

MITIGATION OPTIONS FOR TURKEY IN THE POST-2012 PERIOD, BASED ON THE ANALYSIS OF EMISSIONS OF GREENHOUSE GASES IN THE PERIOD 1990-2004

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Overview

Adopted at the Earth Summit in Rio in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) is recognized as the most comprehensive international agreement that aims to control, stabilize and decrease the emissions of greenhouse gases due to human activities. Article 4 of the UNFCCC defines Annex-I to the Convention and gives specific roles and responsibilities to countries listed in this particular Annex. In a nutshell, Annex I countries are defined as countries that are expected take the lead in adopting national policies and measures on the mitigation of climate change. Pursuant to Decision 3/CP.1 of the 1st Conference of the Parties (COP1) in 1995, Annex-I Parties are invited to submit as of 15th of April each year their inventory of greenhouse gases which includes emissions by sources and removals by sinks.

Turkey acceded to the UNFCCC in 24 May 2004, pursuant to the Decision 26/CP.7 of the COP7 in 2001, which places Turkey in Annex-I, that is in a different situation than other Annex-I Parties to the UNFCCC. Turkey's name is not listed in Annex-B of the Kyoto Protocol (KP) which implies that Turkey has not adopted any target for limitation or decrease of emissions of greenhouse gases in the period 2008-2012, compared to 1990 levels. Within the scope of the commitments of the country as an Annex-I Party, Turkey submitted her first national communication and inventory of greenhouse gases in early 2007, which includes data for the period 1990-2004.

Referring to the fact that the information provided in inventories enable decision makers to take informed actions on developing future policies and measures related to the control of emissions of greenhouse gases, it is also essential for Turkey to have an in-depth understanding of the emissions of greenhouse gases in the past.

This paper aims to present a comprehensive analysis of the inventory of the greenhouse gas emissions of Turkey in the period 1990-2004. The research and analysis have been conducted within the scope of the project entitled "Promoting Climate Change Policies in Turkey", funded by the LIFE Third Countries Fund of the European Commission, co-financed by the Italian Ministry of for the Environment and Territory, implemented by Regional Environmental Center Country Office Turkey (REC Turkey) in collaboration with the Turkish Ministry of Environment and Forestry and the Greek consultant Exergia.

Methods

The analysis is mainly based on the annual data provided in the inventory of greenhouse gases of Turkey submitted in early 2007. The Energy Balance Sheets of the Turkish Ministry of Energy and Natural Resources are used to obtain the information on energy production and consumption. Socio-economic data are gathered from the development indicators database of the World Bank and the Statistics Division Database of the United Nations. The official reports of the UNFCCC Secretariat and reports of research conducted by various institutions and organizations are used for the comparisons of the figures among various countries. A decomposition analysis of emissions of greenhouse gases is also developed.

Results

In the period 1990-2004, increase in total emissions (74%) and per capita emissions (37%) are higher than the increase in the economic income (68%) and the increase in the population (28%) in Turkey. As of 2004, the country's per capita emissions (4.1 ton CO₂-eq/cap) are still well below the OECD average and slightly above the global average. However, the trend in 1990-2004 shows that the carbonization of the economy and lifestyles are also as effective as the increase in the growth of the population and economy, typical features of a developing country. Hence, it has been observed that the increase in the carbon intensity (7%) of Turkey's economy is higher than the increase in the energy intensity (1%).

Within this period, the 11% decrease in the carbon intensity of electricity consumption is the most significant positive progress in terms of climate friendly production. This outcome is primarily the result of a shift to natural gas in the period between 1997-2001 and the enhanced utilization of hydroelectric power in the period between 2001-2004.

Table.1 Selected socio-economic and carbon indicators of Turkey in the period 1990-2004.

		1990	2004	1990-2004	
Socio-Economic	Data	GDP (PPP) (billion USD 2000)	306,9	502,0	64%
		Population (million)	56,2	71,8	28%
		Per Capita GDP (PPP) (USD 2000/cap)	5.466,0	7.055,0	29%
		Total Energy Supply (Million toe)	53,0	87,8	66%
		Total Electricity Production (billion kWh)	57,5	150,7	162%
	Indicators	Per Capita Energy Supply (Toe/cap)	0,9	1,2	30%
		Per capita Electricity Production (kWh/cap)	1.023,8	2.099,2	105%
		Electricity Production in the TPES	11%	14%	25%
		RES in TPES	18%	12%	-33%
		RES in Total Electricity Production	40%	31%	-24%
		Energy for Electricity Production (toe/1000 kWh)	0,100	0,079	-21%
		Energy Intensity of the Economy (Toe/1000 USD)	0,173	0,175	1%
	Carbon	Data	Total GHG (million ton CO ₂ -eq)	170,1	296,6
Electricity GHG (million ton CO ₂ -eq)			30,4	70,7	132%
Indicators		Per Capita GHG Emissions (ton CO ₂ -eq/cap)	3,0	4,1	37%
		Carbon Intensity of Economy (ton CO ₂ -eq/1000 USD)	0,55	0,59	7%
		Carbon Intensity of Electricity Consumption (kg CO ₂ -eq/kWh)	0,53	0,47	-11%
		Carbon Intensity of Electricity Production (ton CO ₂ -eq/toe)	5,30	5,94	12%
		Carbon Intensity of Energy Supply (ton CO ₂ -eq/toe)	3,21	3,38	5%

Conclusions

At the global level, both in the OECD countries and in many countries of the developing world, the period 1990-2004 is recognized as the enhancement energy efficiency and renewable energies, as a crucial part of climate change policies and measures. Thus, the lack of progress in enhancement of energy efficiency and better utilization of renewable energies can be considered as the major consequences of lacking climate change policies in Turkey in 1990-2004, due to Turkey's position with respect to the UNFCCC. However, the huge potential in energy efficiency and renewables in Turkey also imply that the country has a huge potential in mitigating carbon emissions, provided that the country is appropriately involved in the global carbon regime and market in the post 2012 period.

Turkey, a country listed in Annex-I of the UNFCCC in a position that is different than that of other Annex-I countries and a country that is not listed in Annex-B of the KP, is also involved in the international negotiations for the design of the international climate change regime in the post-2012 period. Thus, adopting sectoral carbon intensity targets specifically on energy efficiency and non-hydro renewables as a means of controlling emissions of greenhouse gases might enable Turkey to be involved in global efforts for mitigation of climate change. Such a mitigation option for Turkey might also introduce a new model for other "advanced developing countries", (e.g. Non-EU, Non-Annex-B countries of OECD (i.e. S.Korea and Mexico)) which could provide significant contributions in on-going negotiations to broadening international efforts on mitigation of climate change in the post-2012 period.

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