



Task Force on National Greenhouse Gas Inventories

Launch of IPCC Inventory Software

2006 IPCC guidelines for National Greenhouse Gas Inventories



Side-Event, SB 36 Sessions, Bonn 16 May 2012,

Aim to introduce the new IPCC Inventory Software

- Presentations
 - 2006 Guidelines
 - The Inventory Software
 - Examples
 - Energy Sector
 - Waste Sector
 - Land Use
- Q & A
- Demonstration/trials in small groups
 - Install software if you wish

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

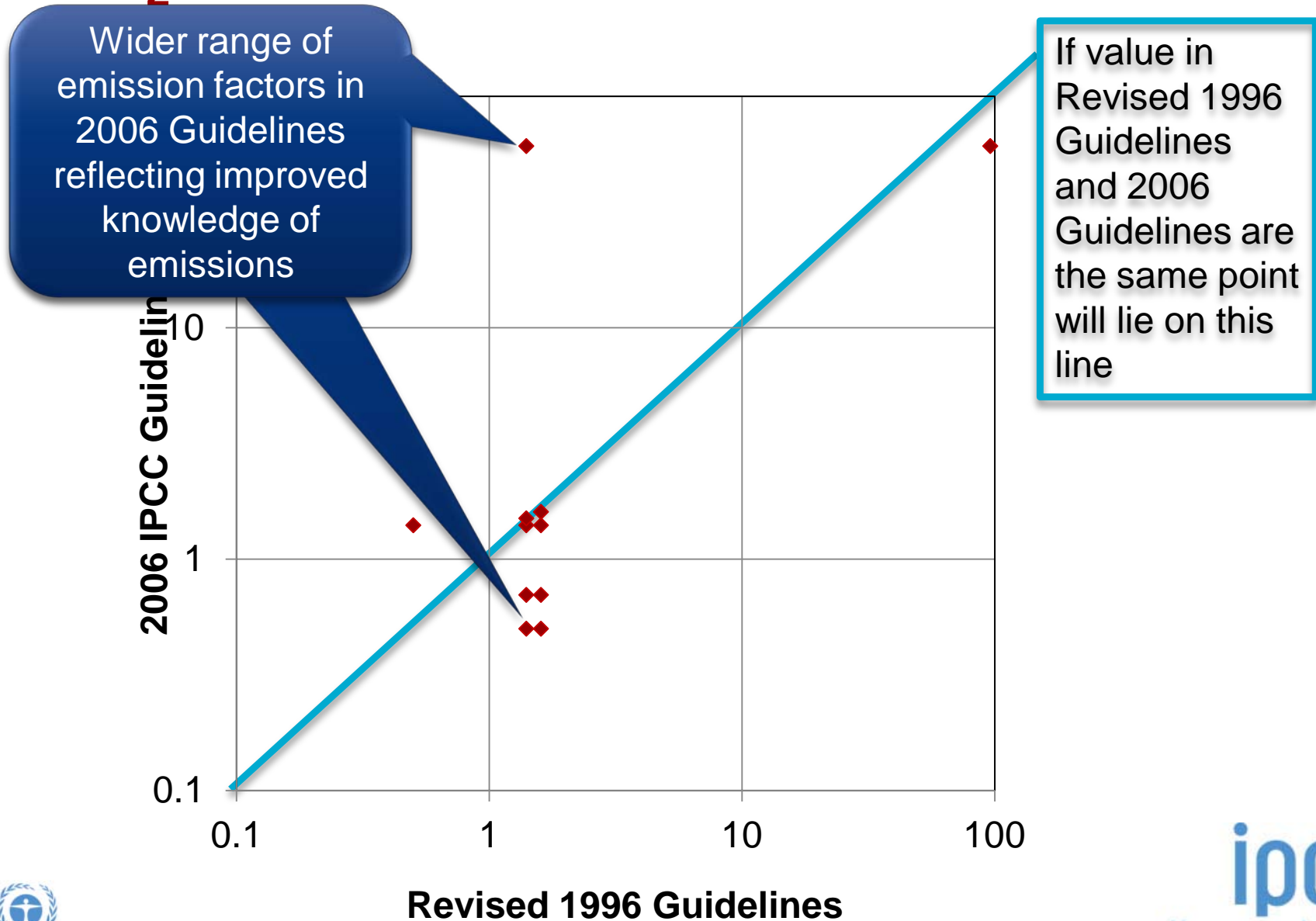
Revised 1996 Guidelines + GPG

- 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)

N₂O – Bituminous Coal Combustion



New Guidance in 2006 Guidelines

Fuel Combustion

- CO₂ -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 N₂O Emissions from Manure
- Harvested Wood Products

Waste

- Open Burning of Waste
- Biological Treatment of Solid Waste

Other

- Indirect N₂O 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	Halogenated Compounds Production	GWP in AR4
CO ₂ , CH ₄ , N ₂ O	✓	✓				✓
HFC, PFC, SF ₆		✓				✓
nitrogen trifluoride (NF ₃)			✓		✓	✓
trifluoromethyl sulphur pentafluoride (SF ₅ CF ₃)					✓	✓
halogenated ethers (e.g. C ₄ F ₉ OC ₂ H ₅ , CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂ , CHF ₂ OCF ₂ OCHF ₂)						✓
CF ₃ I, CH ₂ Br ₂ , CHCl ₃						
CH ₂ Cl ₂ , CH ₃ Cl						✓
C ₃ F ₇ C(O)C ₂ F ₅						
C ₄ F ₆ , C ₅ F ₈ , c-C ₄ F ₈ 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 Changes in 2006 Guidelines

- 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 FOD model for landfill sites

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 2006 Guidelines
 - ❖ It can be used for the whole inventory or just individual categories
 - ❖ 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!

IPCC Inventory Software: Overview

Outline

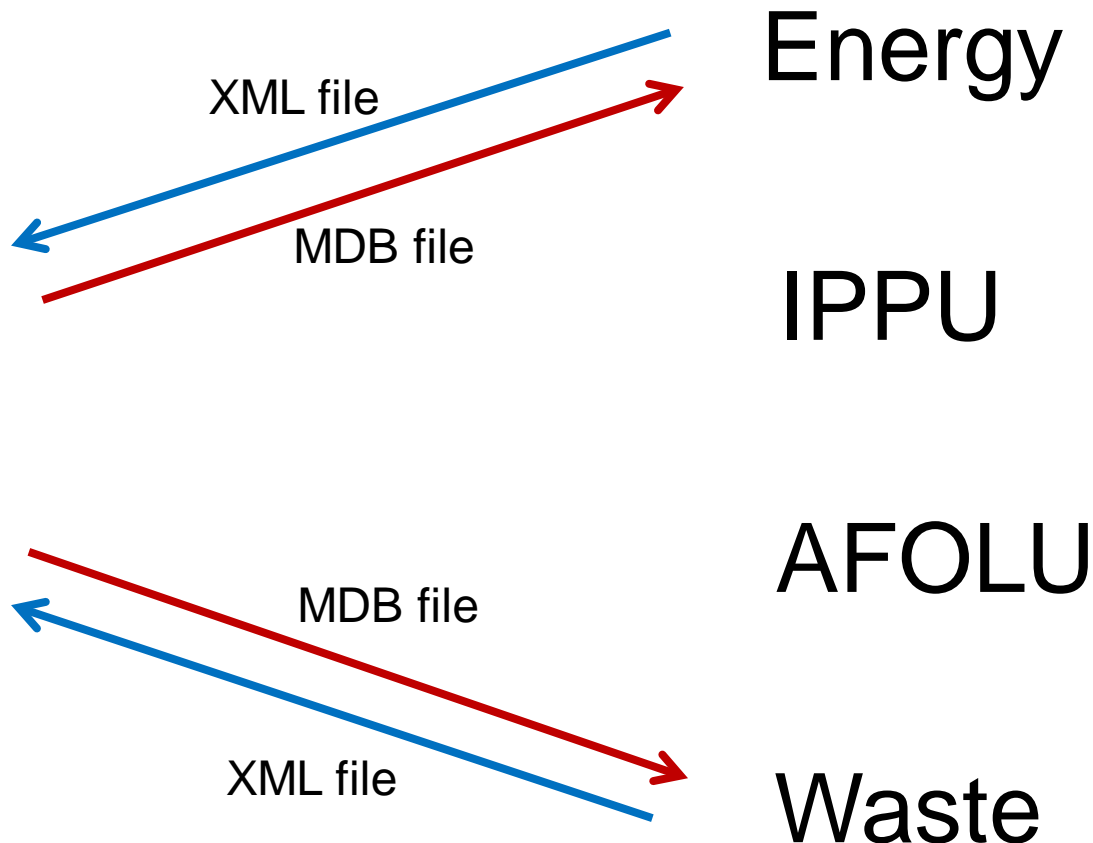
- Software Administration
- Use of worksheets
- Examples
 - Simple worksheet: Energy sector
 - Emissions Model: Solid waste disposal
 - Data Manager: Land type

How to set up compilers team?

Project Manager

Initial setting

- Country
- Inventory Years
- Users



IPCC 2006 Categories

- 1 - Energy
 - 1A - Fuel Combustion Activities
 - 1A1 - Energy Industries
 - 1A1.a - Main Activity Electricity and Heat P
 - 1A1.a.i - Electricity Generation
 - 1A1.a.ii - Combined Heat and Power Ge
 - 1A1.a.iii - Heat Plants
 - 1A1.b - Petroleum Refining
 - 1A1.c - Manufacture of Solid Fuels and Oth
 - 1A1.c.i - Manufacture of Solid Fuels
 - 1A1.c.ii - Other Energy Industries
 - 1A2 - Manufacturing Industries and Constructio
 - 1A2.a - Iron and Steel
 - 1A2.b - Non-Ferrous Metals
 - 1A2.c - Chemicals
 - 1A2.d - Paper and Print
 - 1A2.e - Food Processing, Beverages and To
 - 1A2.f - Non-Metallic Minerals
 - 1A2.g - Transport Equipment
 - 1A2.h - Machinery
 - 1A2.i - Mining (excluding oil and gas)
 - 1A2.j - Wood and wood prod
 - 1A2.k - Construction
 - 1A2.l - Textile and leather
 - 1A2.m - Non-specified
 - 1A3 - Transport
 - 1A3.a - Civil Aviation
 - 1A3.a.i - International
 - 1A3.a.ii - Domestic
 - 1A3.b - Road Transport
 - 1A3.b.i - Cars
 - 1A3.b.i.1 - Passenger cars with 3-wa
 - 1A3.b.i.2 - Passenger cars without 3
 - 1A3.b.ii - Light-duty trucks
 - 1A3.b.ii.1 - Light-duty trucks with 3-
 - 1A3.b.ii.2 - Light-duty trucks without
 - 1A3.b.iii - Heavy-duty trucks and buses
 - 1A3.b.iv - Motorcycles
 - 1A3.b.v - Evaporative emissions from ve
 - 1A3.b.vi - Urea-based catalysts
 - 1A3.c - Railways
 - 1A3.d - Water-borne Navigation
 - 1A3.d.i - International water-borne nav

Hierarchical list of categories

Fuel Combustion Activities

Worksheet: Energy

Sector: Fuel Combustion Activities

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

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

Sheet: 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)	E Amount Captured (Gg CO2)	F CH4 Emission Factor (kg CH4/TJ)	G CH4 Emissions (Gg CH4) (G=C*F/10 ⁶)	H N2O Emission Factor (kg N2O/TJ)	I N2O Emissions (Gg N2O) (I=C*H/10 ⁶)	
Anthracite	1000	Ge	26.7	26700	98300	26***	1	0.0***	15	0.04***
Coking Coal	2000	Ge	28.2	56400	94600	53***	1	0.0***	15	0.0846
Other Bitum...	3095	Ge	25.8	77400	94600	73***	1	0.0***	2	0.1548
Sub-Bitum...	4000	Ge	26.7	106800	96100	72***	1	0.0***	15	0.1134
Lignite	5000	Ge	26.7	133500	101000	55***	1	0.0***	15	0.08***
Oil Shale /***	500	Ge	26.7	13350	107000	47***	1	0.0***	15	0.00***
	600	Ge			97500	12***	1	0.0***	15	0.01***
	300	Ge			77000	63***	3	0.0***	0.6	0.00***
				320720		303791		0.39277		0.51236

Data Entry

Worksheet-based calculations follow 2006 Guidelines

Time Series Display

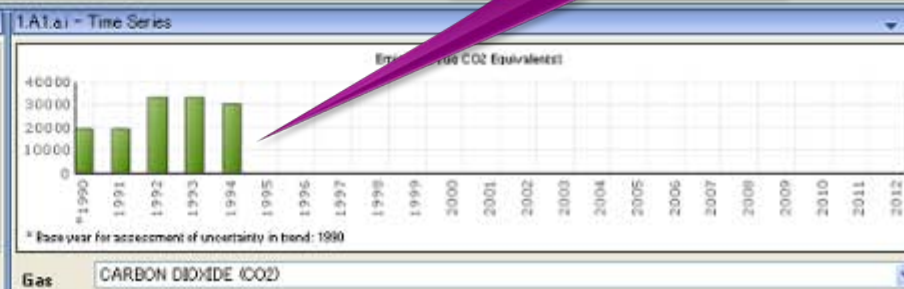
IPCC 2006 Guidelines

Worksheet remarks

Save

1.A1.a.i - Time Series

Gas: CARBON DIOXIDE (CO2)



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.ii - Off-road Vehicles and Other
 - 1.A.4.c.iii - Fishing (mobile combustion)
- 1.A.5 - Non-Specified
 - 1.A.5a - Stationary
 - 1.A.5b - Mobile
 - 1.A.5.b.i - Mobile (aviation component)
 - 1.A.5.b.ii - Mobile (water-borne component)
 - 1.A.5.b.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 emi
 - 1.B.1.a.i.3 - Abandoned underground
 - 1.B.1.a.i.4 - Flaring of drained methan
 - 1.B.1.a.ii - Surface mines
 - 1.B.1.a.ii.1 - Mining
 - 1.B.1.a.ii.2 - Post-mining seam gas em
 - 1.B.1.b - Uncontrolled combustion and burni
 - 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 Upgradin
 - 1.B.2.a.iii.3 - Transport
 - 1.B.2.a.iii.4 - Refining
 - 1.B.2.a.iii.5 - Distribution of oil produc
 - 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

Worksheet

Sector: Energy
 Category: Fugitive Emissions from Fuels - Oil and Natural Gas
 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)
						D	E	F	G
						C=A*B	E=A*D	G=A*F	
Oil Production	Conventional Oil	1000	10 ⁶ Sm ³	95E-05	0.095	0.00072	0.72	0.05	50
	Default Weighted Total	500	10 ⁶ Sm ³	0.0078	0.9	0.0087	4.35	0.05	25
	Heavy Oil / Cold Bitumen	600	10 ⁶ Sm ³	0.0059	3.18	0	0	0.03	0
	Thermal Oil Production	400	10 ⁶ Sm ³	0.0022	0.9	0.0035	1.4	0.03	12
Oil Transport	Loading of Off-shore Production on Tanker Ships	300	10 ⁶ Sm ³	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 4.27 "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	

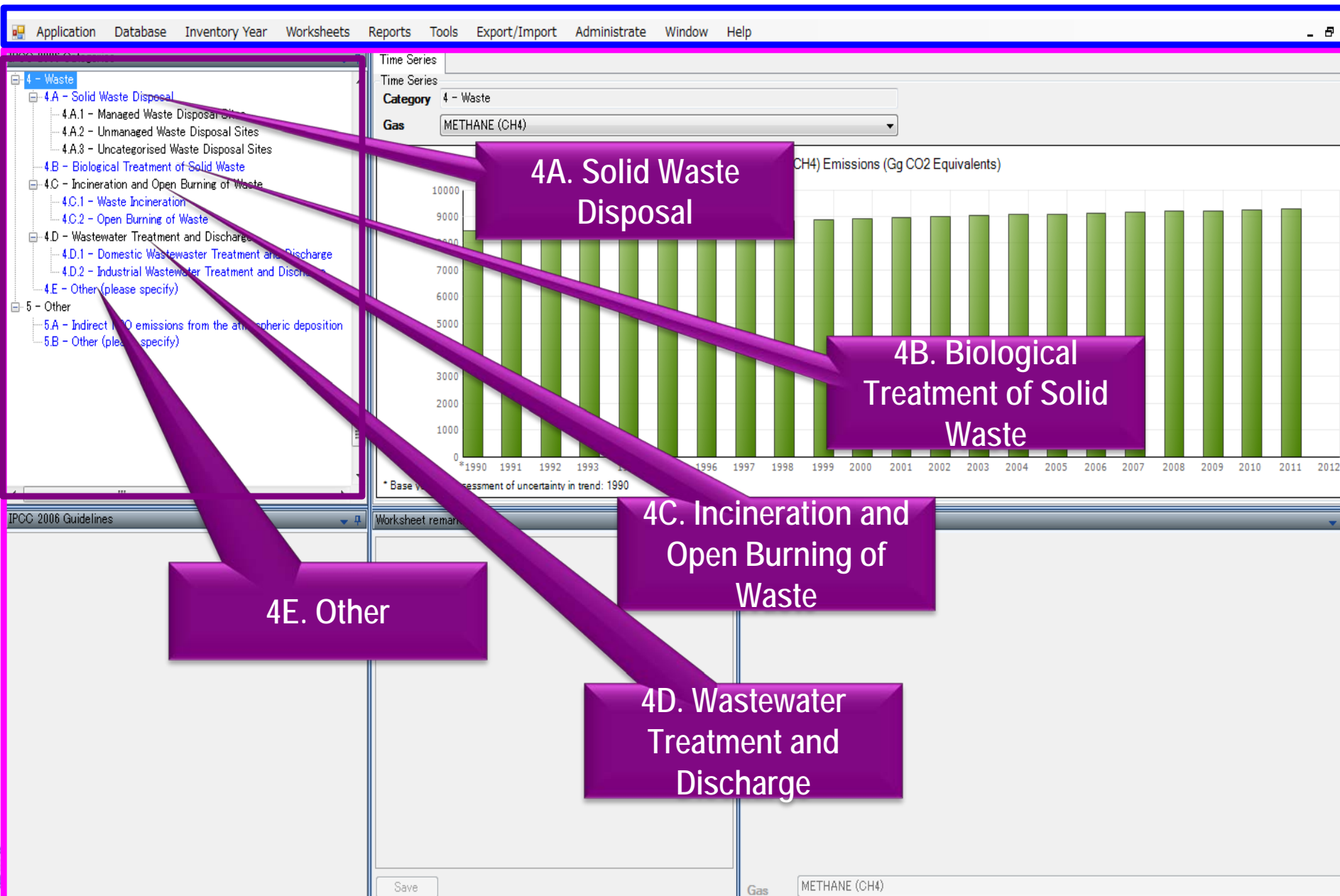
Save

Gas CARBON DIOXIDE (CO2)

Example: Energy

Example: Waste

Waste Sector



Waste Sector: 4A. Solid Waste Disposal

First order decay (FOD) method for estimation of CH₄ emissions from solid waste disposal sites (SWDS)

- *Estimates actual emissions*

Two options for estimation of emissions from municipal solid waste (MSW) depending on data availability

- *Waste composition*
- *Bulk waste*

Historical data on solid waste disposal

- *Amount of MSW can be estimated from population and per capita waste generation data (Tier1)*

Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

IPCC 2006 Categories

- 4 - Waste
 - 4.A - Solid Waste Disposal
 - 4.A.1 - Managed Waste Disposal Sites
 - 4.A.2 - Unmanaged Waste Disposal Sites
 - 4.A.3 - Unsegregated Waste Disposal Sites
 - 4.B - Biological Treatment of Solid Waste
 - 4.C - Incineration and Open Burning of Waste
 - 4.C.1 - Waste Incineration
 - 4.C.2 - Open Burning of Waste
 - 4.D - Wastewater Treatment and Discharge
 - 4.D.1 - Domestic Wastewater Treatment and Discharge
 - 4.D.2 - Industrial Wastewater Treatment and Discharge
 - 4.E - Other (pollution abatement)
- 5 - Other
 - 5.A - Indirect emissions from the atmospheric deposition of nitrogen in NOx and NH3
 - 5.B - Other (pollution abatement)

Parameters

Country/Territory: Slovakia

Region: Europe - Eastern

Climate Zone: Boreal and temperate dry

*Approach: Waste by composition

**Activity Data: Population / GDP (Tier 1)

Starting year: 1950

DOC (Degradable organic carbon) [weight fraction, wet basis]

Material	DOC (weight fraction, wet basis)	Methane generation rate constant (k) [1 / years]
Food Waste	0.150	0.060
Garden	0.200	0.050
Paper	0.400	0.040
Wood and straw	0.000	0.020
Textiles	0.000	0.040
Disposable nappies	0.000	0.050
Sewage sludge	0.000	0.050
Industrial Waste	0.000	0.050

DOC (fraction of DOC dissimilated): 0.50

Delay Time (months): 6

Fraction of methane (CH4) in developed gas: 0.50

Conversion Factor (CH4): 1.383333

Oxidation Factor (Ox): 0.00

Parameters for carbon

% paper in industrial waste: 0.00 %

% wood in industrial waste: 0.00 %

* The bulk waste option is used for countries without data or with limited data on waste composition, but with good information on bulk waste disposed at a particular location. Default values are estimated for each of the climate zone.

** In case of "Population and GDP" activity data sheet to estimate amount of waste to SWDS based on Population and GDP. In case of "National statistics" activity data sheet, amounts directly into "Amount deposited" sheet.

Uncertainties Reset to default Save

Worksheet remarks

4.A - Time Series

Save

Gas: CARBON DIOXIDE (CO2)

Solid Waste Disposal

Select appropriate region and climate zone

IPCC default values will be adjusted (e.g. methane generation rate constant)

Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

IPCC 2006 Categories

- 4 - Waste
 - 4.A - Solid Waste Disposal
 - 4.A.1 - Managed Waste Disposal Sites
 - 4.A.2 - Unmanaged Waste Disposal Sites
 - 4.A.3 - Uncategorised Waste Disposal Sites
 - 4.B - Biological Treatment of Solid Waste
 - 4.C - Incineration and Open Burning of Waste
 - 4.C.1 - Waste Incineration
 - 4.C.2 - Open Burning of Waste
 - 4.D - Wastewater Treatment and Discharge
 - 4.D.1 - Domestic Wastewater Treatment and Discharge
 - 4.D.2 - Industrial Wastewater Treatment and Discharge
 - 4.E - Other (please specify)
- 5 - Other
 - 5.A - Indirect N₂O emissions from the atmospheric deposition of nitrogen in NO_x and NH₃
 - 5.B - Other (please specify)

Parameters: Methane Correction Factor, **Activity Data**, Amount Deposited, Methane Calculations, Methane Recovery, Results, Long Term stored C in SWDS, Harvested Wood Products

Worksheet: Waste
 Sector: Waste
 Category: Methane emissions from Solid Waste Disposal Sites
 Subcategory: 4.A - Solid Waste Disposal
 Sheet: Industrial and MSW Activity Data
 Data: Waste Composition Type: Municipal Solid Waste

Year	Population [millions]	Waste per capita [g/cap/yr]	Total MSW [Gg]	% SWDS [%]	Total to SWDS [Gg]	Composition of waste going to solid waste disposal sites									
						Food [%]	Garden [%]	Paper [%]	Wood [%]	Textile [%]	Nappies [%]	Plastics, other inert [%]	Total [=100 %]		
IPCC Regional Defaults	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1950	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1951	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1952	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1953	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1954	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1955	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1956	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1957	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1958	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1959	6	320	1920	80	1536	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1960	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1961	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1962	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1963	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1964	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1965	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1966	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		
1967	7	2240	2240	80	1792	30.1	1	21.8	7.5	4.7	0.5	34.4	100		

This worksheet allows Ctrl+C/Ctrl+V to copy/paste data. Only edited cells can be overwritten when pasting.

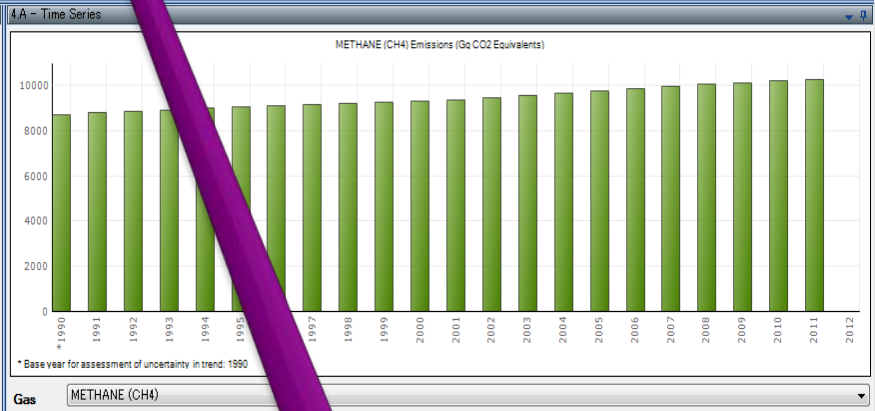
IPCC 2006 Guidelines

Time Delay
 The default assumption is that the reaction starts on the first of January in the year after deposition, which is equivalent to an average delay time of six months before decay to methane commences ("Delay time" = 0). It is good practice to assume an average delay of from two to six months. If a value greater than six months is chosen, evidence to support this must be provided. To make the model work for delay times from 7 to 18 months, the number 13 in "exp2" in all the methane calculating sheets is changed to 25, and DDOCmd in columns F and G is readdressed one cell down.

Save

Worksheet remarks

4.A - Time Series



Are historical data on solid waste disposal available?

NO

YES



IPCC 2006 Categories

- 4.A - Solid Waste Disposal
 - 4.A.1 - Managed Waste Disposal Sites
 - 4.A.2 - Unmanaged Waste Disposal Sites
 - 4.A.3 - Uncategorised Waste Disposal Sites
- 4.B - Biological Treatment of Solid Waste
- 4.C - Incineration and Open Burning of Waste
 - 4.C.1 - Waste Incineration
 - 4.C.2 - Open Burning of Waste
- 4.D - Wastewater Treatment and Discharge
 - 4.D.1 - Domestic Wastewater Treatment and Discharge
 - 4.D.2 - Industrial Wastewater Treatment and Discharge
- 4.E - Other (please specify)
- 5 - Other
 - 5.A - Indirect N2O emissions from the atmospheric deposition
 - 5.B - Other (please specify)

Parameters Methane Correction Factor Activity Data Amount Deposited **Methane Calculations** Methane Recovery Results Long Term stored C in SWDS Harvested Wood Products

Worksheet

Sector: Waste
 Category: Methane emissions from Solid Waste Disposal Sites
 Subcategory: 4.A - Solid Waste Disposal
 Sheet: Methane Calculations

Data

Waste Type: **Industrial Waste**

DOC 0.15 DOCf 0.5 k 0.05 Half-life time (h=ln(2)/k) 13.86294361

exp1=exp(-k) 0.951229424 Month when the reaction set to start (M) 13 exp2=exp(-k*((13-M)/12)) 1 CH4 Fraction 0.5

Year	Amount deposited	MCF	Decomposable DOC (DDOCm) deposited	DDOCm not decomposed on year	DDOCm decomposed. Deposition year	DDOCm accumulated in SWDS end of year	DDOCm decomposed	CH4 generated
	g	fraction	Gg	Gg	Gg	Gg	Gg	Gg
1950	11875	0.675	601.17188	601.17188	0	601.17188	0	0
1951	11875	0.675	601.17188	601.17188	0	1173.02425	29.3195	19.54633
1952	11875	0.675	601.17188	601.17188	0	1716.98706	57.20907	38.13938
1953	11875	0.675	601.17188	601.17188	0	2234.42049	83.73845	55.82563
1954	11875	0.675	601.17188	601.17188	0	2726.61839	108.97397	72.64932
1955	11875	0.675	601.17188	601.17188	0	3194.81152	132.97875	88.6525
1956	11875	0.675	601.17188	601.17188	0	3640.17058	155.8128	103.8752

IPCC 2006 Guidelines

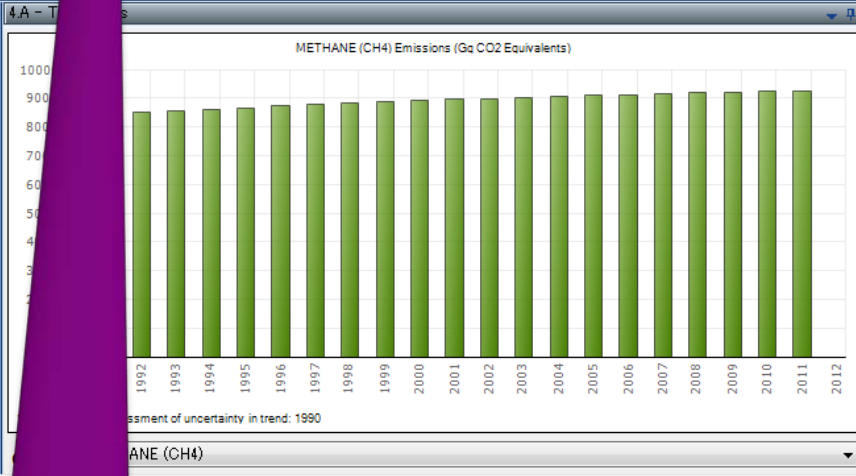
Time Delay

The default assumption is that the reaction starts on the first of January in the year after deposition, which is equivalent to an average delay time of six months before decay to methane commences ("Delay time" = 6). It is good practice to assume an average delay of from two to six months. If a value greater than six months is chosen, evidence to support this must be provided. To make the model work for delay times from 7 to 18 months, the number 13 in "exp2" in all the methane calculating sheets is changed to 25, and DDOCm in columns F and G is readdressed one cell down.

Worksheet re

4.A - T

Save



Waste category and type (e.g. industrial waste)

After entering parameters and activity data

Amount of CH₄ generated

- IPCC 2006 Categories
- 4 - Waste
 - 4A - Solid Waste Disposal
 - 4A.1 - Managed Waste Disposal Sites
 - 4A.2 - Unmanaged Waste Disposal Sites
 - 4A.3 - Uncategorised Waste Disposal Sites
 - 4B - Biological Treatment of Solid Waste
 - 4C - Incineration and Open Burning of Waste
 - 4C.1 - Waste Incineration
 - 4C.2 - Open Burning of Waste
 - 4D - Wastewater Treatment and Discharge
 - 4D.1 - Domestic Wastewater Treatment and Discharge
 - 4D.2 - Industrial Wastewater Treatment and Discharge
 - 4E - Other (please specify)
 - 5 - Other
 - 5A - Indirect N₂O emissions from the atmospheric deposition
 - 5B - Other (please specify)

Parameters Methane Correction Factor Activity Data Amount Deposited Methane Calculations Methane Recovery Results Long Term stored C in SWDS Harvested Wood Products

Worksheet

Sector: Waste
 Category: Methane emissions from Solid Waste Disposal Sites
 Subcategory: 4.A - Solid Waste Disposal
 Sheet: Results

Data

Year	Methane Generated									Total	Methane recovery	Methane Emissions
	Food	Garden	Paper	Wood	Textiles	Nappies	Sludge	Industrial				
	A (Gg)	B (Gg)	C (Gg)	D (Gg)	E (Gg)	F (Gg)	G (Gg)	H (Gg)	I (Gg)	J (Gg)	M = (I-J) * (1-OX) (Gg)	
1950	0	0	0	0	0	0	0	0	0	0	0	0
1951	0.94908	0.03521	1.23418	0.23051	0.15965	0.02113	0.13753	19.54693	22.31362	0	22.31362	
1952	1.8429	0.0687	2.41997	0.45645	0.31304	0.04122	0.26836	38.13938	43.55001	0	43.55001	
1953	2.68466	0.10056	3.55926	0.67792	0.46042	0.06033	0.3928	55.82563	63.76158	0	63.76158	
1954	3.4774	0.13086	4.65388	0.95202	0.60202	0.07852	0.51118	72.64992	82.99817	0	82.99817	
1955	4.22397	0.15969	5.70558	1.10000	0.73806	0.09581	0.62378	88.6525	101.30718	0	101.30718	
1956	4.92707	0.18711	6.71604	1.20000	0.86877	0.11227	0.73089	103.8752	118.7337	0	118.7337	
1957	5.58923	0.21319	7.68688	1.30000	0.99436	0.12791	0.83278	118.35548	135.32062	0	135.32062	
1958	6.21282	0.230	8.61965	1.40000	1.11502	0.1428	0.9297	132.12954	151.10873	0	151.10873	
1959	6.8001	0.2616	9.51585	1.50000	1.23095	0.15696	1.02189	145.23184	166.13681	0	166.13681	
1960	7.35317	0.28405	10.37691	1.60000	1.34233	0.17043	1.10958	157.69513	180.44177	0	180.44177	
1961	8.03222	0.31128	11.4099	1.70000	1.47596	0.18677	1.193	169.55058	194.497	0	194.497	
1962	8.67172	0.33717	12.40239	1.80000	1.60435	0.2023	1.27295	180.82784	207.87806	0	207.87806	
1963	9.27399	0.3618	13.35596	1.90000	1.7277	0.21708	1.34783	191.55609	220.61762	0	220.61762	
1964	9.84118	0.38524	14.27215	2.00000	1.84621	0.23114	1.41963	201.75917	232.74679	0	232.74679	
1965	10.37533	0.40752	15.1524	2.10000	1.96008	0.24451	1.48793	211.46559	244.29513	0	244.29513	
1966	10.87839	0.42873	15.9915	2.20000	2.06949	0.25724	1.55299	220.69863	255.29078	0	255.29078	
1967	11.35214	0.44889	16.8107	2.30000	2.1746	0.26934	1.61469	229.48136	265.76048	0	265.76048	
1968	11.79831	0.46808	17.5900	2.40000	2.27559	0.28085	1.67347	237.88675	275.7297	0	275.7297	
1969	12.21849	0.48632	18.3600	2.50000	2.37262	0.29179	1.72939	245.7827	285.22264	0	285.22264	
1970	12.61421	0.50368	19.1200	2.60000	2.46585	0.30291	1.78258	253.34287	294.56233	0	294.56233	

1994

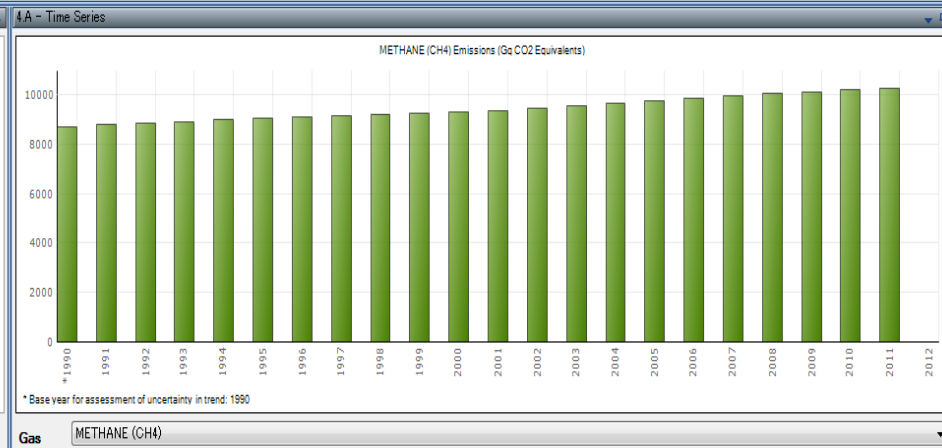
IPCC 2006 Guidelines

Time Delay
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Worksheet remarks

Annual CH₄ emissions

Save



Example: Land Use



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>