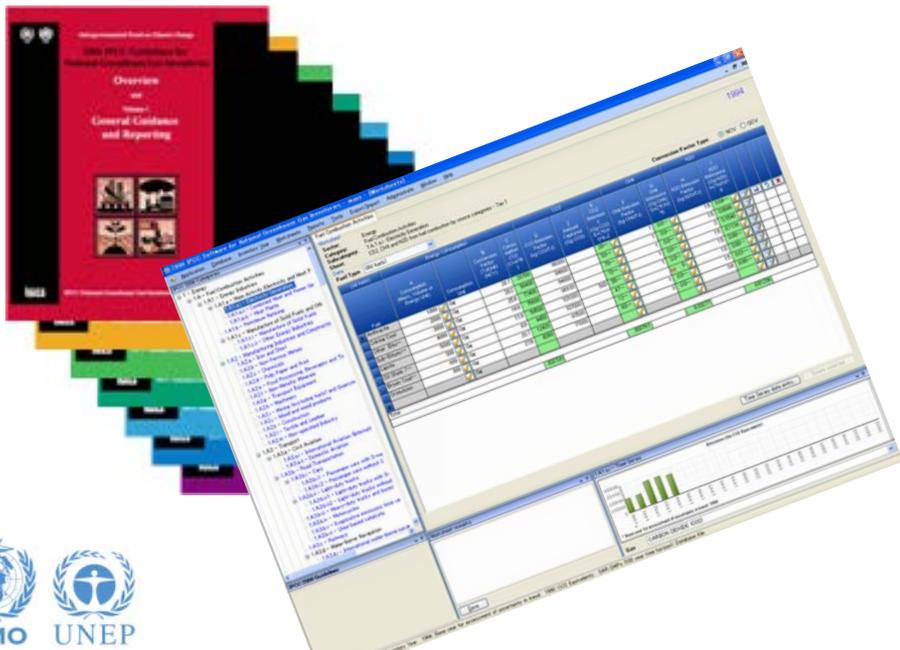




Task Force on National Greenhouse Gas Inventories

# IPCC Inventory Software

WGIA, 11<sup>th</sup> – 12<sup>th</sup> July 2012, Hanoi, Vietnam,



# Introduction

- The IPCC has launched its *IPCC Inventory Software*
- The IPCC Software implements the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- However it can also be used for reporting under the 1996 Guidelines
  - This allows countries to utilise the improvements in the methodologies and default values since 1996
- It improves on earlier software
  - It is database based
  - It is stand-alone – does not depend on specific versions of MS Windows or MS Office.
  - Does not require internet access or expensive hardware

# IPCC Guidelines

- IPCC Guidelines consist of:
  1. Methods
  2. Default data
  3. Good Practice Guidance
  4. Reporting Instructions
- 1,2 & 3 can be used whatever reporting is agreed on
  - IPCC or otherwise
- Thus the methods and data in the 2006 Guidelines can be used however emissions and removals are reported
  - 1996 Guidelines, GPG or 2006 Guidelines

# 2006 Guidelines

- The Revised 1996 Guidelines are 16 years old and much of the data they use is significantly older
- The 2006 Guidelines are a valuable resource that
  - Contain much new and revised data
  - Have improved data and methods that can and are being used by inventory compilers reporting under the Revised 1996 Guidelines
  - Include methods for a more complete range of sources/sinks.
  - Dispense with “*potential emissions*” approaches replacing them with simple Tier 1 methods.
  - Update and expand guidance on “Good Practice”: QA/QC, Data Collection, Uncertainties, Methodological Choice etc.

# Example of improved emission factors: Fossil Fuel Carbon Contents

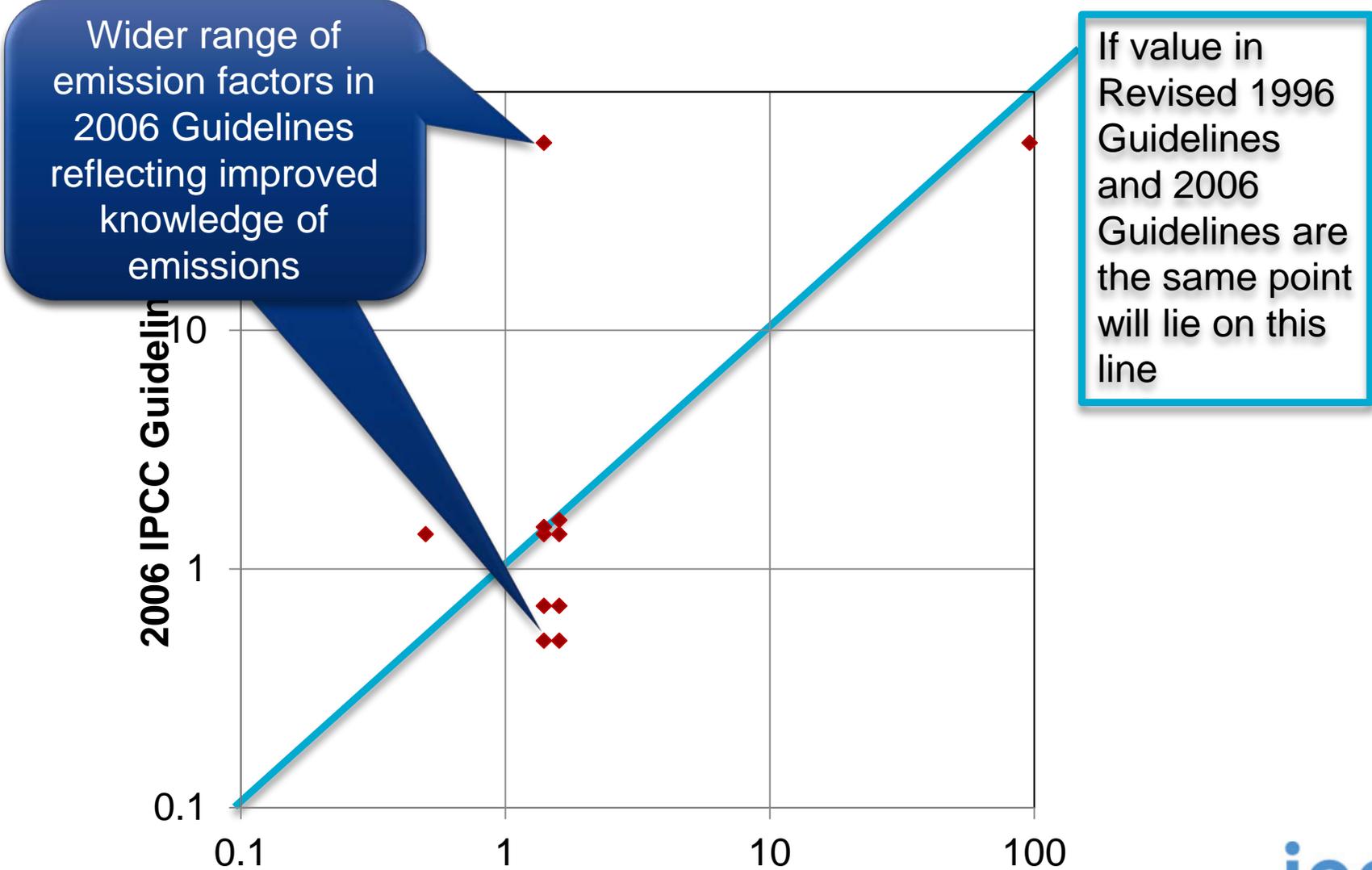
## Revised 1996 Guidelines + GPG

- Marland & Rotty (1984)
- Grubb (1989)
- Expert Meetings
  - 1991 OECD (1991)
  - 1992 IPCC/OECD (1993)
- Conversions use CV from OECD/IEA (1996) and 10% & 5% for gross to net CV (GCV to NCV)

## 2006 Guidelines

- Annex 1 Parties Inventories submitted in 2004 (2002 Emissions): NCV, Carbon factors
- IPCC EFDB data as of December 2003: Carbon and CV data including developing countries
- IEA NCV Database November 2004 (includes developing country data)

# N<sub>2</sub>O – Bituminous Coal Combustion



# New Guidance in 2006 Guidelines

## Fuel Combustion

- CO<sub>2</sub> -Transport and Storage
- Urea-based Catalysts (Road Transport)

## Fugitive Emissions from Fuels

- Abandoned Underground Mines

## Mineral Industry

- Glass Production
- Ceramics
- Non Metallurgical Magnesia Production

## Chemical Industry

- Caprolactam, Glyoxal & Glyoxylic Acid
- Titanium Dioxide Production
- Petrochemical and Carbon Black Production

## Metal Industry

- Lead Production
- Zinc Production

## Electronics Industries

- Integrated Circuit or Semiconductor
- TFT Flat Panel Display
- Photovoltaics
- Heat Transfer Fluid

## Other Product Manufacture and Use

- Electrical Equipment
- Military Applications
- Accelerators
- Medical Applications
- Propellant for Pressure and Aerosol Products

## Substitutes for Ozone Depleting Substances

## Land Use

- Complete, consistent treatment of fires
- Settlements remaining Settlements
- Some wetlands categories
- Urea Application
- Indirect N<sub>2</sub>O Emissions from Manure
- Harvested Wood Products

## Waste

- Open Burning of Waste
- Biological Treatment of Solid Waste

## Other

- Indirect N<sub>2</sub>O Emissions from the Atmospheric Deposition of N (excluding agriculture)

# "New" gases in 2006 Guidelines

## - Sources Identified in 2006 Guidelines

Currently, Annex I parties must report these

Many non-annex I parties just report these

	All Sectors	Industrial Processes	Electronics Industries	Magnesium production	Production of Halogenated Compounds	GWP in AR4
CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	✓	✓				✓
HFC, PFC, SF <sub>6</sub>		✓				✓
nitrogen trifluoride (NF <sub>3</sub> )			✓		✓	✓
trifluoromethyl sulphur pentafluoride (SF <sub>5</sub> CF <sub>3</sub> )					✓	✓
halogenated ethers (e.g. C <sub>4</sub> F <sub>9</sub> OC <sub>2</sub> H <sub>5</sub> , CHF <sub>2</sub> OCF <sub>2</sub> OC <sub>2</sub> F <sub>4</sub> OCHF <sub>2</sub> , CHF <sub>2</sub> OCF <sub>2</sub> OCHF <sub>2</sub> )						✓
CF <sub>3</sub> I, CH <sub>2</sub> Br <sub>2</sub> , CHCl <sub>3</sub>						
CH <sub>2</sub> Cl <sub>2</sub> , CH <sub>3</sub> Cl						✓
C <sub>3</sub> F <sub>7</sub> C(O)C <sub>2</sub> F <sub>5</sub>						
C <sub>4</sub> F <sub>6</sub> , C <sub>5</sub> F <sub>8</sub> , c-C <sub>4</sub> F <sub>8</sub> O			✓		✓	

"New" gases only from these sub-categories

# New Tier 1 Method: Landfills

- The 2006 Guidelines provide a simple, Tier 1 approach, to estimating emissions from landfill (SWDS).
  - This avoids any “potential” emission estimates as these are misleading and may over- or under-estimate emissions
  - A spreadsheet is provided that at a minimum requires ONLY the waste arising in the current year (with historic population data).
  - As more information is added the estimates become increasingly refined. A time series of waste arising, changes in SWDS capacity or changes in waste composition can be included if available.
  - Incidentally this spreadsheet can be used for projections



# New Methods: IPPU & HWP

- Fluorinated Gases
  - Minimal data needed: Only need to know current years' imports, exports, production etc. and year of first use.
- Harvested Wood Products
  - No national data needed: All data can be downloaded from the FAO.



# Sectoral Improvements

- Energy
  - Improved fuel factors based on wide range of data
  - CCS included explicitly
  - Role of “reference approach” as QA tool clarified
  - Urea Based catalysts
- IPPU – Industrial Processes and Product Use
  - Combines Industrial Processes and Solvent Use
  - No removals from short term CO2 storage in products unless emissions accounted for (e.g. Urea)
- AFOLU – Agriculture, Forestry and Other Land Use
  - Combines Agriculture and LULUCF
  - Improved consistency and coverage of fires (n.b. mapping back)
- Waste
  - New (Tier 1) FOD model for landfill sites (similar to 1996 Tier 2)

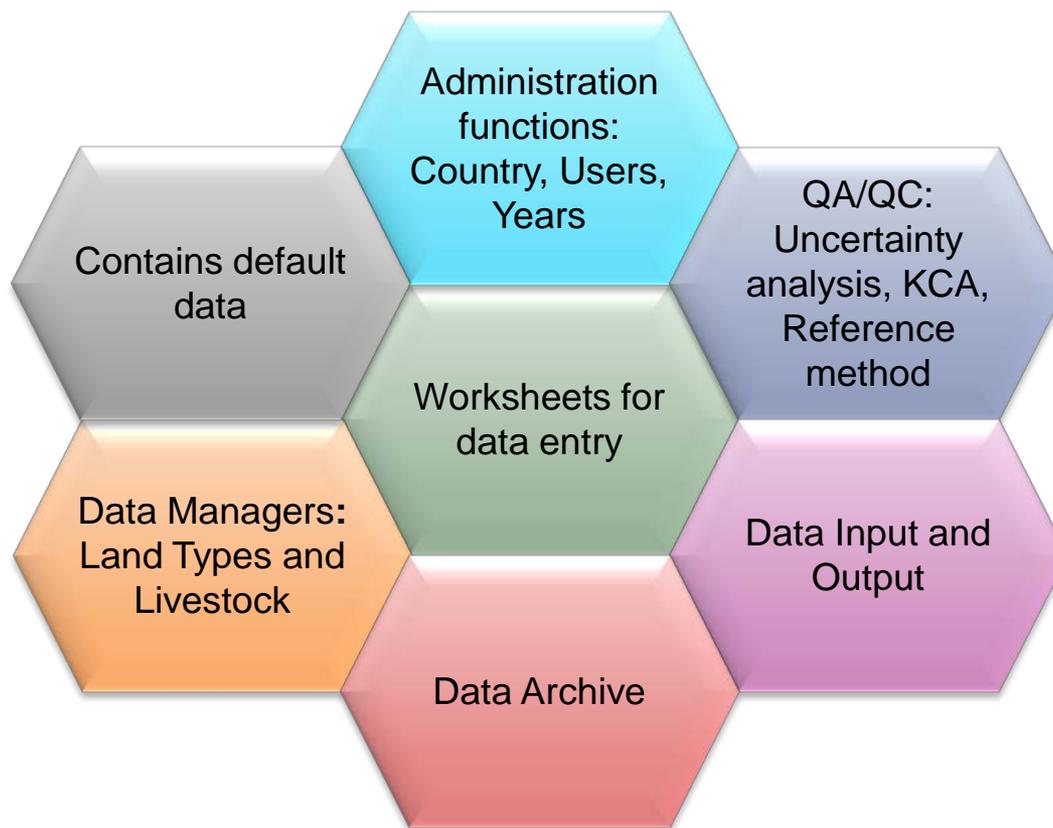
# Why use the 2006 GLs? - Summary

- The 2006 Guidelines are available and can be used to estimate emissions and removals for reporting according to either the 1996, GPG or 2006 guidelines
- They are a valuable resource with
  - ❖ New and updated emission factors and other parameters
  - ❖ Revised and updated methods
    - No “potential” emissions (landfills, F-gas use) all Tier 1 methods give estimates of annual emissions
    - Classification revised to improve transparency and reduce risk of double-counting or omissions
    - More clarity on distinction of Energy and IPPU sectors (non-energy use of fuels)
    - More sources/sinks and gases covered
    - Improved HWP guidance
  - ❖ GPG and methodological guidance integrated

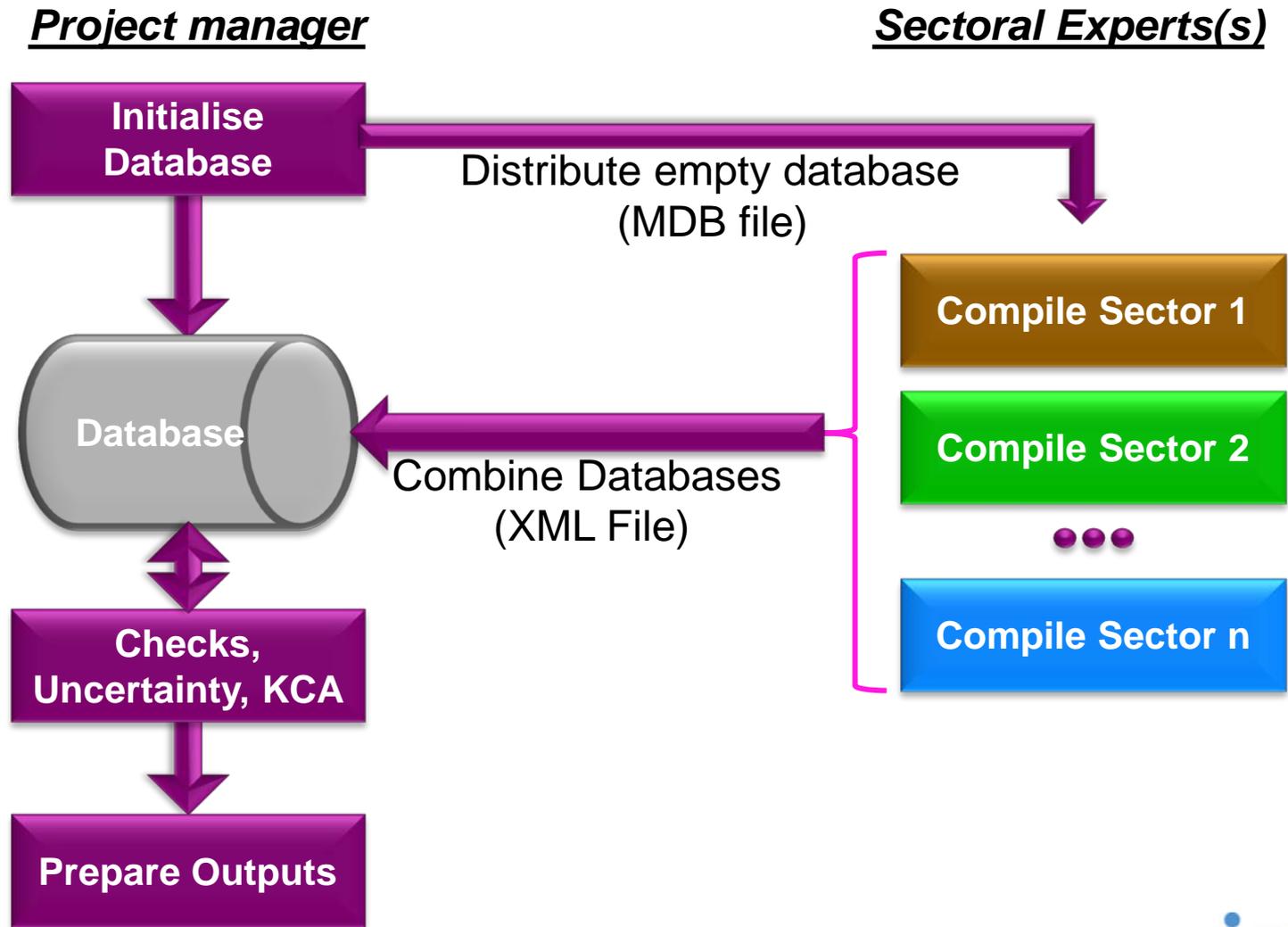
# IPCC Inventory Software

- We now have software that can assist in using the IPCC Guidelines
  - ❖ It can be used for the whole inventory or just individual categories
  - ❖ Can be used when reporting 1996 or 2006 Guidelines
  - ❖ Stand alone software with modest hardware requirements
  - ❖ Includes Uncertainty and Key Category Analysis
  - ❖ Aids QA/QC
  - ❖ Will output in non-Annex 1 National Communications format
  - ❖ Will be developed to include more input/output and reporting options and complete Tier 2 coverage
  - ❖ FREE!

# Software Functions



# Multiple Users



IPCC 2006 Categories

- 1 - Energy
  - 1.A - Fuel Combustion Activities
    - 1.A.1 - Energy Industries
      - 1.A.1.a - Main Activity Electricity and Heat P
        - 1.A.1.a.i - Electricity Generation
        - 1.A.1.a.ii - Combined Heat and Power Ge
        - 1.A.1.a.iii - Heat Plants
      - 1.A.1.b - Petroleum Refining
      - 1.A.1.c - Manufacture of Solid Fuels and Oth
        - 1.A.1.c.i - Manufacture of Solid Fuels
        - 1.A.1.c.ii - Other Energy Industries
    - 1.A.2 - Manufacturing Industries and Constructio
      - 1.A.2.a - Iron and Steel
      - 1.A.2.b - Non-Ferrous Metals
      - 1.A.2.c - Chemicals
      - 1.A.2.d - Pulp, Paper and Print
      - 1.A.2.e - Food Processing, Beverages and To
      - 1.A.2.f - Non-Metallic Minerals
      - 1.A.2.g - Transport Equipm
      - 1.A.2.h - Machinery
      - 1.A.2.i - Mining (excluding
      - 1.A.2.j - Wood and wood prod
      - 1.A.2.k - Construction
      - 1.A.2.l - Textile and
      - 1.A.2.m - Non-specifi
    - 1.A.3 - Transport
      - 1.A.3.a - Civil Aviatio
        - 1.A.3.a.i - Internat
        - 1.A.3.a.ii - Domes
      - 1.A.3.b - Road Transport
        - 1.A.3.b.i - Cars
          - 1.A.3.b.i.1 - Passenger cars with 3-wa
          - 1.A.3.b.i.2 - Passenger cars without 3
        - 1.A.3.b.ii - Light-duty trucks
          - 1.A.3.b.ii.1 - Light-duty trucks with 3-
          - 1.A.3.b.ii.2 - Light-duty trucks without
        - 1.A.3.b.iii - Heavy-duty trucks and buses
        - 1.A.3.b.iv - Motorcycles
        - 1.A.3.b.v - Evaporative emissions from ve
        - 1.A.3.b.vi - Urea-based catalysts
      - 1.A.3.c - Railways
      - 1.A.3.d - Water-borne Navigation
        - 1.A.3.d.i - International water-borne navig

Hierarchical list of categories

Fuel Combustion Activities

Worksheet

Sector: Energy

Category: Fuel Combustion Activities

Subcategory: 1.A.1.a.i - Electricity Generation

Sheet: CO2, CH4 and N2O from fuel combustion by source categories - T...

Data

Fuel Type: (All fuels)

Category selected: Energy

Conversion Factor Type  NCV  GOV

Fuel	Energy Consumption		CO2		CH4		N2O			
	A Consumption (Mass, Volume or Energy Unit)	B Conversion Factor (TJ/Unit) (NCV)	C Consumption (TJ) (C=A*B)	D CO2 Emission Factor (kg CO2/TJ)	Z Amount Captured (Gg CO2)	E CO2 Emissions (Gg CO2) E=C*D*(1-Z)	F CH4 Emission Factor (kg CH4/TJ)	G CH4 Emissions (Gg CH4) G=C*F*10 <sup>-6</sup>	H N2O Emission Factor (kg N2O/TJ)	I N2O Emissions (Gg N2O) I=C*H*10 <sup>-6</sup>
Anthracite	1000	26.7	26700	96300		26***	1	0.0***	1.5	0.04***
Coking Coal	2000	26.2	52400	94600		53***	1	0.0***	1.5	0.0846
Other Bitum...	3000	25.8	77400	94600		73***	1	0.0***	2	0.1548
Sub-Bitumi...	4000			96100		72***	1	0.0***	1.5	0.1134
Lignite	5000			101000	500	55***	1	0.0***	1.5	0.08***
Oil Shale /...	500			107000		47***	NE	0	1.5	0.00***
	600			97500		12***	1	0.0***	1.5	0.01***
	300			77000		63***	3	0.0***	0.6	0.00***
			320720			303791		0.33277		0.51296

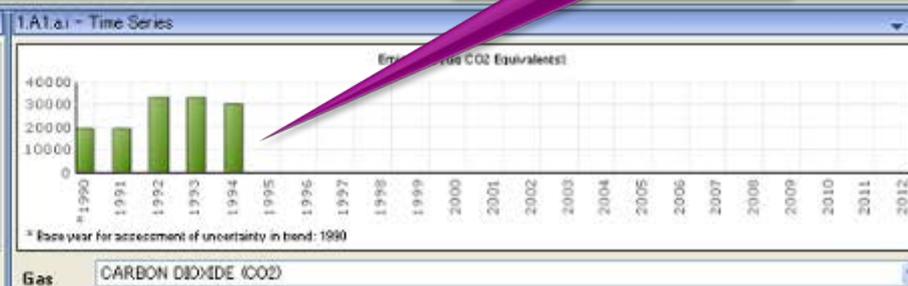
Data Entry

Worksheet-based calculations follow 2006 Guidelines

Time Series Display

Worksheet remarks

Save



- IPCC 2006 Categories
- 1.A.4b - Residential
  - 1.A.4c - Agriculture/Forestry/Fishing/Fish F
  - 1.A.4.c.i - Stationary
    - 1.A.4.c.i.i - Off-road Vehicles and Other
    - 1.A.4.c.i.ii - Fishing (mobile combustion)
  - 1.A.5 - Non-Specified
    - 1.A.5a - Stationary
    - 1.A.5b - Mobile
      - 1.A.5b.i - Mobile (aviation component)
      - 1.A.5b.ii - Mobile (water-borne component)
      - 1.A.5b.iii - Mobile (Other)
    - 1.A.5c - Multilateral Operations
  - 1.B - Fugitive emissions from fuels
    - 1.B.1 - Solid Fuels
      - 1.B.1.a - Coal mine and handling
        - 1.B.1.a.i - Underground mines
          - 1.B.1.a.i.1 - Mining
          - 1.B.1.a.i.2 - Post-mining seam gas emission
          - 1.B.1.a.i.3 - Abandoned underground
          - 1.B.1.a.i.4 - Flaring of drained methane
        - 1.B.1.a.i.ii - Surface mines
          - 1.B.1.a.i.ii.1 - Mining
          - 1.B.1.a.i.ii.2 - Post-mining seam gas emission
      - 1.B.1.b - Uncontrolled combustion and burn
      - 1.B.1.c - Solid fuel transformation
    - 1.B.2 - Oil and Natural Gas
      - 1.B.2.a - Oil
        - 1.B.2.a.i - Venting
        - 1.B.2.a.ii - Flaring
        - 1.B.2.a.iii - All Other
          - 1.B.2.a.iii.1 - Exploration
          - 1.B.2.a.iii.2 - Production and Upgrading
          - 1.B.2.a.iii.3 - Transport
          - 1.B.2.a.iii.4 - Refining
          - 1.B.2.a.iii.5 - Distribution of oil products
          - 1.B.2.a.iii.6 - Other
      - 1.B.2.b - Natural Gas
        - 1.B.2.b.i - Venting
        - 1.B.2.b.ii - Flaring
        - 1.B.2.b.iii - All Other
          - 1.B.2.b.iii.1 - Exploration
          - 1.B.2.b.iii.2 - Production
          - 1.B.2.b.iii.3 - Processing

Oil and Natural Gas

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil and Gas Operations  
 Subcategory: 1.B.2.a.i - Venting  
 Sheet: CO2, CH4 and N2O from fugitive emissions

1994

Industry Segment	Subcategory	Activity	AD	Emission Factor (Gg CO2/Unit for AD)	CO2 Emissions (Gg CO2)	CH4		N2O	
						Emission Factor (Gg CH4/Unit for AD)	CH4 Emissions (Gg CH4)	Emission Factor (Gg N2O/Unit for AD)	N2O Emissions (Gg N2O)
						C=A*B	E=A*D	G=A*F	
Oil Production	Conventional Oil	1000	10 <sup>6</sup> Sm <sup>3</sup>	95E-05	0.095	0.00072	0.72	0.05	50
	Default Weighted Total	500	10 <sup>6</sup> Sm <sup>3</sup>	0.0018	0.9	0.0087	4.35	0.05	25
	Heavy Oil / Cold Bitumen	600	10 <sup>6</sup> Sm <sup>3</sup>	0.0059	3.18	0	0	0	0
	Thermal Oil Production	400	10 <sup>6</sup> Sm <sup>3</sup>	0.0022	0.88	0.0035	1.4	0.03	12
Oil Transport	Loading of Off-shore Production on Tanker Ships	300	10 <sup>6</sup> Sm <sup>3</sup>	0.005	1.5	0.0003	0.09	0.0002	0.06
Total					5.763				

Notation Keys Available

Defaults Available: can be over-written with country specific data

Uncertainties

Time Series Data Entry

IPCC 2006 Guidelines

See Table 4.2.7 'Guidance on obtaining the activity data values required for use in Tier 1 approach to estimate fugitive emissions from oil and gas operations' in Chapter 4, Volume 2 of the 2006 IPCC Guidelines

Worksheet remarks

1.B.2.a.i - Time Series

Year	Emissions (CO2 Equivalents)
1997	
1998	
1999	
2000	
2001	
2002	
2003	
2004	
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	

Save

Gas CARBON DIOXIDE (CO2)

# Support

- The TSU is supporting the software:
  - ❖ Help Desk: email [ipcc-software@iges.or.jp](mailto:ipcc-software@iges.or.jp)
  - ❖ Web Forum: <https://discussions.zoho.com/ipccinventorysoftware/>
- TSU is preparing User Guide and Manual
- TSU will maintain software and is planning to add functions of the software:
  - ❖ Complete Tier 2 coverage
  - ❖ More output formats
  - ❖ Link to ALU Software



Task Force on National Greenhouse Gas Inventories

*Thank you*

IPCC Inventory Software & IPCC Guidelines  
can be downloaded from

<http://www.ipcc-nggip.iges.or.jp>