

NATIONAL GHG INVENTORY OF TURKEY

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TurkStat

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NATIONAL SYSTEM

Background

- Turkey's name was deleted from Annex II of the UNFCCC, and the Parties were invited to recognize the special circumstances of Turkey – decision 26/CP.7, Marrakesh 2001
- The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by Turkey – May 2004
- The Kyoto Protocol was ratified by Turkey – August 2009
- Turkey does not have emission reduction targets under the Kyoto Protocol.
- Turkey submitted its first national inventory report and CRF tables for 1990-2004 period in 2006.

Institutional arrangements

- The Turkish Statistical Institute (TurkStat) is the responsible agency for compiling the National Greenhouse Gases Inventory and submitting to the UNFCCC Secretariat.

Legal Base:

- Coordination Board on Climate Change and Air Management (CBCCAM)
Decision on the setting up of technical working groups and defining the coordinator institutions of working groups
 - Greenhouse Gas Emission Inventories working group: Turkish Statistical Institute (TurkStat) responsible from coordination of the WG.
- The Official Statistics Programme (OSP), based on the Statistics Law of Turkey No: 5429.

Institutional arrangements

The institutions involved in GHG Inventory WG;

- Turkish Statistical Institute (TurkStat),
- Ministry of Energy and Natural Resources (MENR).
- Ministry of Transport, Maritime Affairs and Communications (MTMAC),
- Ministry of Environment and Urbanization (MoEU),
- Ministry of Food, Agriculture and Livestock (MFAL),
- Ministry of Forestry and Water Affairs (MFWA),
- Turkish Cement Manufacturers Association
- Turkish Steel Producers Association

Roles and Responsibilities

Sector	CRF Category	Responsible Organization
Energy	Energy – 1 (excluding 1.A.1.a – Electricity and heat generation and 1.A.3 – Transportation)	Turkish Statistical Institute (TurkStat)
	Electricity and Heat Generation – 1.A.1.a	Ministry of Energy and Natural Resources (MoENR)
	Transportation – 1.A.3	Ministry of Transport, Maritime Affairs and Communications (MoTMAC),
Industrial Process	Industrial Process – 2 (excluding Halocarbon and SP6 consumption - 2.F)	TurkStat
	Halocarbon and SF6 consumption - 2.F	Ministry of Environment and Urbanization (MoEU)
Solvent and other product use	Solvent and other product use – 3	
Agriculture	Agriculture – 4	TurkStat
Land Use, Land Use Change and Forestry	LULUCF - 5	Ministry of Forestry and Water Affairs (MoFWA), Ministry of Food, Agriculture and Livestock (MoFAL)
Waste	Waste – 6	TurkStat
Analysis	Trend analysis Key Category Assessment Uncertainty	TurkStat

Roles and Responsibilities

Sector	Activity Category/ CRF Code	Activity Data Source	Methods and Emission Factors Selection	Calculations
Energy	Energy – 1 (excluding 1.A.1.a – Electricity and heat Production and 1.A.3 – Transportation)	MENR	TurkStat	TurkStat
	Electricity and Heat Production – 1.A.1.a	MENR	MENR	MENR
	Transportation – 1.A.3	MTMAC	MTMAC	MTMAC
Industrial Process	Industrial Process – 2	TurkStat	TurkStat	TurkStat
	Cement Production - 2.A.1	TurkStat & TCMA	TurkStat	TurkStat
	Lime Production - 2.A.2	TurkStat & TLA	TurkStat	TurkStat
	Lime Stone and Dolomite Use - 2.A.3			
	Aluminum Production - 2.C.3	TurkStat & ETİ Aluminum Co. Inc.	TurkStat	TurkStat
Consumption of Halocarbon and SF6 - 2.F	MCT, TurkStat	MoEU	MoEU	
Solvent and other product use	Paint Application – 3.A	TurkStat & Automobile Manufacturing Association	TurkStat	TurkStat
	Chemicals manufacturing and processing – 3.C	TurkStat	TurkStat	TurkStat
Agriculture	Agriculture – 4	TurkStat	TurkStat	TurkStat
Land Use, Land Use Change and Forestry	LULUCF - 5	MFWA, MFAL	MFWA, MFAL	MFWA, MFAL
Waste	Waste – 6	TurkStat	TurkStat	TurkStat

Activity Data Sources

Sector	Category	Activity Data Source
Energy	Energy – 1 (excluding 1.A.1.a – Electricity and heat generation and 1.A.3 – Transportation)	MENR
	Electricity and Heat Generation – 1.A.1.a	MENR
	Transportation – 1.A.3	TurkStat , MENR MTMAC
Industrial Process	Industrial Process – 2	TurkStat
	Cement Manufacturing - 2.A.1	TurkStat & TCMA
	Lime Manufacturing - 2.A.2	TurkStat & TLA
	Lime Stone and Dolomite Use - 2.A.3	
	Aluminum Manufacturing - 2.C.3	TurkStat & ETİ Aluminum Co. Inc.
Halocarbon and SP6 consumption - 2.F	MCT, TurkStat	
Solvent and other product use	Dye use – 3.A	TurkStat & Automobile Manufacturing Association
	Chemicals manufacturing and processing – 3.C	TurkStat
Agriculture	Agriculture – 4	TurkStat
Land Use, Land Use Change and Forestry	LULUCF - 5	MFWA, MFAL
Waste	Waste – 6	TurkStat

The process of inventory preparation (QA/QC Plan)

	Activity	Start date	Deadline
1.	Inventory planning by GHG Inventor Working Group (Creating Inventory Improvement Plan, recalculation, etc.)	01.05.XX-1	30.09.XX-1
2	Reviewing emission calculation methods, EFs, activity data sources, etc. by GHG Inventor Working Group	15.09.XX-1	30.11.XX-1
3.	Collection of activity data and quality control of the data by the institutions involved	01.11.XX-1	31.12.XX-1
4.	Calculation of all emissions from electricity production, transportation, F-gas, emissions and removal from LULUCF by the related Institutions, and transfer to TurkStat.	15.12.XX-1	15.02.XX
5.	Calculation of emissions under the responsibility of Turkstat	15.12.XX-1	15.02.XX
6.	Quality control of the calculated emissions (recalculation by TurkStat IT solution)	15.12.XX-1	15.02.XX
7.	Preparation of the CRF tables by TurkStat	15.02.XX	15.03.XX
8.	Performing key source, trend and uncertainty analysis by TurkStat	15.02.XX	15.03.XX
9.	Preparation of Emission Inventory Report by by the institutions involved and compilation by TurkStat	15.02.XX	31.03.XX
10.	Approval of National Greenhouse Gas Emission Inventory by Inventory Focal Point	01.04.XX	10.04.XX
11	Release of the National Greenhouse Gas Inventory as news release on Turkstat webpage.	01.04.XX	10.04.XX
12.	Reporting of Inventory to UNFCCC Secretariat by TurkStat	10.04.XX	15.04.XX
13.	Documentation and archiving processes	15.04.XX	30.05.XX

Quality management system

- QA/QC plan of Turkish GHG inventory is approved in May 2014.
More comprehensive and systematic QC procedures will be applied from 2015 submission onwards.

Key category analysis

Steps of the identification of key categories of the GHG inventory

- Identifying categories,
- Choice of method, Tier 1
 - Level Assessment excluding LULUCF
 - Level Assessment including LULUCF
- Key categories without LULUCF comprise 418 585 Gg CO₂ eq (2012), corresponds to 95.16% of total GHG emissions (without LULUCF).
- Key categories including LULUCF amounted to 355 488 Gg CO₂eq (2012), corresponds to 95.08 % of total GHG emissions (with LULUCF).

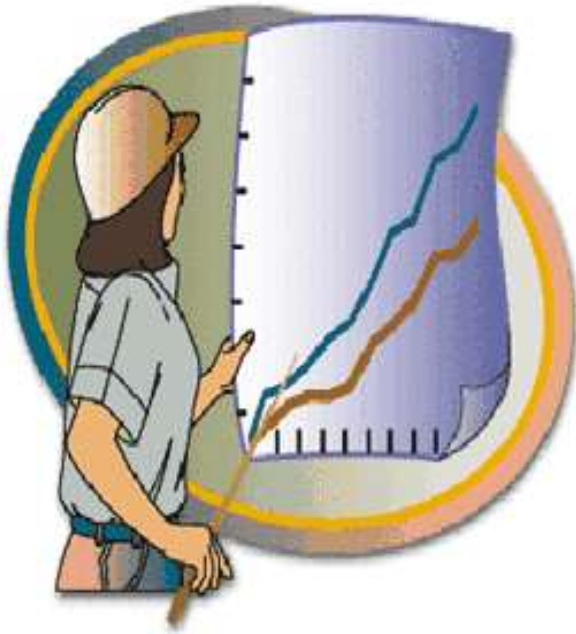
Uncertainty analysis

Quantitative estimates of the uncertainties in the emissions
Tier 1 method using a spreadsheet IPCC GPG 2000

Uncertainty information;
IPCC default values
Expert judgment

Data management

- Calculation sheets are Excel spreadsheets,
- TurkStat file server stores and archives (back to 2006)
 - calculation sheets prepared by the inventory experts.
 - all products (reports, tables) needed for UNFCCC submissions
 - all relevant activity data used for inventory preparation such as statistics, documents/reports relevant to inventory reviews.
- Also Activity data and EFs also stored and archived in TurkStat institutional database system.



EMISSION TRENDS

Summary of emission trends

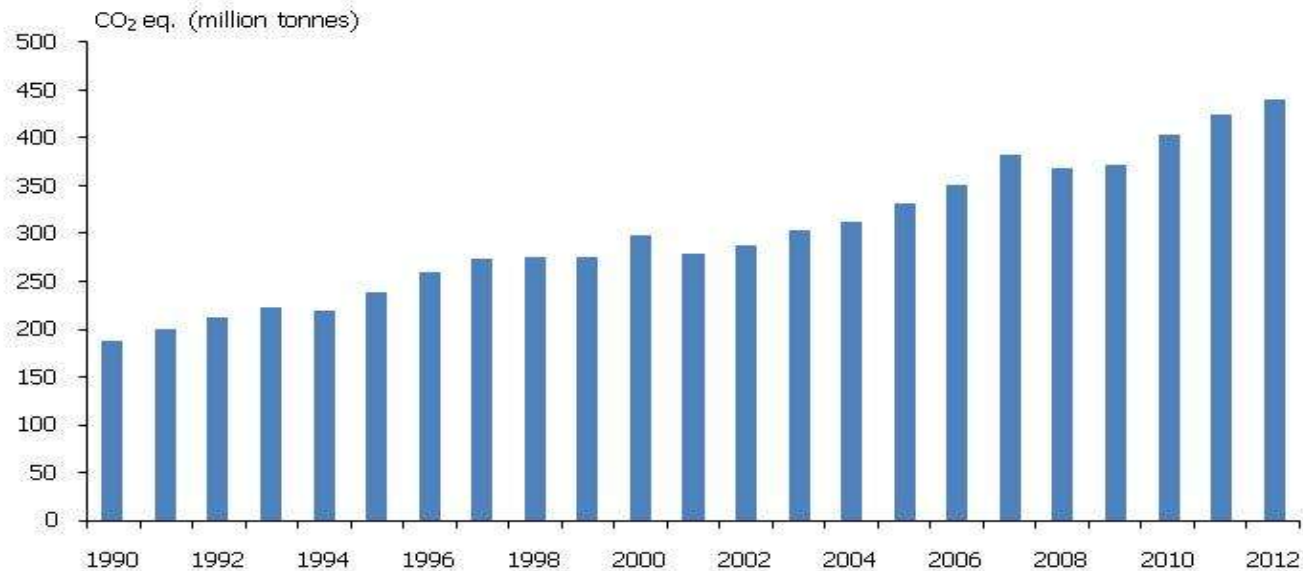
Turkey's total greenhouse gas (GHG) emissions, excluding the land use, land use change and forestry (LULUCF) sector, were estimated to be 439.9 million tonnes (Mt) of carbon dioxide equivalent (CO₂-eq) in 2012. This represents an increase of 15.8 Mt, or 3.72%, on emissions in 2011, and an increase of 133.4% above 1990 levels.

Greenhouse gas emissions (excluding LULUCF), 1990-2012

	1990	1995	2000	2005	2010	2011	2012
Total GHG emissions (Excluding LULUCF) (million tonnes (CO ₂ equivalent))	188.5	238.9	298.1	330.7	403.5	424.1	439.9
Change compared to 1990 (%)	-	26.7	58.2	75.5	114.1	125.0	133.4

Emission trends for aggregated greenhouse gas emissions

GHGs emission trend, 1990 - 2012



The graph presents overall CO₂ equivalent emissions without LULUCF during the period 1990-2012.

Emission trends for aggregated greenhouse gas emissions

(Million tonnes CO ₂ eq.)				
Sector	1990	1995	2000	2005
Total (excluding LULUCF)	188.43	238.82	298.09	330.74
Energy	132.88	161.50	213.23	242.41
Industrial processes	15.44	24.21	24.37	28.78
Solvent and other product use	0	0	0	0
Agriculture	30.39	29.23	27.85	26.28
Waste	9.72	23.88	32.64	33.27
Compared to 1990 % (excluding LULUCF)	100.00	126.74	158.19	175.52
Land use, land-use change and forestry	-44.07	-47.57	-50.06	-49.73
<hr/>				
Sector	2009	2010	2011	2012
Total (excluding LULUCF)	371.15	403.49	424.09	439.87
Energy	279.01	285.14	301.34	308.60
Industrial processes	33.16	55.67	58.61	62.77
Solvent and other product use	0	0	0	0
Agriculture	26.10	27.13	28.83	32.28
Waste	32.88	35.56	35.31	36.22
Compared to 1990 % (excluding LULUCF)	196.96	214.13	225.06	233.44
Land use, land-use change and forestry	-56.35	-57.85	-60.83	-59.82

The inventory for the year 1990 and 2012 revealed that the overall GHG emissions expressed in CO₂ equivalent were correspondingly 188.43 and 439.87 million tonnes excluding the sector LULUCF. The emission trends (without LULUCF) of the basic GHGs is also seen in the same table (1990=100%), the overall emission in 2012 increased by 133.44% compared to emission in 1990.

Emission trends for aggregated greenhouse gas emissions

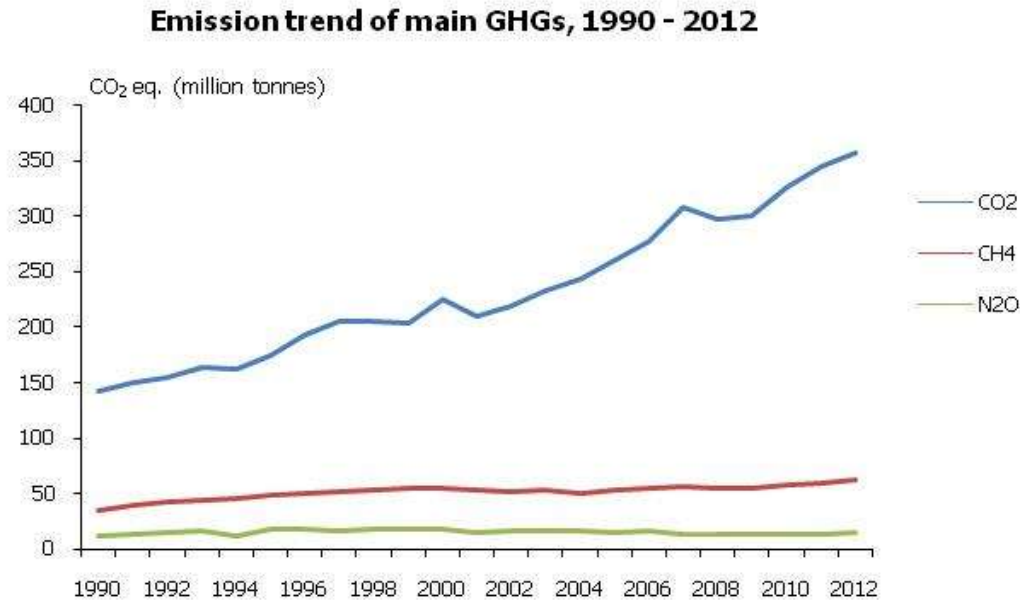
In overall 2012 emissions excluding LULUCF, the energy sector had the largest portion with 70.2%. The energy sector was followed by the industrial processes with 14.3%, the waste with 8.2% and the agricultural activities with 7.3%.

Emission trends by gas

Emissions of CO₂ increased by 152.5% from 1990 to 2012. CH₄ emissions increased by 81% and N₂O emissions increased by 21%. PFC emissions fell by 48.2%.

	(Million tonnes CO ₂ eq.)							
GHG	1990	1995	2000	2005	2009	2010	2011	2012
Total (excluding LULUCF)	188.43	238.82	298.09	330.74	371.15	403.49	424.09	439.87
CO ₂	141.56	174.09	225.61	259.79	299.67	326.85	345.73	357.50
CH ₄	34.05	47.39	53.68	52.55	53.75	57.30	58.05	61.62
N ₂ O	12.22	16.82	17.14	14.67	13.91	14.15	13.73	14.79
HFCs	NA,NE	NA,NE	0.82	2.38	2.84	4.01	5.31	4.68
PFCs	0.60	0.52	0.52	0.49	0.17	0.31	0.32	0.31
SF ₆	NA,NE	NA,NE	0.32	0.86	0.80	0.88	0.95	0.97

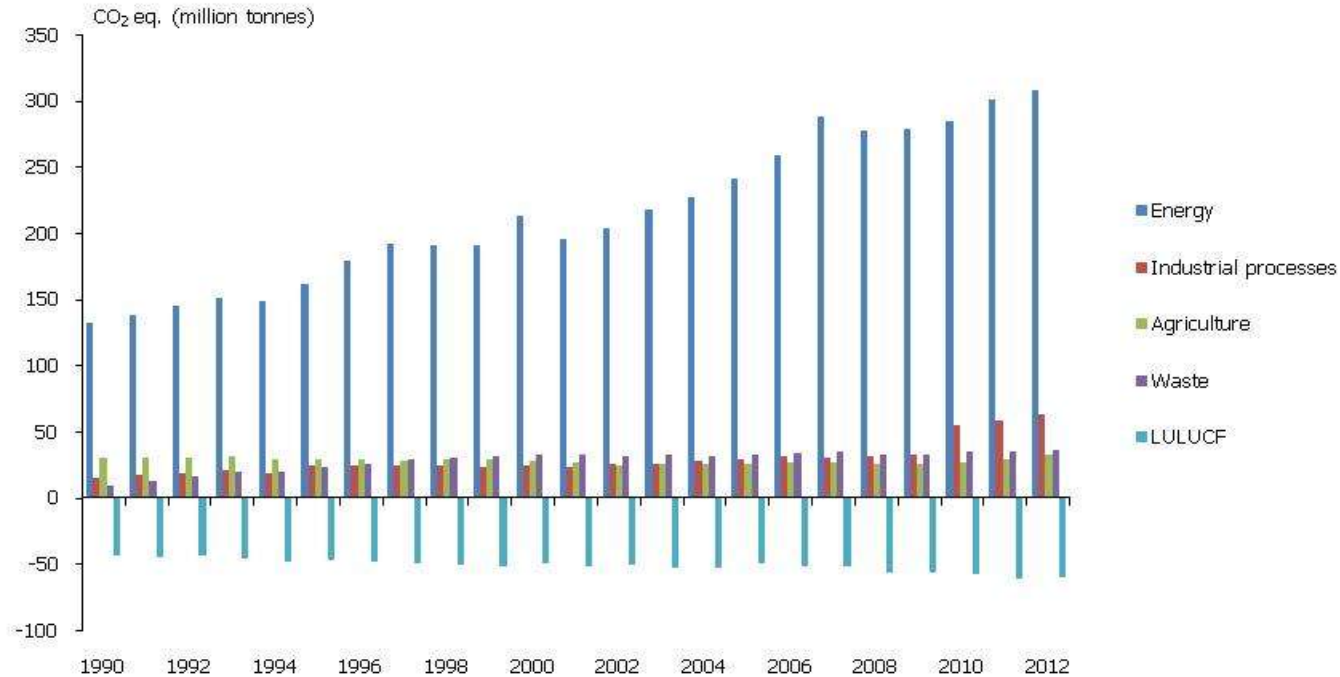
Emission trends by gas



As shown in the graph, the CO₂ emissions show a general increasing trend, while N₂O and CH₄ emissions did not change considerably.

Emission trends by source

GHGs emission trend by sectors, 1990 - 2012



As shown in the graph, the energy sector has the largest share in the overall emissions between the years 1990 and 2012.

Emission trends by source

GHG emissions from energy increased 2.4% to 308.6 million tonnes (Mt) CO₂ eq. in 2012 as compared to 2011. There is 132.26% increase as compared to 1990.

Emissions in the Industrial Processes sector increased to 62.8 Mt CO₂ eq. in 2012 which is 7.1% higher than the emissions in 2011.

Emissions in the agriculture and waste sectors are 32.3 and 36.2 Mt CO₂ eq respectively in 2012.

Emission trends by source

Contribution of sectors to the total emission

	(%)							
	1990	1995	2000	2005	2009	2010	2011	2012
Energy	92.05	84.45	85.97	86.26	88.63	82.49	82.95	81.20
Industrial processes	10.70	12.66	9.83	10.24	10.53	16.11	16.13	16.52
Agriculture	21.05	15.29	11.23	9.35	8.29	7.85	7.94	8.49
Waste	6.73	12.48	13.16	11.84	10.44	10.29	9.72	9.53
LULUCF	-30.53	-24.87	-20.18	-17.70	-17.90	-16.74	-16.74	-15.74

Emission trends for indirect greenhouse gases

Emissions of NO_x, CO and NMVOC are also included in the report since they influence climate change indirectly. NO_x emissions are 1.3 Mt in 2012 and 97% is from energy sector. CO emissions are about 3 Mt in 2012 and 93% of which is from energy. NMVOC emissions are 1.5 Mt in 2012. The largest portion is from industrial processes with 66% and it is followed by energy with 29%.



CHALLENGES

Challenges with National GHG Inventory

National inventory process needs:

- Stronger institutional arrangements;
- Establishing a functioning network of specialists from related areas;
- Creating clear and realistic improvement plans;
- Implementing of QA/QC plan at all stages of inventory preparation by all involved institutions;
- Capacity building – additional experts are needed in the inventory team.

Contact & Information

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