



# Session 3: IPCC Inventory Software for National GHG inventories – New Functionalities in the Energy Sector

**SBSTA - 56**

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**ipcc**

INTERGOVERNMENTAL PANEL ON climate change



# Overview of elements upgraded

- ✓ Fuel Manager
- ✓ Stationary Combustion
- ✓ Road Transportation
- ✓ Railways
- ✓ Off-road transportation
- ✓ Fugitive – Solid – Abandoned mines
- ✓ Fugitive – Oil – Venting
- ✓ Fugitive – Oil – Flaring

# Fuel Manager

- Contains main parameters on fuels, i.e. fuel type, calorific value, carbon content- needed to estimate GHG emissions from combustion
- Allows input of user-defined fuels and their parameters
- Information from fuel manager transfers to all corresponding worksheets
- In any relevant worksheets to estimate GHG emissions from source-categories where fuels are used, if IPCC default fuels are selected, the parameters are filled automatically in the worksheet

# Fuel Manager

Fuel Manager

Conversion Factor Type  NCV  GCV  Show user-defined fuels only

Basic Fuel Data						Reference Approach Specific Data		
Fuel Type	Fuel Name	Primary Fuel	Used in Aviation	Net Calorific Value (TJ / Gg)	Carbon content (kg C / GJ)	Used in Reference Approach	Used in Excluded Carbon estimation	Used in International Bunkers
Liquid Fuels	Diesel for off-road	<input type="checkbox"/>	<input type="checkbox"/>	38	17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liquid Fuels	Diesel for trains	<input type="checkbox"/>	<input type="checkbox"/>	40	19	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solid Fuels	Lignite Power Plants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaseous Fuels	Natural Gas Power Plants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	45	15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biomass	Biomass Residential	<input type="checkbox"/>	<input checked="" type="checkbox"/>	10	25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid Fuels	Petroleum Coke	<input type="checkbox"/>	<input type="checkbox"/>		26.6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liquid Fuels	Refinery Feedstocks	<input type="checkbox"/>	<input type="checkbox"/>		20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liquid Fuels	Refinery Gas	<input type="checkbox"/>	<input type="checkbox"/>		15.7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liquid Fuels	Residual Fuel Oil	<input type="checkbox"/>	<input type="checkbox"/>		21.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid Fuels	Shale Oil	<input type="checkbox"/>	<input type="checkbox"/>		20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid Fuels	White Spirit and SBP	<input type="checkbox"/>	<input type="checkbox"/>		20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Solid Fuels	Anthracite	<input checked="" type="checkbox"/>	<input type="checkbox"/>		26.8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Type and Name of default fuels cannot be changed and default fuels cannot be deleted.  
Selected Conversion Factor Type is automatically applied in all the relevant worksheets across all the Inventory Years.

Save Undo Close

# Stationary Combustion

2 worksheets are provided to estimate emissions

- A. Fuel Consumption Data** - subdivision, fuel, consumption amount, units, conversion factor
- consumption units can be selected from the defaults (Gg, TJ) - in this case conversion factor being filled automatically from Fuel Manager
  - or entered directly whatever unit is provided – and conversion factor thus be entered manually
- B. Fuel Combustion Emissions** – technology type and penetration rate by subdivision/fuel, EFs for each technology/fuel
- click “+” at left to expand subdivision and fill in data
  - Technology type can be left “unspecified” (e.g. Tier 1) or compiled with several ones (if available)
  - All technology penetration rates should sum up to 100% for each fuel in subdivision

# Stationary Combustion

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories Fuel Consumption Data Fuel Combustion Emissions

1.A.1 - Energy Industries  
 1.A.1.a - Main Activity Electricity  
 1.A.1.a.i - Electricity  
 1.A.1.a.ii - Combined Heat and Power Generation (CHP)  
 1.A.1.a.iii - Heat Plants  
 1.A.1.b - Petroleum Refining  
 1.A.1.c - Manufacture of Non-Ferrous Metals  
 1.A.1.c.i - Manufacture of Non-Ferrous Metal Products  
 1.A.1.c.ii - Other Energy  
 1.A.2 - Manufacturing Industries  
 1.A.2.a - Iron and Steel  
 1.A.2.b - Non-Ferrous Metal  
 1.A.2.c - Chemicals  
 1.A.2.d - Pulp, Paper and Printing  
 1.A.2.e - Food Processing  
 1.A.2.f - Non-Metallic Mineral Products  
 1.A.2.g - Transport Equipment  
 1.A.2.h - Machinery  
 1.A.2.i - Mining (excluding Fuels)  
 1.A.2.j - Wood and Wood Products  
 1.A.2.k - Construction  
 1.A.2.l - Textile and Leather  
 1.A.2.m - Non-specified

Worksheet: Fuel Combustion Emissions  
 Sector: Energy  
 Category: Fuel Combustion Activities  
 Subcategory: 1.A.1.a.ii - Combined Heat and Power (CHP)  
 Sheet: Fuel Combustion Emissions  
 Data  
 Fuel Type: (All fuels)

2000

Equation 2.4					
Subdivision	Fuel	Total consumption (TJ)	CO2 Emissions (Gg CO2)	CH4 Emissions (Gg CH4)	N2O Emissions (Gg N2O)
S	F	TC	CO2	CH4	N2O
Eastern CHP	Other Biogas	15120	825.552	0.01512	0.00151

Technology		CO2			CH4		N2O		
Type of Technology	Technology penetration (%)	Consumption (TJ)	CO2 Emission Factor (kg CO2/TJ)	Amount Captured (Gg CO2)	CO2 Emissions (Gg CO2)	CH4 Emission Factor (kg CH4/TJ)	CH4 Emissions (Gg CH4)	N2O Emission Factor (kg N2O/TJ)	N2O Emissions (Gg N2O)
T	P	C=TC*(P/100)	EF(CO2)	Z	CO2=C*EF (CO2)/10 <sup>6</sup> -Z	EF(CH4)	CH4=C*EF (CH4)/10 <sup>6</sup>	EF(N2O)	N2O=C*EF (N2O)/10 <sup>6</sup>
CCGT	100	15120	54600		825.552	1	0.01512	0.1	0.00151
Total		15120			825.552		0.01512		0.00151

Equation 2.4					
Subdivision	Fuel	Total consumption (TJ)	CO2 Emissions (Gg CO2)	CH4 Emissions (Gg CH4)	N2O Emissions (Gg N2O)
[Empty table body]					

Worksheet remarks: 1.A.1.a.ii - Time Series  
 Gas: CARBON DIOXIDE (CO2)

Country/Territory: Japan | Inventory Year: 2000 | Base year for assessment of uncertainty in trend: 1990 | CO2 Equivalents: SAR GWPs (100 year time horizon) | Database file:

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Country/Territory: Japan | Inventory Year: 2000 | Base year for assessment of uncertainty in trend: 1990 | CO2 Equivalents: SAR GWPs (100 year time horizon) | Database file:

# Road Transportation

Tier 1, 2, 3 are implemented via 4 worksheets

- **Fuel Consumption Data:** the amount of fuel consumed for each [fuel type/vehicle type/emission control technology]
- **Fuel Combustion Emissions:** EFs and calculation of emissions for each [fuel type/vehicle type/emission control technology]
- **CH<sub>4</sub> and N<sub>2</sub>O Emissions – Tier 3:** used for Tier 3 estimations of methane and nitrous oxide considering the fuel type, vehicle type, emission control technology, operating conditions, distance travelled and emissions on cold start of the vehicle
- **Fuel Consumption – Validation:** estimation of fuel use from the distance travelled data based on the types of fuel/vehicle/road





# Road Transportation

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.A.3.a.ii - Domestic Aviation
- 1.A.3.b - Road Transportation
  - 1.A.3.b.i - Cars
    - 1.A.3.b.i.1 - Passenger cars with 3-way catalysts
      - 1.A.3.b.i.1.1 - Passenger cars with 3-way catalysts (Selected)
      - 1.A.3.b.i.1.2 - Passenger cars with 3-way catalysts
    - 1.A.3.b.i.2 - Passenger cars with 3-way catalysts
  - 1.A.3.b.ii - Light-duty trucks
    - 1.A.3.b.ii.1 - Light-duty trucks
    - 1.A.3.b.ii.2 - Light-duty trucks
  - 1.A.3.b.iii - Heavy-duty trucks
  - 1.A.3.b.iv - Motorcycles
  - 1.A.3.b.v - Evaporative emissions
  - 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
  - 1.A.3.d.ii - Domestic Water
- 1.A.3.e - Other Transportation
  - 1.A.3.e.i - Pipeline Transport
  - 1.A.3.e.ii - Off-road

- 4 - Other Sectors
- 1.A.4.a - Commercial/Institution

Fuel Consumption Data Fuel Combustion Emissions CH4 and N2O Emissions - Tier 3 Fuel Consumption - Validation

Worksheet

Sector: Energy  
 Category: Fuel Combustion Activities  
 Subcategory: 1.A.3.b.i.1 - Passenger cars with 3-way catalysts  
 Sheet: CH4 and N2O Emissions - Tier 3

2000

Data

Gas: METHANE (CH4) Fuel Type: (All fuels)

Equation 3.2.5

Subdivision	Fuel	Vehicle type	Emission control technology	Operating conditions	Distance travelled (km)	CH4 Emission Factor (kg/km)	CH4 Emissions (kg)	CH4 Emissions during warm-up (kg)	CH4 Emissions (Gg)
					A	B	C=A*B	D	E=(C+D)*10^-6
Taxis	Motor Gasoline	5 seat	TWC-OC	Urban	100000000	0.00004	3900	170	0.00407
Total					100000000		3900		0.00407

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.A.3.a.ii - Domestic Aviation
- 1.A.3.b - Road Transportation
  - 1.A.3.b.i - Cars
    - 1.A.3.b.i.1 - Passenger cars with 3-way catalysts
      - 1.A.3.b.i.1.1 - Passenger cars with 3-way catalysts (Selected)
      - 1.A.3.b.i.1.2 - Passenger cars with 3-way catalysts
    - 1.A.3.b.i.2 - Passenger cars with 3-way catalysts
  - 1.A.3.b.ii - Light-duty trucks
    - 1.A.3.b.ii.1 - Light-duty trucks
    - 1.A.3.b.ii.2 - Light-duty trucks
  - 1.A.3.b.iii - Heavy-duty trucks
  - 1.A.3.b.iv - Motorcycles
  - 1.A.3.b.v - Evaporative emissions
  - 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
  - 1.A.3.d.ii - Domestic Water
- 1.A.3.e - Other Transportation
  - 1.A.3.e.i - Pipeline Transport
  - 1.A.3.e.ii - Off-road

- 4 - Other Sectors
- 1.A.4.a - Commercial/Institution

Fuel Consumption Data Fuel Combustion Emissions CH4 and N2O Emissions - Tier 3 Fuel Consumption - Validation

Worksheet

Sector: Energy  
 Category: Fuel Combustion Activities  
 Subcategory: 1.A.3.b.i.1 - Passenger cars with 3-way catalysts  
 Sheet: CH4 and N2O Emissions - Tier 3

2000

Data

Gas: NITROUS OXIDE (N2O) Fuel Type: (All fuels)

Equation 3.2.5

Subdivision	Fuel	Vehicle type	Emission control technology	Operating conditions	Distance travelled (km)	N2O Emission Factor (kg/km)	N2O Emissions (kg)	N2O Emissions during warm-up (kg)	N2O Emissions (Gg)
					A	B	C=A*B	D	E=(C+D)*10^-6
Taxis	Motor Gasoline	5 seat	TWC-OC	Urban	100000000	0.00003	2600	460	0.00306
Total					100000000		2600		0.00306

# Road Transportation

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.A.3.a.ii - Domestic Aviation
- 1.A.3.b - Road Transportation
  - 1.A.3.b.i - Cars
    - 1.A.3.b.i.1 - Passenger cars with 3-way catalyts
    - 1.A.3.b.i.2 - Passenger cars with 2-way catalyts
  - 1.A.3.b.ii - Light-duty trucks
    - 1.A.3.b.ii.1 - Light-duty trucks with 3-way catalyts
    - 1.A.3.b.ii.2 - Light-duty trucks with 2-way catalyts
  - 1.A.3.b.iii - Heavy-duty trucks
  - 1.A.3.b.iv - Motorcycles
  - 1.A.3.b.v - Evaporative emissions
  - 1.A.3.b.vi - Urea-based catalyts
- 1.A.3.c - Railways
- 1.A.3.d - Water-borne Navigation
  - 1.A.3.d.i - International water
  - 1.A.3.d.ii - Domestic water
- 1.A.3.e - Other Transportation
  - 1.A.3.e.i - Pipeline Transportation
  - 1.A.3.e.ii - Off-road

- 4 - Other Sectors
- 1.A.4.a - Commercial/Institutional
- 1.A.4.b - Residential

Fuel Consumption Data Fuel Combustion Emissions CH4 and N2O Emissions - Tier 3 **Fuel Consumption - Validation**

Worksheet

**Sector:** Energy 2000

**Category:** Fuel Combustion Activities

**Subcategory:** 1.A.3.b.i.1 - Passenger cars with 3-way catalyts

**Sheet:** Fuel Consumption - Validation

Data

**Fuel Type** (All fuels)

Equation 3.2.6

Subdivision	Fuel	Vehicle type	Road type	Number of vehicles	Distance travelled (km)	Consumption (l/km)	Total fuel consumption (l)	Conversion Factor (Gg/l)	Total fuel consumption (Gg)
				A	B	C	D=B*C	E	F=D*E
Taxis	Gas/Diesel Oil	5 seat	Urban	1	100000	0.8	80000	7.5E-07	0.06
Total				1	100000	0.8	80000		0.06

# Railways

Tier 1, 2, 3 are implemented via 3 worksheets

- **Fuel Consumption Data:** the amount of fuel consumed for each [fuel/locomotive type], either entered directly, or calculated via Equation 3.4.5 based on the number of locomotives, specific fuel consumption and number of days in operation
- **Fuel Combustion Emissions:** EFs and pollutant weighting factors for each [fuel/locomotive type], calculation of emissions
- **CH<sub>4</sub> and N<sub>2</sub>O emissions – Tier 3:** used for Tier 3 estimations of methane and nitrous oxide considering the fuel, locomotive type, number of locomotives, annual hours of use, rated power of locomotive and load factor of locomotive

# Railways

IPCC Inventory Software - user - [Worksheets]

IPCC Inventory Software - user - [Worksheets]

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Cat. 2006 IPCC Cat. 2006 IPCC Cat.

Fuel Consumption Data Fuel Combustion Emissions **CH4 and N2O Emissions - Tier 3**

Worksheet

Sector: Energy 2000

Category: Fuel Combustion Activities

Subcategory: 1.A.3.c - Railways

Sheet: CH4 and N2O Emissions - Tier 3

Data

Fuel Type (All fuels)

Equation 3.4.3

Subdivision	Locomotive type	Fuel	Number of locomotives	Annual hours of use (hours)	Average rated power of locomotive (kW)	Typical load factor of locomotive (Fraction)	CH4		N2O	
							CH4 Emission Factor	CH4 Emissions (Gg CH4)	N2O Emission Factor	N2O Emissions (Gg N2O)
S	LT	F	N	H	P	LF	EF (CH4)	$CH_4 = N * H * P * LF * EF (CH_4) / 10^6$	EF (N2O)	$N_2O = N * H * P * LF * EF (N_2O) / 10^6$
North-Central Rail	EMD SD-40	Diesel for trains	50	6000	2247	0.9	0.004	2.42676	0.013	7.88697
Total			50	6000				2.42676		7.88697

# Off-road transportation

Tier 1, 2, 3 are implemented via 3 worksheets

- **Fuel Consumption Data:** the amount of fuel consumed for each [fuel/vehicle/equipment type]
- **Fuel Combustion Emissions:** EFs for each [fuel/vehicle/equipment type], calculation of emissions
- **CH<sub>4</sub> and N<sub>2</sub>O emissions – Tier 3:** used for Tier 3 estimations of methane and nitrous oxide considering the fuel, vehicle type, number of vehicles, annual hours of use, rated power of vehicle and load factor of vehicle

# Off-road transportation

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories Fuel Consumption Data Fuel Combustion Emissions CH4 and N2O Emissions - Tier 3

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories Fuel Consumption Data Fuel Combustion Emissions CH4 and N2O Emissions - Tier 3

Worksheet

Sector: Energy 2000

Category: Fuel Combustion Activities

Subcategory: 1.A.3.e.ii - Off-road

Sheet: CH4 and N2O Emissions - Tier 3

Data

Fuel Type: Liquid Fuels Uncertainties for Liquid Fuels

Equation 3.3.3

									CH4		N2O						
Subdivision				Vehicle type		Fuel	Source population	Annual hours of use (hours)	Average rated power of vehicle (kW)	Typical load factor of vehicle (Fraction)	CH4 Emission Factor (kg CH4/TJ)	CH4 Emissions (Gg CH4)	N2O Emission Factor (kg N2O/TJ)	N2O Emissions (Gg N2O)			
S	LT	F	N	H	P	LF	EF(CH4)	CH4=N*H*P*LF*EF(CH4)/10*6	EF(N2O)	N2O=N*H*P*LF*EF(N2O)/10*6							
Industry	Forklifts	Motor Gasoline	100	2000	5	0.8	130	104	4	3.2							
Forestry	Chainsaw	Motor Gasoline	1000	3000	1.3	0.9	250	877.5	1	3.51							
Total			1100	5000				981.5		6.71							

WMO UNEP

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

# Fugitive – Solid – Abandoned mines

Tier 1, 2, 3 are implemented via 2 worksheets

- **CH<sub>4</sub> Emissions From Abandoned Coal Mines:** counts for Tier 1 emissions based on time from closure, number of mines and fraction of gassy mines
- **CH<sub>4</sub> Emissions From Abandoned Coal Mines – Tier 2&3:** counts for Tier 2 and 3 methane emissions

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Cat... CH4 Emissions From Abandoned Coal Mines CH4 Emissions From Abandoned Coal Mines - Tier 2 & 3

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Solid Fuels  
 Subcategory: 1.B.1.a.i.3 - Abandoned underground mines  
 Sheet: CH4 emissions from abandoned underground coal mines - Tier 2 & 3

Data

Equation 4.1.11, 4.1.12, 4.1.13

Subdivision	Region / Basin	Closure Interval	Coal rank	Number of abandoned mines	Fraction of Gassy Coal Mines	Average emission rate before abandonment (m3/Year)	Coefficient A	Coefficient b	Years elapsed since abandonment and inventory year	Emission Factor	Conversion Factor (Gg CH4/m3)	Methane Emissions (Gg CH4)	Methane recovered (Gg CH4)	Methane emissions to be reported (Gg CH4)
S	B	CI	CR	N	G	ER	A	b	T	EF = (1+A*T) <sup>b</sup>	CF	E=N*G*ER*EF*CF	Methane recovered (Gg CH4)	ER=E-R
Mid-cent	West	1951 - 1975	Anthracite	100	0.9	10000000	1.72	-0.58	25	0.11138	0	67.16063		67.16063
New	East	1976 - 2000	Bituminous	120	0.95	18800000	3.72	-0.42	5	0.28658	0	411.51906	110	301.51906
Total				220								478.67969		368.67969

# Fugitive – Oil – Venting

Tier 1 and 2 are implemented via 3 worksheets

- **Activity Data:** amount of oil production for each [subdivision/industry segment/subcategory], selection of calculation method Tier 1 or 2. **This information transfers to “Flaring” category automatically and vice-versa**
- **Emissions – Tier 1:** CO<sub>2</sub> and CH<sub>4</sub> emissions for Tier 1 for each [subdivision/industry segment/subcategory]
- **Emissions – Tier 2:** CO<sub>2</sub> and CH<sub>4</sub> emissions for Tier 2 for each [subdivision/industry segment/subcategory] based on the molecular weight and fraction of associated gas

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

Activity Data Emissions - Tier 1 Emissions - Tier 2

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil  
 Subcategory: 1.B.2.a.i - Venting  
 Sheet: Activity Data

Data

Subdivision	Industry Segment	Subcategory	Calculation method	Total annual oil production / Activity (10 <sup>3</sup> m3)	Average gas-to-oil ratio (m3/m3)	Gas conservation efficiency factor	Fraction of waste gas flared	Total gas vented (10 <sup>3</sup> m3)	Total gas flared (10 <sup>3</sup> m3)
				Q / A	GOR	CE	X	V=Q*GOR*(1-CE)*(1-X)	F=Q*GOR*(1-CE)*X
Upstream	Well Testing	All	Tier 1	1000					
Central production fa...	Oil Production	Conventional Oil	Tier 2	2000	120	0.5	0.9	12000	108000
Total				3000				12000	108000



# Fugitive – Oil – Venting

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.B.1.a.i.4 - Flaring of dr
- 1.B.1.a.ii - Surface mines
  - 1.B.1.a.ii.1 - Mining
  - 1.B.1.a.ii.2 - Post-minin
- 1.B.1.b - Uncontrolled combusti
- 1.B.1.c - Solid fuel transformatio
- 1.2 - 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
      - 1.B.2.a.iii.3 - Transport
      - 1.B.2.a.iii.4 - Refining
      - 1.B.2.a.iii.5 - Distribution
      - 1.B.2.a.iii.6 - Other
  - 1.B.2.b - Natural Gas
  - 1.B.2.b.i - Venting

Activity Data Emissions - Tier 1 Emissions - Tier 2

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil  
 Subcategory: 1.B.2.a.i - Venting  
 Sheet: Emissions - Tier 1

Data

Gas: CARBON DIOXIDE (CO2)  
 CARBON DIOXIDE (CO2)  
 METHANE (CH4)

Equation 4.2.1

Subdivision	Industry Segment	Subcategory	Activity (10 <sup>3</sup> m3)	CO2 Emission Factor (Gg/10 <sup>3</sup> m3)	CO2 Emissions (Gg CO2)
			A	EF	E=A*EF
Upstream	Well Testing	All	1000	0.0053	5.3
Total			1000		5.3

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.B.1.a.i.4 - Flaring of dr
- 1.B.1.a.ii - Surface mines
  - 1.B.1.a.ii.1 - Mining
  - 1.B.1.a.ii.2 - Post-minin
- 1.B.1.b - Uncontrolled combusti
- 1.B.1.c - Solid fuel transformatio
- 1.2 - 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
      - 1.B.2.a.iii.3 - Transport
      - 1.B.2.a.iii.4 - Refining
      - 1.B.2.a.iii.5 - Distribution
      - 1.B.2.a.iii.6 - Other
  - 1.B.2.b - Natural Gas
  - 1.B.2.b.i - Venting

Activity Data Emissions - Tier 1 Emissions - Tier 2

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil  
 Subcategory: 1.B.2.a.i - Venting  
 Sheet: Emissions - Tier 2

Data

Gas: METHANE (CH4)  
 CARBON DIOXIDE (CO2)  
 METHANE (CH4)

Equation 4.2.3

Subdivision	Industry Segment	Subcategory	Total gas vented (10 <sup>3</sup> m3)	Molecular weight	Fraction of the associated gas that is composed of CH4	CH4 Emissions (Gg CH4)
			V	M	Y	E=V*M*Y*42.3*10 <sup>-6</sup>
Central production facility	Oil Production	Conventional Oil	12000	16.043	0.3	2.44303
Total			12000			2.44303

# Fugitive – Oil – Flaring

Tier 1 and 2 are implemented via 5 worksheets

- **Activity Data:** amount of oil production for each [subdivision/industry segment/subcategory], selection of calculation method Tier 1 or 2. **This information transfers to “Venting” category automatically and vice-versa**
- **Emissions – Tier 1:** CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions for Tier 1 for each [subdivision/industry segment/subcategory]
- **CH<sub>4</sub> Emissions – Tier 2:** CH<sub>4</sub> emissions for Tier 2 for each [subdivision/industry segment/subcategory] based on the flaring destruction efficiency, molecular weight and fraction of associated gas
- **CO<sub>2</sub> Emissions – Tier 2:** CO<sub>2</sub> emissions for Tier 2 for each [subdivision/industry segment/subcategory] based on the molecular weight, fraction of associated gas and fraction of non-CO<sub>2</sub> carbon of waste gas
- **N<sub>2</sub>O Emissions – Tier 2:** N<sub>2</sub>O emissions for Tier 2 for each [subdivision/industry segment/subcategory] based on the nitrous oxide EF

# Fugitive – Oil – Flaring

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.B.1.a.i.4 - Flaring of dr
- 1.B.1.a.ii - Surface mines
  - 1.B.1.a.ii.1 - Mining
  - 1.B.1.a.ii.2 - Post-minin
- 1.B.1.b - Uncontrolled combusti
- 1.B.1.c - Solid fuel transformatio
- 1.2 - 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
      - 1.B.2.a.iii.3 - Transport
      - 1.B.2.a.iii.4 - Refining
      - 1.B.2.a.iii.5 - Distribution
      - 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

Activity Data Emissions - Tier 1 CH4 Emissions - Tier 2 CO2 Emissions - Tier 2 N2O Emissions - Tier 2

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil  
 Subcategory: 1.B.2.a.ii - Flaring  
 Sheet: Activity Data

Data

Subdivision	Industry Segment	Subcategory	Calculation method	Total annual oil production / Activity (10 <sup>3</sup> m3)	Average gas-to-oil ratio (m3/m3)	Gas conservation efficiency factor	Fraction of waste gas flared	Total gas vented (10 <sup>3</sup> m3)	Total gas flared (10 <sup>3</sup> m3)
				Q / A	GOR	CE	X	V=Q*GOR*(1-CE)*(1-X)	F=Q*GOR*(1-CE)*X
Upstream	Well Testing	All	Tier 1	1000					
Central production facility	Oil Production	Conventional Oil	Tier 2	2000	120	0.5	0.9	12000	108000
Total				3000				12000	108000

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  - 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
      - 1.B.2.a.iii.3 - Transport
      - 1.B.2.a.iii.4 - Refining
      - 1.B.2.a.iii.5 - Distribution
      - 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

Activity Data Emissions - Tier 1 CH4 Emissions - Tier 2 CO2 Emissions - Tier 2 N2O Emissions - Tier 2

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil  
 Subcategory: 1.B.2.a.ii - Flaring  
 Sheet: Emissions - Tier 1

Data

Gas: METHANE (CH4) (selected)

Equation 4.2.1

Subdivision	Industry Segment	Subcategory	Activity (10 <sup>3</sup> m3)	CH4 Emission Factor (Gg/10 <sup>3</sup> m3)	CH4 Emissions (Gg CH4)
			A	EF	E=A*EF
Upstream	Well Testing	All	1000	0.000165	0.165
Total			1000		0.165

# Fugitive – Oil – Flaring

IPCC Inventory Software - user - [Worksheets]

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

2006 IPCC Categories

- 1.B.1.a.i.4 - Flaring of dr
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- 1.B.1.b - Uncontrolled combusti
- 1.B.1.c - Solid fuel transformatio
- 1.2 - 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

Activity Data Emissions - Tier 1 CH4 Emissions - Tier 2 CO2 Emissions - Tier 2 N2O Emissions - Tier 2

Worksheet  
**Sector:** Energy  
**Category:** Fugitive Emissions from Fuels - Oil  
**Subcategory:** 1.B.2.a.ii - Flaring  
**Sheet:** CH4 Emissions - Tier 2

Data

Equation 4.2.4

Subdivision	Industry Segment	Subcategory	Total gas flared (10 <sup>3</sup> m3)	Flaring destruction efficiency	Molecular weight	Fraction of the associated gas that is composed of CH4	CH4 Emissions (Gg CH4)
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Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

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- 1.B.1.a.i
- 1.B.1.a.ii
- 1.B.1.a.i
- 1.B.1.a.i
- 1.B.1.b - Uncon
- 1.B.1.c - Solid f
- 1.2 - Oil and Natu
- 1.B.2.a - Oil
  - 1.B.2.a.i - V
  - 1.B.2.a.ii - F
  - 1.B.2.a.iii -
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.a.i
  - 1.B.2.b - Natura

Activity Data Emissions - Tier 1 CH4 Emissions - Tier 2 CO2 Emissions - Tier 2 N2O Emissions - Tier 2

Worksheet  
**Sector:** Energy  
**Category:** Fugitive Emissions from Fuels - Oil  
**Subcategory:** 1.B.2.a.ii - Flaring  
**Sheet:** N2O Emissions - Tier 2

Data

Equation 4.2.8

Subdivision	Industry Segment	Subcategory	Total gas flared (10 <sup>3</sup> m3)	N2O Emission Factor (Gg/10 <sup>3</sup> m3)	N2O Emissions (Gg N2O)
			F	EF	E=F*EF
Central production facility	Oil Production	Conventional Oil	108000	0.0003	32.4
Total			108000		32.4



# Thank you

<https://www.ipcc-nggip.iges.or.jp/index.html>

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INTERGOVERNMENTAL PANEL ON climate change

