projections is 2005-2020 with the starting year 2003.

Key inputs and the driving forces of the economic development, and hence, of the GHG emission patterns are discussed. However, there is no discussion about uncertainties or robustness of the model.

More information on the modelling parameters and indicators are provided in the table below and in the Table 12.

7. PROJECTION INDICATOR REPORTING

The Table 12 shows the projection indicators for monitoring and evaluating progress with regard to policies and measures as well as the given numerators and denominators. Information has been provided mainly for the projections of the year 2005. Projections for some indicators are shown for the years 2005, 2010, 2015, and 2020.

8. REPORTING OF PARAMETERS ON PROJECTIONS

The limited number of parameters for projection is provided in the Table 10. For most parameters, information is provided in absolute values for the years 2010 and 2020; in some cases relative data is provided.

Table 11. Indicators for projections to monitor and evaluate progress with policies and measures (2005/166/EC) Annex III

These data are not provided.

Table 12 List of Parameters on Projections

1. Mandatory parameters on projections	2005	2010	2015	2020
Assumptions for general economic parameters				
GDP (GDP, growth rate))		5.50%	6.40%	5.40%
Population (million people)	73.101	78.459	83.34	87.759
International coal prices at given years in euro per tonne or GJ (Gigajoule)				
International oil prices at given years in euro per barrel or GJ				
International gas prices EUR (2000)/m^3				
Assumptions for the energy sector				
Total gross inland consumption (mtoe) (split by oil,gas,coal,renewables,nuclear,other)	73.4	98.762	125.364	160.3
Oil (fossil) mtoe	25.1			52.32
Gas (fossil) mtoe	8.2			21.73
Hard Coal and coke (mtoe)	10.1			34.43
Lignite and asphaltite (mtoe)	3.3			3.85
Renewable energy sources mtoe	6.9			9.3
Nuclear (IEA definition of energy calc) mtoe				
Net electricity import PJ	12.1			38.28
Other mtoe				
Total electricity production by fuel type (TWh)				544
Oil (fossil) TWh				19.4
Gas (fossil) TWh	97.3			198.8
Coal TWh	44.6			135.9
Renewable TWh				118.3
Nuclear (IEA definition for energy calc. TWh				
Other TWh				
Energy demand by sector	73.4	98.762	125.364	160.3
Industry (including energy industries, mtoe)				
Non-energy				
Residential	21.6	27.64	35.44	42.74
Agriculture				
Transport				
Own-use				

Source: 1st NC

9. COUNTRY CONCLUSIONS

Turkey is an Annex I Party to the UNFCCC. The 7th Conference of Parties (2001) recognized special circumstances of the country. As such, under "common but differentiated responsibilities" Turkey does not have an emission reduction target. The GHG emissions of the country are projected to increase almost threefold in the coming years due to high economic growth and increased energy demand. Turkey expects these specific circumstances to be recognised and treated accordingly. However, it is also important to note that Turkey is promoting new policies and undertaking measures to ensure energy is supplied in the most sustainable way possible.