

# 1 UNDERSTANDING THE COMMON REPORTING FRAMEWORK

*This chapter contains a listing, with definitions, of the categories you should use when reporting emissions and removals. The source/sink categories have been grouped into sectors as follows:*

- *Energy*
- *Industrial Processes*
- *Solvent and Other Product Use*
- *Agriculture*
- *Land-Use Change and Forestry*
- *Waste*

*The sectors and their source/sink categories are described and discussed in the chapters of the Reference Manual and the modules of the Workbook. This chapter also contains a brief explanation of the principles underlying the Sectoral Tables and Summary Report Tables for reporting national inventories.*

## 1.1 Source/sink categories

- Users of the *Revised 1996 IPCC Guidelines* are requested to estimate and report all anthropogenic emissions and removals of greenhouse gases. The numerous sources and sinks are categorised and described on the following pages. The source/sink categories are grouped into the major sectors shown overleaf. The proposed categories should cover most activities emitting or removing greenhouse gases. However, some countries may need to add activities to the "Other" sector in order to cover their particular circumstances. If so, then the nature of the activities should be carefully described so that the list of sectors and their source/sink categories can be updated by the IPCC at a later date.
- All activities are limited to anthropogenic activities and related emissions and removals.
- Recognising that the IPCC needs to accommodate other existing inventory programmes, Annex 2 *IPCC and CORINAIR Source Categories* provides details of correspondences with CORINAIR, a programme developed by the Commission of European Communities for use in Europe.

SECTORS	DESCRIPTION OF ACTIVITIES INCLUDED
<b>1 ENERGY</b>	Total emission of all greenhouse gases from stationary and mobile energy activities (fuel combustion as well as fugitive fuel emissions).
<b>2 INDUSTRIAL PROCESSES</b>	Emissions within this sector comprise by-product or fugitive emissions of greenhouse gases from industrial processes. Emissions from fuel combustion in industry should be reported under Energy.  Emissions should, wherever possible, be reported according to the ISIC Group or Class within which they occur.
<b>3 SOLVENT AND OTHER PRODUCT USE</b>	This category pertains mainly to NMVOC emissions resulting from the use of solvents and other products containing volatile compounds.
<b>4 AGRICULTURE</b>	Describes all anthropogenic emissions from this sector, except for fuel combustion emissions and sewage emissions, which are covered in Energy and Waste modules.
<b>5 LAND-USE CHANGE &amp; FORESTRY</b>	Total emissions and removals from forest and land-use change activities.
<b>6 WASTE</b>	Total emissions from waste management.
<b>7 OTHER</b>	Any other anthropogenic source or sink not referred to above (must be appropriately documented).

<b>1 ENERGY</b>		Total emission of all greenhouse gases from stationary and mobile energy activities (fuel combustion as well as fugitive fuel emissions). Sum of categories I A & B.
<b>1 A</b>	<b>FUEL COMBUSTION ACTIVITIES</b>	Total emissions of all greenhouse gases from all fuel combustion activities as described further below. CO <sub>2</sub> emissions from combustion of biomass fuels are <b>not</b> included in totals for the energy sector. They may not be net emissions if the biomass is sustainably produced. If biomass is harvested at an unsustainable rate (that is, faster than annual regrowth), net CO <sub>2</sub> emissions will appear as a loss of biomass stocks in the <i>Land-Use Change and Forestry</i> module. Other greenhouse gases from biomass fuel combustion <b>are</b> considered net emissions and are reported under <i>Energy</i> . (Sum of I A 1 to I A 5). Incineration of waste for waste-to-energy facilities should be reported here and not under Section 6C. Emissions based upon fuel for use on ships or aircraft engaged in international transport (1 A 3 a i and 1 A 3 d i) should, as far as possible, not be included in national totals but reported separately.
1 A 1	ENERGY INDUSTRIES	Comprises emissions from fuels combusted by the fuel extraction or energy-producing industries.
1 A 1	a Public Electricity and Heat Production	Sum of emissions from public electricity generation, public combined heat and power generation, and public heat plants. Public utilities are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers (undertakings which generate electricity/heat wholly or partly for their own use, as an activity which supports their primary activity) should be assigned to the sector where they were generated and not under 1 A 1 a. Autoproducers may be in public or private ownership.
	i Public Electricity Generation	Comprises emissions from all fuel use for electricity generation except those from combined heat and power plants.
	ii Public Combined Heat and Power Generation (CHP)	Emissions from production of both heat and electrical power for sale to the public, at a single facility; co-generation plant.
	iii Public Heat Plants	Production of heat for sale by pipe network.
1 A 1	b Petroleum Refining	All combustion activities supporting the refining of petroleum products. Does not include evaporative emissions, which should be reported separately under 1 A 3 b v or 1 B 2 a below.
1 A 1	c Manufacture of Solid Fuels and Other Energy Industries	Combustion emissions from fuel use during the manufacture of secondary and tertiary products from solid fuels including production of charcoal. Emissions from own on-site fuel use should be included.
	c i Manufacture of Solid Fuels	Emissions arising from fuel combustion for the production of coke, brown coal briquettes and patent fuel.
	c ii Other Energy Industries	Combustion emissions arising from the energy-producing industries own (on-site) energy use not mentioned above. This includes the emissions from own-energy use in coal mining and oil and gas extraction. Combustion emissions from pipeline transport should be reported under 1 A 3 e.

1 A 2	MANUFACTURING INDUSTRIES AND CONSTRUCTION (ISIC - 3RD REVISION) <sup>1</sup>	Emissions from combustion of fuels in industry including combustion for the generation of electricity and heat. Emissions from autoproducers should be assigned to the sector where they were generated and an attempt made to separately identify the emissions associated with autogeneration from those associated with process heat. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1 A 1 c and not within manufacturing industry. Emissions from the industry sector should be specified by subsectors that correspond to the International Standard Industrial Classification of All Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1 A 3 below). Emissions arising from off-road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories (ISIC) should be reported, as well as those from significant emitters of pollutants. A suggested list of categories is outlined below.	
1 A 2	a	Iron and Steel (ISIC Group 271 and Class 2731)	
1 A 2	b	Non-Ferrous Metals (ISIC Group 272 and Class 2732)	
1 A 2	c	Chemicals (ISIC Division 24)	
1 A 2	d	Pulp, Paper and Print (ISIC Divisions 21 and 22)	
1 A 2	e	Food Processing, Beverages and Tobacco (ISIC Divisions 15 and 16)	
1 A 2	f	Other	The remaining emissions from fuel combustion in industry should be reported here. This also includes emissions from the construction branch. Please specify what is reported, as far as possible by ISIC categories. Care should be taken not to double count emissions from construction by including them also in Categories 1 A 3 e ii and/or 1 A 5.
1 A 3	TRANSPORT	Emissions from the combustion and evaporation of fuel for all transport activity, regardless of the sector, specified by subsectors as follows. Emissions from fuel sold to any air or marine vessel engaged in international transport (international bunker fuels) should as far as possible be excluded from the totals and subtotals in this category and should be reported separately.	
1 A 3	a	Civil Aviation	Emissions from international civil aviation and domestic air transport (commercial, private, agricultural, etc.), including take-offs and landings. Exclude use of fuel at airports for ground transport which is reported under 1 A 3 e <i>Other Transportation</i> (below). Also exclude fuel for stationary combustion at airports; report this information under the appropriate stationary combustion category.
	i	<i>International Aviation (International Bunkers)</i>	Emissions which relate to fuel use for international civil aviation. Note that these emissions are to be excluded as far as possible from national totals but should be reported separately. (In other inventory methodologies, landing and take-off (LTO) cycle emissions are often considered as domestic emissions. For the purpose of greenhouse gas emissions inventories, fuel used during landing and take-off for an international flight stage is considered to be part of <i>International Bunkers</i> fuel use.)
	ii	<i>Domestic</i>	Includes all civil domestic passenger and freight traffic inside a country (not used as international bunkers) and including take-offs and landings for these flight stages.

<sup>1</sup> International Standard Industrial Classification of all Economic Activities, Series M No. 4, Rev. 3, United Nations, New York, 1990.

1 A 3	b	Road Transportation	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on highways.
	i	<i>Cars</i>	Automobiles designated primarily for transport of persons and having a capacity of 12 persons or fewer. Gross vehicle weight rating of 3900 kg or less.
		<i>Passenger cars with 3-way catalysts</i>	Passenger car emissions from vehicles with 3-way catalysts.
		<i>Passenger cars without 3-way catalysts</i>	Passenger car emissions from vehicles without 3-way catalysts.
	ii	<i>Light Duty Trucks</i>	Vehicles with a gross vehicle weight of 3900 kg or less designated primarily for transportation of light-weight cargo or which are equipped with special features such as four-wheel drive for off-road operation.
		<i>Light duty trucks with 3-way catalysts</i>	Light Duty Truck emissions from vehicles with 3-way catalysts.
		<i>Light duty trucks without 3-way catalysts</i>	Light Duty Truck emissions from vehicles without 3-way catalysts.
	iii	<i>Heavy Duty Trucks and Buses</i>	Any vehicle rated at more than 3900 kg gross vehicle weight or designed to carry more than 12 persons at a time.
	iv	<i>Motorcycles</i>	Any motor vehicle designed to travel with not more than three wheels in contact with the ground and weighing less than 680 kg.
	v	<i>Evaporative Emissions from Vehicles</i>	Evaporative emissions are included here (they are estimated with the same activity data as are used for estimating combustion emissions).
1 A 3	c	Railways	Includes emissions from both freight and passenger traffic routes.
1 A 3	d	Navigation	Emissions from fuels used to propel water-borne vessels, including hovercraft and hydrofoils.
	i	<i>International Marine (Bunkers)</i>	Comprises emissions from fuels burned by sea-going ships of all flags that are engaged in international transport. These emissions should as far as possible be excluded from national totals and reported separately.
	ii	<i>National Navigation</i>	Emissions from fuel used for navigation of all vessels not engaged in international transport, except fishing (which should be reported under 1 A 4 c iii). Note that this may include journeys of considerable length between two ports in a country (e.g. San Francisco to Honolulu).
1 A 3	e	Other Transportation	Combustion emissions from all remaining transport activities including pipeline transportation, ground activities in airports and harbours, and off-road activities not otherwise reported under 1 A 4 c Agriculture or 1 A 2. Manufacturing Industries and Construction. Military transport should be reported under 1 A 5 (see 1 A 5 <i>Other</i> , below).
	i	<i>Pipeline Transport</i>	
	ii	<i>Off-road</i>	

1 A 4	OTHER SECTORS	Emission from combustion activities as described below. Emissions from autoproducers should be assigned to the sector where they were generated and an attempt made to separately identify the emissions associated with autogeneration from those associated with process heat.
1 A 4	a Commercial / Institutional	Emission from fuel combustion in commercial and institutional buildings. (All activities included in ISIC categories 4103, 42, 6, 719, 72, 8, and 91-96).
1 A 4	b Residential	All emissions from fuel combustion in households.
1 A 4	c Agriculture / Forestry / Fishing	Emissions from fuel combustion in agriculture, forestry, or domestic inland, coastal and deep-sea fishing. This includes traction vehicles, pump fuel use, grain drying, horticultural greenhouses and other agriculture, forestry or fishing related fuel use. (Activities included in ISIC categories 05, 11, 12, 1302). Highway agricultural transportation is excluded.
	i Stationary	
	ii Off-road Vehicles and Other Machinery	
	iii Fishing	
1 A 5	OTHER (Not elsewhere specified)	All remaining emissions from non-specified fuel combustion. Include emissions from military fuel use.
1 A 5	a Stationary	
1 A 5	b Mobile	Vehicles and Other Machinery, Marine and Aviation (not included in 1 A 4 c ii or elsewhere).
1 B	FUGITIVE EMISSIONS FROM FUELS	Fugitive emissions are intentional or unintentional releases of gases from anthropogenic activities. In particular, they may arise from the production, processing, transmission, storage and use of fuels, and include emissions from combustion only where it does not support a productive activity (e.g., flaring of natural gases at oil and gas production facilities). Evaporative emissions from vehicles are included under Road Transport as Subsection 1 A 3 b v.  Sum of 1 B 1 & 1 B 2.
1 B 1	SOLID FUELS	Total release of methane during coal mining and post-mining activities. Combustion emissions from colliery methane recovered and used should be excluded here and reported under Fuel Combustion Emissions.
1 B 1	a Coal Mining	Total emissions from underground and surface mining and post-mining activities.
	i Underground Mines	
	Mining activities	Emissions from underground mines, brought to the surface by ventilation systems.
	Post-mining activities	Emissions from coal after extraction from the ground, which occur during preparation, transportation, storage, or final crushing prior to combustion.

	<i>ii Surface Mines</i>	Total emissions from surface mining and post-mining activities.
	<i>Mining activities</i>	Emissions primarily from the exposed coal surfaces and coal rubble, but also emissions associated with the release of pressure on the coal.
	<i>Post-mining activities</i>	Emissions from coal after extraction from the ground, during preparation, transportation, storage, or final crushing prior to combustion.
1 B 1	<i>b Solid Fuel Transformation</i>	Fugitive emissions arising during the manufacture of secondary and tertiary products from solid fuels.
1 B 1	<i>c Other</i>	Fugitive emissions from fuel treatment plants not elsewhere specified.
1 B 2	<b>OIL AND NATURAL GAS</b>	Total fugitive emissions from oil and gas activities. Fugitive emissions may arise from equipment exhaust (non-combustion), leakages, upsets and mishaps at any point in the chain from production through final use. Note also that emissions from flaring are included (the combustion is considered a non-productive activity).
1 B 2	<b>a Oil</b>	
	<i>i Exploration</i>	Fugitive emissions from oil exploration only.
	<i>ii Production</i>	Fugitive emissions from the production of crude oil only.
	<i>iii Transport</i>	Fugitive emissions resulting from the loading and unloading of crude oil from tankers.
	<i>iv Refining/ Storage</i>	Fugitive emissions from the refining of oil and from storage in tanks.
	<i>v Distribution of Oil Products</i>	Emissions (primarily NMVOCs) from transport and handling of oil products.
	<i>vi Other</i>	
1 B 2	<b>b Natural Gas</b>	
	<i>i Production/ Processing</i>	Emissions from the production of gas, gas gathering systems and gas separation plants.
	<i>ii Transmission/ Distribution</i>	Emissions from pipelines for long distance and local transport of methane, compressor stations and their maintenance facilities.
	<i>iii Other leakage</i>	Release of gas at point of use, including residential, commercial, industrial and electricity generation users.
1 B 2	<b>c Venting and Flaring</b>	The release and/or combustion of excess gas at facilities for the production of oil or gas and for the processing of gas.
	<i>i Oil</i>	
	<i>ii Gas</i>	
	<i>iii Combined (in case oil and gas cannot be separated)</i>	

<b>2 INDUSTRIAL PROCESSES</b>	<p>Emissions within this sector comprise by-product or fugitive emissions of greenhouse gases from industrial processes. Emissions from fuel combustion in industry should be reported under Energy. In instances where industrial process emissions result jointly from chemical processes and fuel combustion it may be difficult to assign the emission(s) to either sector. Where the main purpose of the fuel combustion is to use the heat released, the resulting emissions should be assigned to the Energy sector.</p> <p>Emissions should, wherever possible, be reported according to the ISIC Group or Class within which they occur. Certain methods in Chapter and Module 2, however, infer final GHG emissions from supply of the GHG, equipment containing it (for example, air conditioning equipment) or a stock material with which emissions are linked (for example, limestone). In these cases, assignment of emissions to ISIC activities may be difficult or incomplete.</p>
<b>2 A MINERAL PRODUCTS (ISIC<sup>2</sup> Division 26)</b>	
2 A 1 CEMENT PRODUCTION	
2 A 2 LIME PRODUCTION	
2 A 3 LIMESTONE AND DOLOMITE USE	
2 A 4 SODA ASH PRODUCTION AND USE	
2 A 5 ASPHALT ROOFING	
2 A 6 ROAD PAVING WITH ASPHALT	
2 A 7 OTHER	Please specify.
<b>2 B CHEMICAL INDUSTRY (ISIC Division 24)</b>	
2 B 1 AMMONIA PRODUCTION	
2 B 2 NITRIC ACID PRODUCTION	
2 B 3 ADIPIC ACID PRODUCTION	
2 B 4 CARBIDE PRODUCTION	
2 B 5 OTHER	Please specify.
<b>2 C METAL PRODUCTION (ISIC Division 27)</b>	
2 C 1 IRON AND STEEL PRODUCTION	

<sup>2</sup> International Standard Industrial Classification of all Economic Activities, Series M No. 4, Rev. 3, United Nations, New York, 1990.



2 C 2	FERROALLOYS PRODUCTION	
2 C 3	ALUMINIUM PRODUCTION	
2 C 4	SF <sub>6</sub> USED IN ALUMINIUM AND MAGNESIUM FOUNDRIES	
2 C 5	OTHER	Please specify.
2 D	OTHER PRODUCTION	(ISIC Divisions 15 and 29)
2 D 1	PULP AND PAPER	
2 D 2	FOOD AND DRINK	
2 E	PRODUCTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE	(Possibly ISIC Class 2411 or 2429)
2 E 1	BY-PRODUCT EMISSIONS	
2 E 2	FUGITIVE EMISSIONS	
2 E 3	OTHER	Please specify.
2 F	CONSUMPTION OF HALOCARBONS AND SULPHUR HEXAFLUORIDE	
2 F 1	REFRIGERATION AND AIR CONDITIONING EQUIPMENT	
2 F 2	FOAM BLOWING	
2 F 3	FIRE EXTINGUISHERS	
2 F 4	AEROSOLS	
2 F 5	SOLVENTS	
2 F 6	OTHER	Please specify.
2 G	OTHER	

## 3 SOLVENT AND OTHER PRODUCT USE

This category covers mainly NMVOC emissions resulting from the use of solvents and other products containing volatile compounds. When the solvents and other products are, or are produced from, petroleum products, the carbon in the NMVOC emissions will be included in the CO<sub>2</sub> inventory if the Reference Approach for CO<sub>2</sub> emissions from energy is used. See note on double counting in "Overview of the IPCC Guidelines". Emissions from the consumption of halocarbons and sulphur hexafluoride should be reported in the Industrial Processes Chapter under 2 F. All other non-energy emissions not included under Industrial Processes are reported here.

3 A PAINT APPLICATION	
3 B DEGREASING & DRY CLEANING	
3 C CHEMICAL PRODUCTS, MANUFACTURE & PROCESSING	
3 D OTHER	Includes use of N <sub>2</sub> O as a carrier gas, anaesthetic, and propellant.

<b>4 AGRICULTURE</b>	Describes all anthropogenic emissions from this sector except for fuel combustion and sewage emissions, which are covered in Energy 1 A and Waste 6 B, respectively. Sum of all agriculture categories 4 A, B, C, D, E, F & G.
<b>4 A ENTERIC FERMENTATION</b>	Methane production from herbivores as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by micro-organisms into simple molecules for absorption into the bloodstream. Both ruminant (e.g. cattle, sheep) and non-ruminant animals (e.g. pigs, horses) produce CH <sub>4</sub> , although ruminants are the largest source (per unit of feed intake).
4 A 1 CATTLE	
4 A 1 a Dairy	Cattle producing milk for commercial exchange and calves and heifers being grown for dairy purposes.
4 A 1 b Non-Dairy	All non-dairy cattle including: cattle kept or grown for meat production, draft animals, and breeding animals.
4 A 2 BUFFALO	
4 A 3 SHEEP	
4 A 4 GOATS	
4 A 5 CAMELS AND LLAMAS	
4 A 6 HORSES	
4 A 7 MULES AND ASSES	
4 A 8 SWINE	
4 A 9 POULTRY	
4 A 10 OTHER	Please specify.
<b>4 B MANURE MANAGEMENT</b>	Methane and nitrous oxide are produced from the decomposition of manure under low oxygen or anaerobic conditions. These conditions often occur when large numbers of animals are managed in a confined area (e.g. dairy farms, beef feedlots, and swine and poultry farms), where manure is typically stored in large piles or disposed of in lagoons and other types of manure management systems. Methane emissions are covered in Sections 4 B 1 to 4 B 9 and N <sub>2</sub> O emissions in Sections 4 B 10 to 4 B 12 below.
4 B 1 CATTLE	
4 B 1 a Dairy	
4 B 1 b Non-Dairy	
4 B 2 BUFFALO	
4 B 3 SHEEP	
4 B 4 GOATS	
4 B 5 CAMELS AND LLAMAS	
4 B 6 HORSES	
4 B 7 MULES AND ASSES	
4 B 8 SWINE	
4 B 9 POULTRY	

4 B	ANAEROBIC	
10		
4 B 11	LIQUID SYSTEMS	
4 B 12	SOLID STORAGE AND DRYLOT	
4 B 13	OTHER	Please specify.
4 C	RICE CULTIVATION	The anaerobic decomposition of organic material in flooded rice fields produces methane, which escapes to the atmosphere by ebullition (bubbling up) through the water column, diffusion across the water/air interface, and transport through the rice plants. It is suggested that these CH <sub>4</sub> emissions be based on lowland rice ecosystems without organic amendments relating to water regime, where lowland refers to fields flooded for a significant period of time. Correction factors for soils with organic amendments should be applied as necessary. Any N <sub>2</sub> O emissions from the use of nitrogen-based fertilisers in rice cultivation should be reported under 4 D <i>Agricultural Soils</i> .
4 C 1	IRRIGATED	Water regime is fully controlled.
4 C 1	a	Continuously flooded
4 C 1	b	Intermittently flooded
	i	<i>Single aeration</i> Fields have a single aeration during the cropping season at any growth stage.
	ii	<i>Multiple aeration</i> Fields have more than one aeration period during the cropping season.
4 C 2	RAINFED	Water regime depends solely on precipitation.
4 C 2	a	Flood prone The water level may rise up to 50 cm during the cropping season.
4 C 2	b	Drought prone Drought periods occur during every cropping season.
4 C 3	DEEPWATER	Floodwater rises to more than 50 cm for a significant period of time during the cropping season.
4 C 3	a	Water depth 50-100 cm Fields inundated with water depth from 50 - 100 cm.
4 C 3	b	Water depth 100 cm Fields inundated with water depth 100 cm.
4 C 4	OTHER	
4 D	AGRICULTURAL SOILS	Emissions and removals of CH <sub>4</sub> and N <sub>2</sub> O from agricultural soil/land and NMVOCs from crops. These are influenced by irrigation practices, climatic variables, soil temperature and humidity. Any N <sub>2</sub> O emissions from the use of nitrogen-based fertilisers in rice cultivation should be reported here. N <sub>2</sub> O emissions may be related to the use of both organic and inorganic fertilisers, biological Nitrogen fixation, and return of crop residues to the field or to animal production. Non-CO <sub>2</sub> greenhouse gas emissions associated with the use of compost and human waste as fertilisers should also be recorded in this category. Emissions of N <sub>2</sub> O from sewage are to be reported under Waste (6 B) and N <sub>2</sub> O emissions from animal waste management systems other than grazing under manure management (4 B). Emissions of N <sub>2</sub> O from manure used for fuel are reported under the Energy Module (1 A).

4 E	PRESCRIBED BURNING OF SAVANNAS	<p>Emissions of CH<sub>4</sub>, CO, N<sub>2</sub>O, and NO<sub>x</sub> from the burning of savannas*. Savannas are burned to control the growth of vegetation, remove pests and weeds, promote the nutrient cycle and to encourage the growth of new grass for animal grazing. CO<sub>2</sub> from savanna burning is noted for information but is not included in the inventory total since it is assumed that an equivalent amount of CO<sub>2</sub> is removed by regrowing vegetation in the following year.</p> <p>*Savannas are tropical and subtropical formations with continuous grass cover, occasionally interrupted by trees and shrubs, which exist in Africa, Latin America, Asia, and Australia.</p>
4 F	FIELD BURNING OF AGRICULTURAL RESIDUES	<p>Emission of non-CO<sub>2</sub> greenhouse gases from burning (in the field) of crop residue and other agricultural wastes on site. These include woody crop residues (e.g. coconut shells, jute sticks, etc.); cereal residues (e.g. rice and wheat straw, maize stalks, etc.); green crop residues (e.g. groundnut straw, soybean tops, etc.). The burning of agricultural waste for energy is excluded here but included under fuel combustion activities in Section 1 A. CO<sub>2</sub> from vegetal or biomass burning is noted for information but is not included in the inventory total, since it is assumed that a roughly equivalent amount of CO<sub>2</sub> is removed by regrowth of the next crop.</p>
4 F 1	CEREALS	<p>Emissions from the on-site burning of residue from cereal crops harvested for dry grain, including but not limited to wheat, barley, maize, oats, rye, rice, millet and sorghum.</p>
4 F 2	PULSE	<p>Emissions from the on-site burning of residue from pulse crops harvested for dry grain, including but not limited to pea, bean and soya.</p>
4 F 3	TUBER AND ROOT	<p>Emissions from the on-site burning of residue from tuber and root crops, including but not limited to potatoes, feedbeet, sugarbeet, girasol (Jerusalem artichoke) and peanut.</p>
4 F 4	SUGAR CANE	<p>Emissions from the on-site burning of sugar cane crop residue.</p>
4 F 5	OTHER	<p>Emissions from the on-site burning of residue from crops not included above.</p>
4G	OTHER	<p>Describe each emission source/sink in detail.</p>

<b>5 LAND-USE CHANGE &amp; FORESTRY</b>	Total emissions and removals from forest and land use change activities as described below. These activities have an impact on three different carbon sources/sinks: aboveground biomass, belowground biomass and soil carbon.	
	Sum of 5 A, B, C, D & E.	
<b>5 A CHANGES IN FOREST AND OTHER WOODY BIOMASS STOCKS</b>	Emissions and removals of CO <sub>2</sub> from decreases or increases in biomass stocks due to forest management, logging, fuelwood collection, etc. The category is either a net source if biomass harvest/destruction exceeds regrowth in the inventory year, or a net sink if regrowth exceeds harvest/destruction. Include afforestation under 5 A 5.	
5 A 1	TROPICAL FORESTS	.
5 A 1	a	Wet/ very moist
5 A 1	b	Moist, short dry season
5 A 1	c	Moist, long dry season
5 A 1	d	Dry
5 A 1	e	Mountain moist
5 A 1	f	Mountain dry
5 A 1	g	Plantations
5 A 1	h	Other
5 A 2	TEMPERATE FORESTS	.
5 A 2	a	Coniferous
5 A 2	b	Broadleaf
5 A 2	c	Plantations
5 A 2	d	Other
5 A 3	BOREAL FORESTS	.
5 A 3	a	Mixed broadleaf/Coniferous
5 A 3	b	Coniferous
5 A 3	c	Forest tundra
5 A 4	GRASSLANDS/ TUNDRA	Emissions and removals of CO <sub>2</sub> from grasslands including tropical savanna and boreal tundra.
5 A 5	OTHER	Emissions and removals of CO <sub>2</sub> from other biomass categories, including village and farm trees, etc. <sup>3</sup>

<sup>3</sup> These categories are organised by ecosystem. The “Other” category is intended to account for biomass which is found in locations other than the major ecosystem types listed. This includes dispersed trees in villages, farms, urban areas, etc., and also includes additional ecosystem types which may be important for biomass accounting in specific countries. Afforestation programmes which create forests will be accounted for in the appropriate forest ecosystem category. Afforestation which produces dispersed trees, e.g., urban tree planting, would be accounted for in “Other.”

5 B	<b>FOREST AND GRASSLAND CONVERSION</b>	This category includes conversion of existing forests and natural grasslands to other land uses. Emissions of CO <sub>2</sub> , CH <sub>4</sub> , CO, N <sub>2</sub> O, NO <sub>x</sub> and NMVOCs from the burning and decay of biomass.
	Time period is an important element in estimating emissions from many of these categories. For example, the IPCC default method recommends time periods of 10 years for biomass decay.	
5 B 1	TROPICAL FORESTS	
5 B 1 a	Wet/very moist	
5 B 1 b	Moist, short dry season	
5 B 1 c	Moist, long dry season	
5 B 1 d	Dry	
5 B 1 e	Mountain moist	
5 B 1 f	Mountain dry	
5 B 1 g	Plantations	
5 B 1 h	Other	
5 B 2	TEMPERATE FORESTS	
5 B 2 a	Coniferous	
5 B 2 b	Broadleaf	
5 B 2 c	Plantations	
5 B 2 d	Other	
5 B 3	BOREAL FORESTS	
5 B 3 a	Mixed broadleaf/Coniferous	
5 B 3 b	Coniferous	
5 B 3 c	Forest tundra	
5 B 4	GRASSLANDS/TUNDRA	Emissions of CO <sub>2</sub> from grasslands including tropical savanna and boreal tundra.
5 B 5	OTHER	Emissions from conversion of ecosystem types (e.g. wastelands, desert, etc.) not otherwise covered in any of the above categories.

5 C ABANDONMENT OF MANAGED LANDS	Removal of CO <sub>2</sub> from the abandonment of formerly managed lands (e.g. croplands and pastures). This category includes conversion of managed to abandoned lands. The categories below are determined by the type of biomass which regrows on the abandoned land.
5 C 1 TROPICAL FORESTS	
5 C 2 TEMPERATE FORESTS	
5 C 3 BOREAL FORESTS	
5 C 4 GRASSLANDS/TUNDRA	
5 C 5 OTHER	Removals from abandoned land regrown to any biomass type other than forests or grasslands.
5 D CO <sub>2</sub> EMISSIONS AND REMOVALS FROM SOIL	Emissions and removals of CO <sub>2</sub> in soil associated with land-use change and management. Includes CO <sub>2</sub> emissions from liming of agricultural soil.
5 E OTHER	Emissions and removals (sources and sinks) of CO <sub>2</sub> from land use or land-use change activities which can not be included under the categories provided above. Emissions of NMVOC from the living trees in managed forests and N <sub>2</sub> O or CH <sub>4</sub> emissions/removals from the soil of managed forests are reported here. Managed forests include all trees planted or managed by man for profit, pleasure, wind or water-erosion protection etc.



<b>6 WASTE</b>		Total emissions from solid waste disposal on land, wastewater, waste incineration and any other waste management activity. Any CO <sub>2</sub> emissions from fossil-based products (incineration or decomposition) should be accounted for here but see note on double counting under Section 2 "Reporting the National Inventory." CO <sub>2</sub> from organic waste handling and decay should not be included (see below). Sum of 6 A, B, C & D.
<b>6 A SOLID WASTE DISPOSAL ON LAND</b>		Methane is produced from anaerobic microbial decomposition of organic matter in solid waste disposal sites. Carbon dioxide (CO <sub>2</sub> ) is also produced but only CO <sub>2</sub> from non-biologic or inorganic waste sources should be reported here.
<b>6 A 1 MANAGED WASTE DISPOSAL ON LAND</b>		A managed solid waste disposal site must have controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control fires) and will include at least one of the following: cover material; mechanical compaction; or levelling of the waste.
<b>6 A 2 UNMANAGED WASTE DISPOSAL SITES</b>		These are all other solid waste disposal sites that do not fall into the above category.
<b>6 A 3 OTHER</b>		Other solid waste disposal on land.
<b>6 B WASTEWATER HANDLING</b>		Methane and nitrous oxide are produced from anaerobic decomposition of organic matter by bacteria in sewage facilities and from food processing and other industrial facilities during wastewater handling. N <sub>2</sub> O may also be released from wastewater handling and human waste. Methane emissions are covered in 6 B 1 and 6 B 2, nitrous oxide emissions in 6 B 2.
<b>6 B 1 INDUSTRIAL WASTEWATER</b>		Handling of liquid wastes and sludge from industrial processes such as: food processing, textiles, or pulp and paper production. This may involve such things as wastewater collection and treatment, ponds, or discharge into surface water.
<b>6 B 2 DOMESTIC AND COMMERCIAL WASTEWATER</b>		Handling of liquid wastes and sludge from housing and commercial sources (including human waste) through: wastewater collection and treatment, open pits / latrines, ponds, or discharge into surface waters. N <sub>2</sub> O emissions from discharge of human sewage to aquatic environments are included here.
<b>6 B 3 OTHER</b>		
<b>6 C WASTE INCINERATION</b>		Incineration of waste, not including waste-to-energy facilities. Emissions from waste burnt for energy are reported under the Energy Module, 1 A. Emissions from burning of agricultural wastes should be reported under Section 4. All non-CO <sub>2</sub> greenhouse gases from incineration should be reported here as well as CO <sub>2</sub> from non-biological waste.
<b>6 D OTHER</b>		Release of greenhouse gases from other waste handling activities.

**7 OTHER**

Efforts should be made to fit all emission sources/sinks into the six categories described above. If it is impossible to do so, however, this category may be used, accompanied by a detailed explanation of the source/sink activity.

## 1.2 Fuel Categories

Common terms and definitions of fuels are necessary for countries to describe emissions from fuel combustion activities consistently. A list of fuel types is provided below. Definitions for each of these fuels are given in the Glossary included in these *Reporting Instructions*. The list is organised into five major fuel types: liquid, solid, gas, biomass and other. It should be noted that "other fuels" are distinct from fuels listed in the biomass fuels category because they represent fuels that include biomass and non-biomass components.

### BASIC FUELS HIERARCHY (Fuel Combustion Only)

MAIN FUEL CATEGORIES (Included in totals of greenhouse gases Sources)		
CATEGORY	SUBCATEGORY	
LIQUID (Crude oil and petroleum products)	CRUDE OIL	
	ORIMULSION	
	NATURAL GAS LIQUIDS	
	GASOLINE	Motor Gasoline
		Aviation Gasoline
		Jet Gasoline
	(JET KEROSENE)	
	OTHER KEROSENE	
	SHALE OIL	
	GAS/DIESEL OIL	
	RESIDUAL FUEL OIL	
	LIQUEFIED PETROLEUM GAS	
	ETHANE	
	NAPHTHA	
	BITUMEN	
	LUBRICANTS	
	PETROLEUM COKE	
	REFINERY FEEDSTOCK	
	OTHER OIL	Refinery Gas
		Paraffin Waxes
		White Spirit
		Other

CATEGORY	SUBCATEGORY
SOLID (Coal and coal products)	ANTHRACITE *

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	COKING COAL	
	OTHER BITUMINOUS COAL	
	SUB-BITUMINOUS COAL	
	LIGNITE	
	OIL SHALE	
	PEAT	
	COKE	Coke Oven Coke
		Gas Coke
	BKB/PATENT FUEL	Patent Fuel
		Brown Coal Briquettes
	DERIVED GASES	Gas Works Gas
		Coke Oven Gas
		Blast Furnace Gas
GAS	NATURAL GAS	
OTHER FUELS	MUNICIPAL SOLID WASTE (GARBAGE)	
	INDUSTRIAL WASTE	
BIOMASS	SOLID	Wood/Wood Waste
(Excluded from CO <sub>2</sub> emissions totals.)		Charcoal
		Other Solid Biomass
	LIQUID	Bio-alcohol
		Sulphur Lies (Black Liquor)
	GAS	Landfill Gas
		Sludge Gas
TOTAL		
(Primary fossil fuel supply)		

\* If anthracite not separately identifiable, include with Other Bituminous Coal.

### 1.3 Reporting Major Sources at Differing Levels of Detail: Sectoral and Summary Report Tables.

The Sectoral and Summary Report Tables in this book allow the user to report the inventory at different aggregate levels of detail. There are six Sectoral Report Tables (Tables 1 to 6) to report emissions and removals at a more detailed sub-category level. The two Summary Report Tables (Tables 7A & 7B) are for aggregated emissions and removals, differing in their level of detail.

Some of the main features of the Sectoral and Summary Report Tables are summarised below.

#### Energy

- If a detailed, Sectoral Approach for energy has been used for the estimation of CO<sub>2</sub> from fuel combustion you are still asked to **complete and report the Worksheet 1-1 from the Reference Approach in the Workbook for verification purposes.**
- Total energy emissions from both the Reference and the Sectoral Approaches should be reported in the Sectoral and Summary Report Tables. **Do not add up CO<sub>2</sub> emissions calculated from both approaches.** An explanation of any significant differences between these results should be provided.
- Countries are asked to report emissions from international aviation and marine bunkers and CO<sub>2</sub> from biomass for energy under Memo Items. **Emissions from International Bunkers should not be included in national totals.** CO<sub>2</sub> emissions from the combustion of biomass fuels are accounted for in the Land-Use Change and Forestry Sector, if the wood has been produced unsustainably.

#### Industrial Processes

- HFCs, PFCs and SF<sub>6</sub> should be reported in two ways, as potential and actual emissions.

#### Notation Key

- As far as possible, countries should use the Sectoral and Summary Report Tables outlined in this document to summarise final inventory results. The notation shown in the key (see box) should be used to show where countries believe the identified source is zero (0). Where countries have opted not to estimate (NE) a particular source of each greenhouse gas, this should be shown. Data problems may limit the possibility of separating out each source individually; in this case it is included elsewhere (IE) and this should also be included in the table with a footnote indicating where the emission source/sink has been reported. Finally, countries may report a particular category as not occurring (NO) in their country.

#### NOTATION KEY

0	Source is estimated to be zero
NE	Not estimated
IE	Estimated but included elsewhere
NO	Not occurring

#### Additional Gases

- To avoid duplication of effort, reporting of substances covered under the Montreal Protocol is not required. However, countries wishing to

report these substances and additional gases for completeness may do so, using the spare copies of the Summary Report Tables where the column headings have been left blank.

### Overview

- The Overview Table (8A) should be used by countries to summarise their own assessment of completeness (e.g. partial, full estimate, not estimated) and quality (high, medium or low) of major source/sink inventory estimates. It gives a brief overview of the categories that have been taken into account in the emission inventory, as well as the level of documentation and disaggregation of the categories (see the Notation Key for a full explanation). The Disaggregation Key (8B) which follows the Overview Table gives a detailed explanation of the key used for the level of disaggregation for an inventory.

### Data Completeness

- In all tables used by countries to summarise their inventory data, footnotes should be added to indicate if emission estimates are incomplete, or representative of only a part of the total activity, for any particular source or sink category. In this way countries are expected to report on the completeness of each individual emission estimate.

## 1.4 Worksheets

**Worksheets** are **essential** for **transparency** and reconstruction of the inventory.

**Remember to provide all worksheets, containing at least activity data and emission factors, used to prepare the inventory for each sector, along with Sectoral and Summary Report Tables.**