

GHG INVENTORY SYSTEM IN TURKEY

Erhan UNAL

Turkish Statistical Institute

Croatia

2014

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	TurkStat
	Key Category Assessment	
	Uncertainty	

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 systematical QC procedures will be applied from 2015 submission onwards

Data management

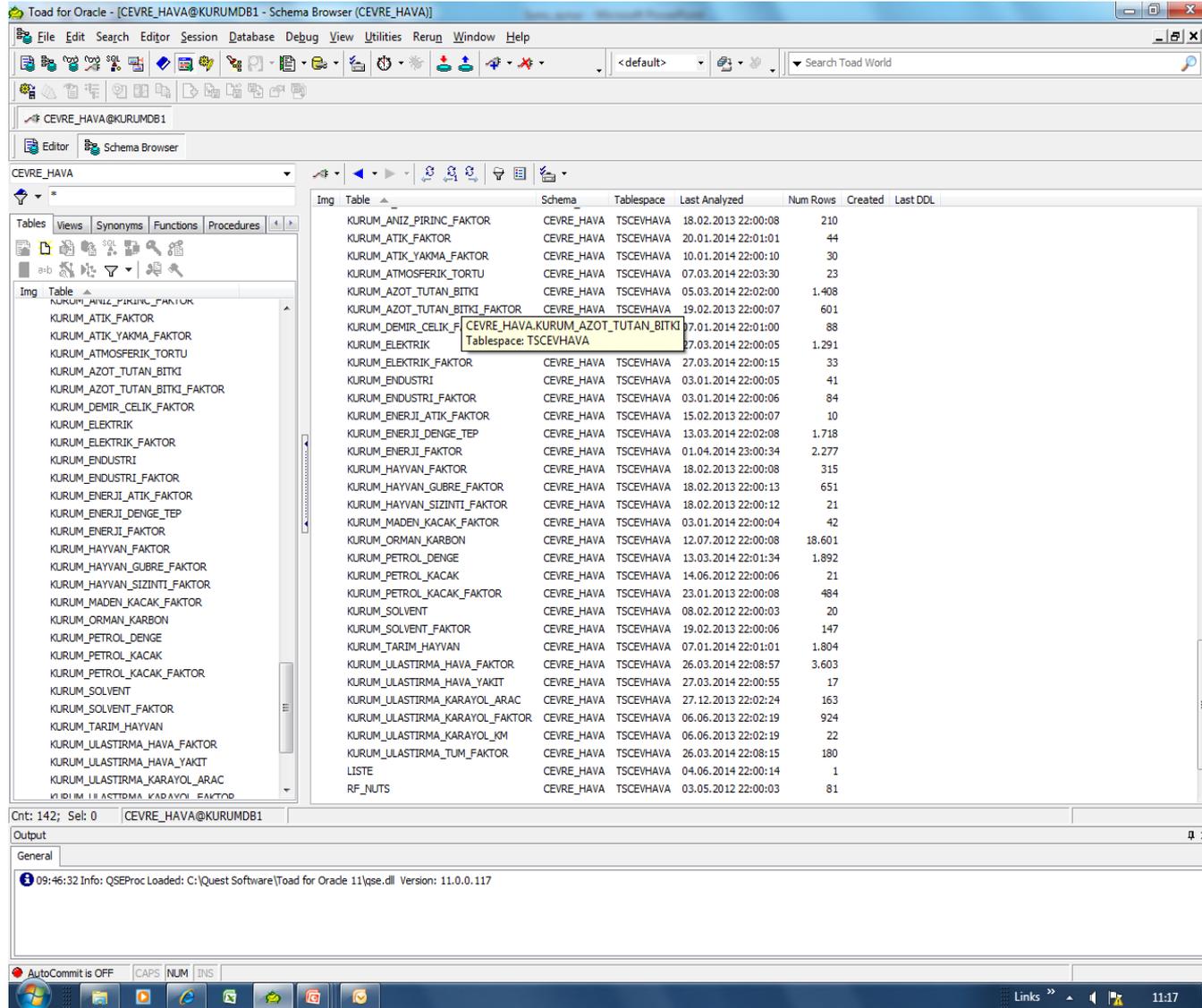
- Calculation sheets is Excel spreadsheets,
- TurkStat file server stores and archives (back to 2006)
 - calculation sheets prepared by the inventory experts.
 - all products (reports, tables) needed for UNFCCC submissions
 - all relevant activity data used for inventory preparation such as statistics,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

Inventory database – description

Emission inventory portal

1. Database

- Oracle Database
- Access to tables via TOAD (**t**ool for **o**racle **a**pplication **d**evelopers)
TOAD is a software application to manage both relational and non-relational databases using SQL
- *Create tables, update/delete records, and authorize users by using SQL (Structured Query Language) codes*



The screenshot shows the Toad for Oracle Schema Browser interface. The main window displays a list of tables in the CEVRE_HAVA schema. The table list includes columns for Table Name, Schema, Tablespace, Last Analyzed, Num Rows, Created, and Last DDL. A tooltip is visible over the table 'KURUM_DEMIR_CELIK_FI', showing its schema as 'CEVRE_HAVA.KURUM_AZOT_TUTAN_BITKI' and its tablespace as 'TSCEVHAVA'.

Table	Schema	Tablespace	Last Analyzed	Num Rows	Created	Last DDL
KURUM_ANIZ_PIRINC_FAKTOR	CEVRE_HAVA	TSCEVHAVA	18.02.2013 22:00:08	210		
KURUM_ATIK_FAKTOR	CEVRE_HAVA	TSCEVHAVA	20.01.2014 22:01:01	44		
KURUM_ATIK_YAKMA_FAKTOR	CEVRE_HAVA	TSCEVHAVA	10.01.2014 22:00:10	30		
KURUM_ATMOSFERIK_TORTU	CEVRE_HAVA	TSCEVHAVA	07.03.2014 22:03:30	23		
KURUM_AZOT_TUTAN_BITKI	CEVRE_HAVA	TSCEVHAVA	05.03.2014 22:02:00	1.408		
KURUM_AZOT_TUTAN_BITKI_FAKTOR	CEVRE_HAVA	TSCEVHAVA	19.02.2013 22:00:07	601		
KURUM_DEMIR_CELIK_FI	CEVRE_HAVA.KURUM_AZOT_TUTAN_BITKI	Tablespace: TSCEVHAVA	17.01.2014 22:01:00	88		
KURUM_ELEKTRIK	CEVRE_HAVA	TSCEVHAVA	27.03.2014 22:00:05	1.291		
KURUM_ELEKTRIK_FAKTOR	CEVRE_HAVA	TSCEVHAVA	27.03.2014 22:00:15	33		
KURUM_ENDUSTRI	CEVRE_HAVA	TSCEVHAVA	03.01.2014 22:00:05	41		
KURUM_ENDUSTRI_FAKTOR	CEVRE_HAVA	TSCEVHAVA	03.01.2014 22:00:06	84		
KURUM_ENERJİ_ATIK_FAKTOR	CEVRE_HAVA	TSCEVHAVA	15.02.2013 22:00:07	10		
KURUM_ENERJİ_DENGE_TEP	CEVRE_HAVA	TSCEVHAVA	13.03.2014 22:02:08	1.718		
KURUM_ENERJİ_FAKTOR	CEVRE_HAVA	TSCEVHAVA	01.04.2014 23:00:34	2.277		
KURUM_HAYVAN_FAKTOR	CEVRE_HAVA	TSCEVHAVA	18.02.2013 22:00:08	315		
KURUM_HAYVAN_GUBRE_FAKTOR	CEVRE_HAVA	TSCEVHAVA	18.02.2013 22:00:13	651		
KURUM_HAYVAN_SIZINTI_FAKTOR	CEVRE_HAVA	TSCEVHAVA	18.02.2013 22:00:12	21		
KURUM_MADEN_KACAK_FAKTOR	CEVRE_HAVA	TSCEVHAVA	03.01.2014 22:00:04	42		
KURUM_ORMAN_KARBON	CEVRE_HAVA	TSCEVHAVA	12.07.2012 22:00:08	18.601		
KURUM_PETROL_DENGE	CEVRE_HAVA	TSCEVHAVA	13.03.2014 22:01:34	1.892		
KURUM_PETROL_KACAK	CEVRE_HAVA	TSCEVHAVA	14.06.2012 22:00:06	21		
KURUM_PETROL_KACAK_FAKTOR	CEVRE_HAVA	TSCEVHAVA	23.01.2013 22:00:08	484		
KURUM_SOLVENT	CEVRE_HAVA	TSCEVHAVA	08.02.2012 22:00:03	20		
KURUM_SOLVENT_FAKTOR	CEVRE_HAVA	TSCEVHAVA	19.02.2013 22:00:06	147		
KURUM_TARIM_HAYVAN	CEVRE_HAVA	TSCEVHAVA	07.01.2014 22:01:01	1.804		
KURUM_ULASTIRMA_HAVA_FAKTOR	CEVRE_HAVA	TSCEVHAVA	26.03.2014 22:08:57	3.603		
KURUM_ULASTIRMA_HAVA_YAKIT	CEVRE_HAVA	TSCEVHAVA	27.03.2014 22:00:55	17		
KURUM_ULASTIRMA_KARAYOL_ARAC	CEVRE_HAVA	TSCEVHAVA	27.12.2013 22:02:24	163		
KURUM_ULASTIRMA_KARAYOL_FAKTOR	CEVRE_HAVA	TSCEVHAVA	06.06.2013 22:02:19	924		
KURUM_ULASTIRMA_KARAYOL_KM	CEVRE_HAVA	TSCEVHAVA	06.06.2013 22:02:19	22		
KURUM_ULASTIRMA_TUM_FAKTOR	CEVRE_HAVA	TSCEVHAVA	26.03.2014 22:08:15	180		
LISTE	CEVRE_HAVA	TSCEVHAVA	04.06.2014 22:00:14	1		
RF_NUTS	CEVRE_HAVA	TSCEVHAVA	03.05.2012 22:00:03	81		

Output window: 09:46:32 Info: QSEProc Loaded: C:\Qse Software\Toad for Oracle 11\qse.dll Version: 11.0.0.117

CEVRE_HAVA@KURUMDB1

KURUM_ENERJI_DENGE_TEP: Created: 03.07.2012 16:44:02 Last DDL: 22.07.2013 10:10:38
 Primary Key: <none>

Columns Indexes Constraints Triggers Data Script Grants Synonyms Partitions Subpartitions Stats/Size Referential Used By Policies Auditing

Sort by Primary Key Desc
 Read Only Auto Refresh

YIL	EN...	ENERJI_DENGE...	ENE...	ENERJI_DENGE_BIRIM_AD	ENERJI_DENGE_BIRIM...	TAS_KOMURU	LINYIT	ASFALTIT	KOK	PETROK.
2012	1	Orjinal birim	1	Yerli Üretim (+)	Domestic Production	2292,261	68124,805	1044		
2012	1	Orjinal birim	2	İthalat (+)	Import	29195,224			377,6879...	387
2012	1	Orjinal birim	3	İhracat (-)	Export	7,043896				
2012	1	Orjinal birim	4	İhrakiye (-)	Bunker					
2012	1	Orjinal birim	5	Stok Değişimi (+/-)	Stock Change	-20,735	335,779	-176	32,019	
2012	1	Orjinal birim	6	İstatistik Hata (+/-)	Statistical Error					
2012	1	Orjinal birim	7	Birincil Enerji Arzı	Primary Energy Supply	31459,706104	68460,584	868	409,7069...	365
2012	1	Orjinal birim	8	Rafineri Dışı Üretim (+)	Non-refinery production					
2012	1	Orjinal birim	9	Toplam Enerji Arzı	Total Energy Supply					
2012	1	Orjinal birim	10	Çevrim ve Enerji Sektörü	Power Plants	-17296,942	-55929,6	-404,44	4071,848	
2012	1	Orjinal birim	11	Elektrik Santralleri	Power Plant	-11854,022	-55742,463	-404,44		
2012	1	Orjinal birim	12	Kok Fabrikaları	Coking Plant	-5391,977			4071,848	
2012	1	Orjinal birim	13	Briket	Briquette					
2012	1	Orjinal birim	14	Petrol Rafinerileri	Petroleum Refinery					
2012	1	Orjinal birim	15	İç Tüketim ve Kayıp	Domestic consumption...	-50,943	-187,137			
2012	1	Orjinal birim	16	Toplam Nihai Enerji Tüketimi	Total Final Energy Co...	14162,764104	12530,984	463,56	4481,554...	369
2012	1	Orjinal birim	17	Sektörler Toplamı	Sectors Total	14162,616	12530,984	464	4481,555	
2012	1	Orjinal birim	18	Sanayi Tüketimi	Industrial Consumption	4140,847	5894,051	265	4481,555	
2012	1	Orjinal birim	19	Demir Çelik	Iron and Steel	1429,89	124,736		4365,003	
2012	1	Orjinal birim	20	Kimya-Petrokimya	Chemistry-Petrochemi...	121,3	345,65		61,286	
2012	1	Orjinal birim	21	Petrokimya Feedstock	Petrochemistry Feedst...					
2012	1	Orjinal birim	22	Gübre	Fertilizer	0				

File Edit Search Editor Session Database Debug View Utilities Rerun Window Help

CEVRE_HAVA@KURUMDB1

Editor Schema Browser

CEVRE_HAVA

DAGITIM_ENERJI: Created: 02.04.2014 15:15:52 Last DDL: 02.04.2014 15:15:52
Primary Key: <none>

Columns Indexes Constraints Triggers Data Script Grants Synonyms Partitions Subpartitions Stats/Size Referential Used By Policies

Sort by Primary Key Desc
Read Only Auto Refresh

BOLUM	YIL	REHBER	SERAGAZI_YONTEM	SEKTOR	ENERJI_GRUP	SERAGAZI	YAKIT	ENERJI_PETROL	DEGER
DAGITIM_ENERJI	1 1990	1996	1	1	1	1	1	11	851,445520611841
DAGITIM_ENERJI_ATIK	1 1990	1996	1	1	1	1	1	14	0
DAGITIM_HAVAYOLU_UCAK	1 1990	1996	1	1	1	1	1	19	0
DAGITIM_HAYGUBRE_SIZAKIS_N2O	1 1990	1996	1	1	1	1	1	20	0
DAGITIM_HAYGUBRE_SIZ_GOSTERGE_N2O	1 1990	1996	1	1	1	1	1	22	0
DAGITIM_HAYVAN_GUBRE_CH4	1 1990	1996	1	1	1	1	1	23	2653,1983297512
DAGITIM_KACAK_PETROL	1 1990	1996	1	1	1	1	1	24	248,415906816
DAGITIM_KARAYOLU	1 1990	1996	1	1	1	1	1	25	0
DAGITIM_KARBON_HESAP	1 1990	1996	1	1	1	1	1	26	1266,5329749072
DAGITIM_MADEN_KACAK	1 1990	1996	1	1	1	1	1	28	37,2623860224
DAGITIM_ORMAN_KARBON	1 1990	1996	1	1	1	1	1	29	3,1051988352
DAGITIM_PIRINC_ANIZ	1 1990	1996	1	1	1	1	1	30	0
DAGITIM_SENTETIK	1 1990	1996	1	1	1	1	1	31	0
DAGITIM_SIZINTI_GOSTERGE_N2O	1 1990	1996	1	1	1	1	1	34	0
DAGITIM_SOLVENT	1 1990	1996	1	1	1	1	1	999	3845,7887573952
DAGITIM_SURDUR_KALKINMA	1 1990	1996	1	1	1	1	1	11	20662,2223286371
DAGITIM_TARIM_SOIL	1 1990	1996	1	1	1	1	2	14	0
DAGITIM_ULASTIRMA_TUM	1 1990	1996	1	1	1	1	2	19	0
DENEME	1 1990	1996	1	1	1	1	2	20	529,41834792
DIM_ANIZ_PIRINC_FAKTOR	1 1990	1996	1	1	1	1	2	22	634,056327273601
DIM_ATIK	1 1990	1996	1	1	1	1	2	23	2453,05472471136
DIM_AZOT_TUTAN_BITKI	1 1990	1996	1	1	1	1	2	24	1775,10857832
DIM_AZOT_TUTAN_BITKI_FAKTOR	1 1990	1996	1	1	1	1	2		
DIM_DAGIT_ORMAN_GENCORMAN	1 1990	1996	1	1	1	1	2		
DIM_DAGIT_ORMAN_TOMRUK	1 1990	1996	1	1	1	1	2		
DIM_ELEKTRIK	1 1990	1996	1	1	1	1	2		
DIM_ENERJI_DENGE_TEP	1 1990	1996	1	1	1	1	2		

Data Dissemination



TURKISH
STATISTICAL INSTITUTE

News Release

No: 16174
07 April 2014
Hrs: 10:00

Greenhouse Gas Emissions Inventory, 2012

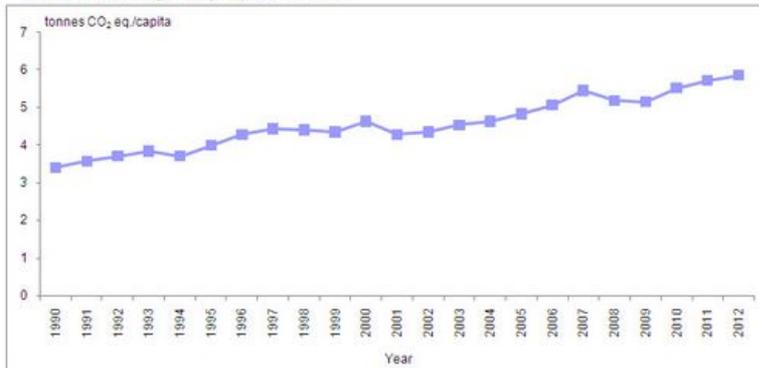
Total GHG emissions increased to 439.9 million tonnes CO₂ equivalent in 2012

The inventory results revealed that the overall greenhouse gas (GHG) emissions as CO₂ equivalent for the year 2012 were 439.9 million tonnes. In overall 2012 emissions, 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%.

GHG emissions per capita increased

Total greenhouse gas emissions as CO₂ equivalent increased 133.4% in 2012 compared to the emissions in 1990. CO₂ emissions per capita was 5.9 tonnes in 2012, while it was 3.4 tonnes for the year 1990.

GHG emissions per capita, 1990 - 2012



Metadata

Close

Analytical Framework, Concepts, Definitions, and Classifications

Scope of the Data

Accounting Conventions

Characteristics of Basic Data Sources

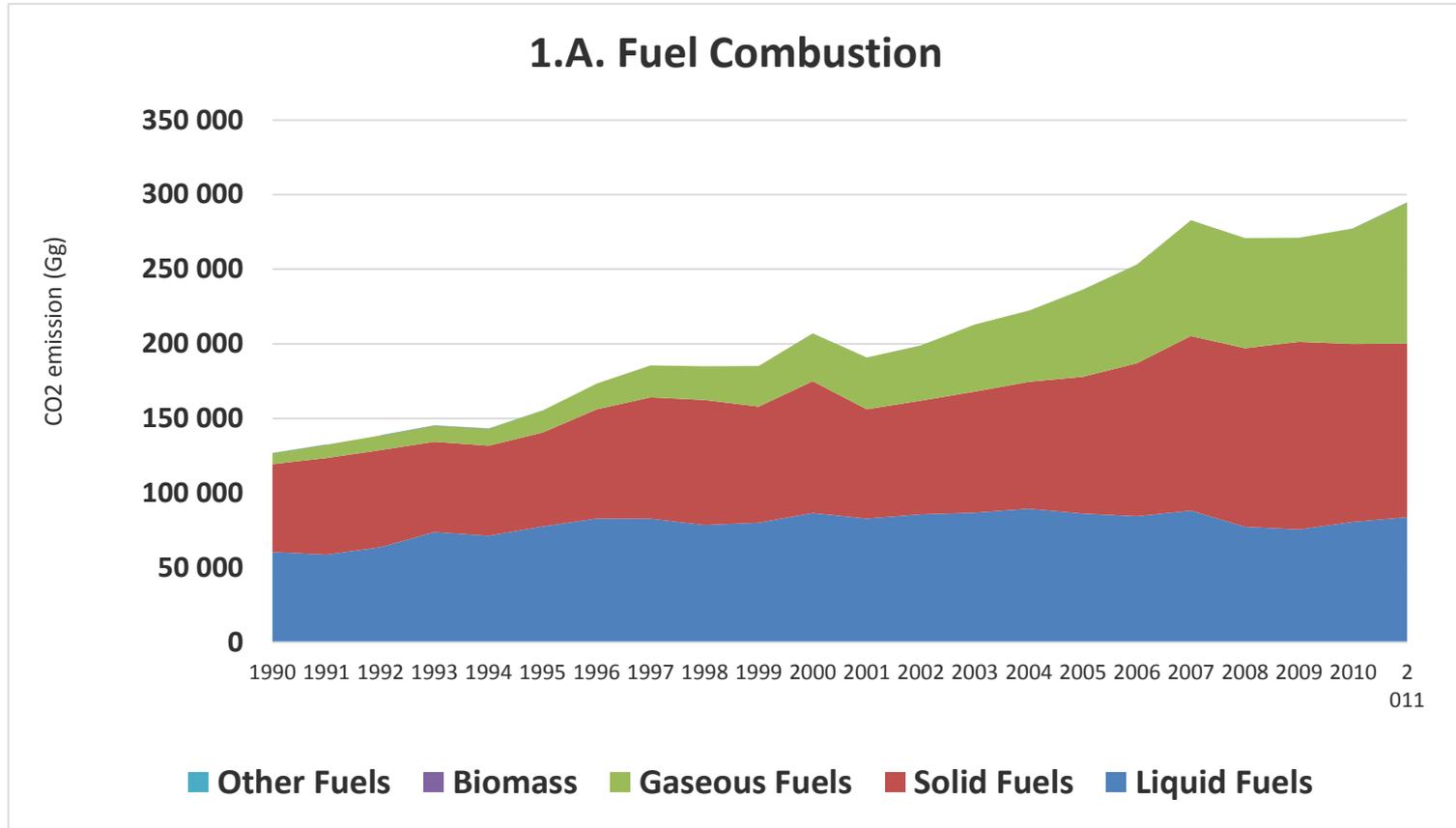
Compilation Practices

Other subjects

Footnotes

Before submission to UNFCCC, summary of the results is published as news release annually in April on TurkStat web page in English and Turkish www.tuik.gov.tr

Energy



Completeness

IPCC Category	CO ₂	CH ₄	N ₂ O
1.A Fuel Combustion			
1.A.1 Energy Industries	✓	✓	✓
1.A.2 Manufacturing Industry and Construction	✓	✓	✓
1.A.3 Transport	✓	✓	✓
1.A.4 Other Sectors	✓	✓	✓
1.A.5 Other	NA	✓	✓

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),

Issues

- Country specific carbon contents of fuels
- Disaggregation of “other” sector in energy balance table
- Historical data (for fuel bunkers)

Key Categories (from energy)

- Public electricity and heat production
- Road transportation
- Residential
- Agriculture/forestry/fisheries
- Cement Production
- Iron and steel
- Chemicals
- Civil aviation
- Petroleum refining
- Navigation
- Fertilizer
- Mining

Industrial Process

Sector	Activity Category/ CRF Code	Activity Data Source	Methods and Emission Factors Selection	Calculations
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

Issues needs to be Improved

- Defining Cao content for Cement production
- Proper way of allocation of confidential emissions
- Using higher tiers for key categories
- More QC activites for some categories (chemicals)
- Only Refrigeration and Air Conditioning (RAC) roughly estimated.
- Ferroalloys process emissions is NE

Key categories

- Cement production (47 plants)
- Iron and steel production (3 Integrated, 27 EAF)
- HFCs
- Lime production

Questions?