DATABASE ON GREENHOUSE GAS EMISSION FACTORS

(IPCC-EFDB)

Annex to the User Manual

Guidance on the "Properties" field

Version A-1.10

(6 April 2005)

Supporting material prepared for consideration by the Intergovernmental Panel on Climate Change.

This supporting material has not been subject to formal IPCC review and approval process.

Approved by the IPCC Task Force Bureau on National Greenhouse Gas Inventories.

This is an annex to the EFDB User Manual (Version 1.10). This document provides you with guidance on the "Properties" which is one of the most important data fields in the EFDB.

This document should be used in conjunction with the EFDB User Manual, in particular,

- Section 6.1 "Option 1 – Search by specifying the criteria such as the IPCC Source/Sink Category, Gas and fulltext filters" when you search for data as a general EFDB user.
- Section 7.3 "Step – Single Input form" and Table 7-1 "Instruction on necessary information in each data field" when you, as a data provider, submit your own data for inclusion in the EFDB.

Annex: Guidance on the "Properties" field

The IPCC Emission Factor Database (EFDB) contains a lot of data records on greenhouse gas (GHG) emission factors or other parameters to be used in calculation of GHG emissions by sources and removals by sinks. Each data record is composed of various data fields that characterise it. (Table 7-1 in the EFDB User Manual presents all of the data fields.)

"**Properties**" is one of the most important data fields. It defines what EFDB users might see as critical pieces of information for searching the necessary emission factors or other parameters. This field consists of 5 sub-fields as shown below.

- **Technologies/Practices**
- **Parameters/Conditions**
- **Region/Regional Conditions**
- **Abatement/Control Technologies**[1]
- **Others**[2]

When providing an emission factor or other parameter, it is assumed that data providers will have a clear view of the activity to which the emission factor or other parameter relates and will be able to carefully specify the conditions which define the factor and help the user. Any relevant information that characterise the emission factor or other parameter information should be fully described in appropriate sub-fields.

Tables 1 to 6 provide you with detailed guidance and typical examples on what kind of information should be (or could be) given as "Properties".

These tables are not meant for exhaustive lists of "properties", but for lists of typical examples and guidance for users' and data providers' reference.

---

[1] This sub-field should be treated as a separate "property" because of their specific consideration in emission reduction and control analyses. In some cases, however, the distinction between "Technologies / Practices" and "Abatement / Control Technologies" might be subtle or difficult to differentiate. For example in the Agriculture Sector, "anaerobic lagoon" is a manure management system and falls under "Technologies / Practices", but "covered anaerobic lagoon with biogas collection" would fall under "Abatement / Control Technologies". It should be noted that this field is explicitly intended to make GHG abatement information more easily retrievable.

[2] Any additional information that does not fit into aforementioned 4 categories should fall under this category.

Guidance on how to use Tables 1-6

<For general EFDB users (Those who wish to search data)>

Tables 1-6 show you what kind of information may be available in "Properties" field of each data record. It will help you think of adequate queries (or key words) to use filter function[3] to facilitate your search.

For example:

When you are looking for data on emission factor or some other parameters for calculation of methane emissions from livestock manure management, you can get a long list of relevant data records by specifying "Manure Management (4B)" as IPCC Source/Sink Category and "METHANE" as Gas in the "Find EF: Option 1 – Search by specifying the criteria such as the IPCC Source/Sink Category, Gas and fulltext filters"[4].

Should you wish to use filter function in order to narrow down the list, it is recommended to refer to Table 4, Guidance on the "Properties" field: Agriculture Sector. Then you will see various examples of information that you can expect to find in the "Properties" field as shown below. You will be able to think of adequate queries or key words for filter function from these examples. If you are looking for emission factor for methane emissions associated with a particular type of waste management system (e.g., lagoon), you can apply a relevant key word (e.g., "lagoon") to the **Filter** textbox in the column of "Technologies/Practices".

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Manure Management (4B)	Emission Factors (methane/nitrous oxide) Volatile Solids (VS) Production Methane Conversion Factor (MCF) Methane-producing Potential (Bo) Value Nitrogen Excretion Rate	**Type of waste management system:** e.g., - *Lagoon* - *Solid storage* - *Other liquid systems* **Livestock description:** e.g., - *Weight* - *Subspecies* - *Number of animals in operation*	Collection/ flaring/ anaerobic digesters Diet modifications	**Operational conditions of system:** e.g., - *Retention time of waste* - *Recycling of waste* - *Solids separation* **Diets and feed characteristics for animals** Milk production	**Climatic conditions**	

---

[3] For details on "filter function", see page 14 of the EFDB User Manual.

[4] See Section 6.1 (pages 10-15) in the EFDB User Manual.

<For data providers>

Tables 1-6 show you what kind of information should be made available in the sub fields of "Properties" when you propose a new data record to the EFDB[5]. It should be noted that the information for each sub field is classified into two groups as follows.

Some of the properties only apply subject to conditions. (For example, "Site conditions" in Waste Sector must be specified if the EF/other parameter is site-specific, but not if it is a national average value. Thus, some mandatory properties are subject to the conditional "…unless national average.")

● **Property which must be specified**: Certain of the properties are considered essential to EFDB users in examining the applicability of data records to their national GHG inventories. Such properties are indicated in bold and underlined fonts in Tables 1-6. If you submit your data without providing appropriate information in the sub-fields, you will be prompted to fill those fields by the Technical Support Unit of the IPCC-NGGIP.

● Property which could be specified: The properties that are considered not essential but helpful to EFDB users are indicated in normal fonts in Tables 1-6. You do not need to, but are encouraged to, specify such properties in your proposal.

For example:

When you propose a new data on emission factor for methane emissions from industrial wastewater treatment, you should refer to Table 6, Guidance on the "Properties" field: <u>Waste Sector</u>. Then you will see various examples of information that you should provide in the "Properties" field as shown below. In this case:

• You **must** specify "Industry type" (e.g., pulp and paper industry) in "Parameters/Conditions" sub field, and also "Country or Region" (e.g., India) in "Region/Regional conditions" sub field.

• You are encouraged to specify, if possible, "Treatment type" (e.g., Untreated) in "Technologies/Practices" sub field, "Abatement/Control technology" (e.g., Methane recovery is carried out.), and COD or BOD per kg production (or per m^3 effluent) in "Parameters/Conditions" sub field.

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	**Abatement/ Control technology**	**Parameters/ Conditions**	**Region/ Regional conditions**	**Other Properties**
Industrial Wastewater (6B1)	Methane Emission Factor	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*	- *Recovery* - *Other*	**Industry type** COD or BOD per kg production COD or BOD per m^3 effluent	**Country or Region**	

It should be noted that Tables 1-6 are not meant for exhaustive lists of "properties", but for lists of typical examples and guidance for users' and data providers' reference. It is highly recommended to provide any relevant information in an adequate sub field even if that is not explicitly indicated in these tables.

---

[5] See Chapter 7 (pages 21-35) in the EFDB User Manual.

Table 1 Guidance on the "Properties" field: <u>Energy Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Fuel Combustion Activities (1A)						
CO$_2$ from Fuel Combustion (All sub source categories)	N.B. The emissions are directly determined by the carbon content of the fuel. All source categories are treated identically, including mobile sources. If submission of a separate factor for incomplete oxidation is made this should be specific to a source category and technology. However, if the submitted emission factor includes an adjustment for incomplete oxidation this fact **must** be stated (in "Other Properties" sub field).				
	CO$_2$ Emission Factor Carbon Emission Factor					<For all fuels> **Carbon content (on an 'as received' basis for solid fuels) and net calorific value (NCV) of fuel** <For solid fuels> **Moisture content of solid fuel as used** (In case fuel characteristics are available only on a dry basis) <For gaseous fuels> **Temperature and pressure for which emission factors are given** **NCV and molar composition of the gas** **If the terms STP or NTP are used the corresponding definitions must be given.** <For solid and liquid fuels> Sulfur content for solid fuels, liquid and crude oil used as a fuel, and API gravity for crude oil.

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Non-CO_2 from Stationary Combustion	CH_4 Emission Factor N_2O Emission Factor NMVOCs Emission Factor CO Emission Factor NOx Emission Factor SO_2 Emission Factor	**Type of boiler or combustion facilities** (It is recommended that the definitions of boilers be used as presented in the *Revised 1996 IPCC Guidelines* or in the EMEP/CORINAR Guidebook.)	**Type and description of technology applied** (If no control applied, this should be explicitly stated.)	**Operating conditions** **Fuel type including fuel characteristics** (The fuel characteristics for gaseous fuels should include the net calorific value (NCV) and molar composition.)	Regional conditions (if any)	Size of plant Age of plant Maintenance level
Non-CO_2 from Mobile Combustion	CH_4 Emission Factor N_2O Emission Factor NMVOCs Emission Factor CO Emission Factor NOx Emission Factor SO_2 Emission Factor	**Engine type:** e.g., - *Two-stroke* - *Otto cycle* **Fuel used**	**Type and description of technology applied** (If no control applied, this should be explicitly stated.)	**Vehicle size** **Age** **Operating conditions (including driving cycles)**	Altitude Other regional conditions (if any) (These regional conditions will be valuable.)	
Fugitive Emissions from Fuel (1B)						
Solid Fuels (1B1) – Under-ground Mines (1B1a1)	CH_4 Emission Factor from Underground Mines		**Type and description of technology applied:** e.g., - *CH_4 recovery* - *Pre-drainage.*	**Type of coal (brown, hard)** **Depth of mine**	Coal field Other regional conditions (if any) (These regional conditions will be valuable.)	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Oil and Natural Gas (1B2)	The number of different processes used in the oil and gas sector makes it essential that an emission factor be accompanied by sufficient information for a user to judge whether it is appropriate for use in local conditions. This is particularly important where Tier 1 emission factors are provided as they will be applied to activity data embracing several or many different processes. The list below is simplified to provide examples of the information required to support Tier 1 factors. "Examples of process characteristics affecting emission factor" at the bottom of this table is a breakdown of processes cutting across the source category classification and further examples of the factors influencing the emission factors for the processes. This list is not exhaustive but may be consulted as an *aide-memoire* when identifying factors influencing the emission factor.					
Oil Extrac-tion (Eplora-tion/ Produc-tion) (1B2a1, 1B2a2)	CH_4 Emission Factor	**Field type (associated/non-associated)** **Re-injection** **Flaring and venting** **Maintenance**		Crude oil sulphur content API Gas/Oil ratio Gas composition	Field name	
Oil Refining/ Storage (1B2a4)	CH_4 Emission Factor			**Reid vapour pressure of stored oil** **Capacity of plant** **CH_4 content of stored oil**	Temperature	Form of tanks Age of refining plant and storage tanks Tank colour
Natural Gas Extrac-tion (Produc-tion/ Process-ing) (1B2b1)	CH_4 Emission Factor	**Associated/non-associated well type**			Field name	State of maintenance

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Natural Gas Transmission/ Distribution (1B2b2)	CH_4 Emission Factor			**Length of the pipeline** **Operating pressure** (It should be clearly indicated whether storage facilities, processing plants or compressor station emissions are included in the emission factor.)		Age of the pipeline Pipeline materials
Venting and Flaring (1B3)	CH_4 Emission Factor					**Combustion efficiency** **Flare composition** **Maintenance**

Examples of process characteristics affecting emission factor.

Venting and flaring

- Gas compositions, flare combustion efficiency

Emissions from storage tanks

- solution gas factors, type of liquid (crude, gasoline, etc.), tank sizes, colours and type (floating roof, fixed etc.), vapour composition, Reid V.P.

Equipment leaks

- Specific oil & gas activity / facility / installation counts by type, processes used at each facility, gas vapour composition of process streams (NMHC, CH_4, H_2O etc.)

Pipeline leaks

- Length of pipeline, type of crude or composition of gas transported, type of compressors used (centrifugal, reciprocating)

Table 2 Guidance on the "Properties" field: <u>Industrial Processes Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Mineral Products (2A)						
Cement Production (2A1)	Emission Factor for CO_2 from Clinker Production	**<u>CaO fraction in clinker</u>** **<u>CKD Correction Factor (if any)</u>**		In case of stack measurements, fuel combustion emissions should be excluded		Correction for non-carbonate sources of CaO in clinker
	Clinker Fraction in Cement	**<u>Clinker fraction in cement</u>**		**<u>Type of cement:</u>** e.g., - *Portland cement* - *Hydraulic cement* - *Slag cement* - *Masonry cement* - *Puzzolan cement*	Country where data were measured	Share of cement types and clinker percentage per type
Lime Production (2A2)	Emission Factor for CO_2 Emissions from Lime Production	**<u>Lime type (Process):</u>** e.g., - *Quicklime (Lime Kiln-Calcite Feed)* - *Dolomitic lime(Lime Kiln-Dolomite Feed)*		Correction for lime impurity (if substantial)		
Limestone and Dolomite Use (2A3)	CO_2 Emission Factor for Limestone Use CO_2 Emission Factor for Dolomite Use	- Limestone use - Dolomite use		Correction for lime impurity (if substantial)		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Soda Ash Production and Use (2A4)	CO_2 Emission Factor for Soda Ash Production	**Manufacturing process:** e.g., - *trona* - *sodium chloride (Solvay process)*		In the solvay process; stoichiometric ratio		
Chemical Industry (2B)						
Ammonia Production (2B1)	CO_2 Emission Factor for Ammonia Production	**Fuel type:** e.g., - *natural gas* - *heavy fuel oil*		**Carbon content of fuel type consumed** Gas/oil used as fuel should be excluded from the emission factor		Fraction produced from hydrogen instead of natural gas or oil
Nitric Acid Production (2B2)	N_2O Emission Factor for Nitric Acid Production	**Process type:** e.g., - *pressure level*	**Abatement Technology Type** With/without Non-Selective Catalytic Reduction (NSCR)	For NSCR; - N_2O destruction factor (%) - Utilisation factor (%) Age of the plant		
	N_2O Destruction Factor for Nitric Acid Production	**Process type:** e.g., - *pressure level*	**Abatement Technology Type** With Non-Selective Catalytic Reduction (NSCR)	N_2O destruction factor (%) for NSCR Utilisation factor (%) for NSCR Age of the plant		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Adipic Acid Production (2B3)	N_2O Emission Factor for Adipic Acid Production		**Abatement technology type:** e.g., - *Unabated* - *Catalytic Destruction* - *Thermal Destruction* - *Recycle to feedstock for Phenol* - *Recycle to feedstock for Adipic Acid*	N_2O destruction factor (%) for relevant abatement technology Utilisation factor (%) for relevant abatement technology Age of the plant		Fraction of alcohol used as feedstock
	N_2O Destruction Factor for Adipic Acid Production		**Abatement technology type:** e.g., - *Catalytic Destruction* - *Thermal Destruction* - *Recycle to feedstock for Phenol* - *Recycle to feedstock for Adipic Acid*	N_2O destruction factor (%) for relevant abatement technology Utilisation factor (%) for relevant abatement technology		Fraction of alcohol used as feedstock
Carbide Production (2B4)	CO_2 Emission Factor for Silicon Carbide Production CH_4 Emission Factor for Silicon Carbide Production			<For CO_2> **Fraction of carbon input sequestered in the product (in Silicon Carbide Production)**		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Carbide Production (2B4)	CO_2 Emission Factor for Calcium Carbide Production	**Step in the process:** e.g., - *Limestone (heating calcium carbonate to produce lime)* - *Reduction (of lime with carbon such as petrol coke)* - *Use of product (acetylene production)*		For each process step: stoichiometric ratio		Note: Carbon in CO as by-product should be excluded, when this is utilised as energy
Other (2B5)	CO_2 from Non-Energy Use: energy used as chemical feedstock (Tier 1 approach)	**Fuel type:** - *natural gas* - *oil products (specify types)* - *coal* - *coal products (specify types)*		**Fraction of fuel input emitted:** e.g., - *fraction emitted during manufacture* - *fraction emitted during usage of product(s)* In case of oil products: - *composition of the product mix*	**Carbon content** (per fuel type) **Type of products** (per fuel type)	Lifetime of products considered Fraction of fuel input emitted, if possible split into categories mentioned: inadvertent emissions during manufacture and during product usage Carbon emitted in the waste disposal phase (e.g. by incineration) should be excluded to avoid double counting
	CH_4 Emission Factors from other Product Manufacturing Precursor Emission Factors from other Product Manufacturing			**Product:** e.g., <for CH_4> - *Carbon Black* - *Ethylene* - *Dichloroethylene* - *Styrene* - *Methanol* - *Coke*		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Metal Production (2C)						
Iron and Steel Production (2C1)	CO_2 (fossil) Emission Factor for Iron and Steel Production	**Type of facility:** e.g., - *Integrated facility* - *Separate facilities (coke production, pig iron production, steel production)* **Type of technology:** e.g., - *Basic Oxygen Furnace (BOF)* - *Open Hearth Furnace (OHF)* - *Electric Arc Furnace (EAF)* **Types of reducing agent used:** e.g., - *Coke* - *Coal* - *Petroleum coke* - *Charcoal*		Note: Preferably the emission factor should be expressed as: CO_2 from carbon content per unit of reducing agent used If expressed as CO_2 per unit of steel produced: - *Amount of reducing agent used (and/or amount of burning electrodes, if any)* - *Carbon stored in steel (and iron, if not all iron is used for steel production)*	Note: In some countries instead of coke (coal) charcoal may be used as reducing agent; the CO_2 Emission Factor from the use of charcoal should be calculated separately.	Note: The emission factor should only include the carbon included in the reducing agent and in the iron ore: *all other fuel fuel* and carbon contained in *limestone or dolomite* used as additional flux **Role of blast furnace gas produced:** e.g., - *fullly used at the site and is the carbon included or excluded in the emission factor* - *partly used outside the iron and steel plant and therefore excluded from the emission factor*
	Precursor Gases Emission Factor for Iron and Steel Production	**Type of technology:** e.g., - *pig iron production* - *steel production (BOF, OHF, EAF)* - *rolling of steel*				

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Ferroalloys Production (2C2)	CO_2 Emission Factors for Ferroalloy Production	**Type of carbon:** e.g., - *Fossil carbon* - *Biocarbon*		**Type of ferroalloy:** e.g., - *Ferrosilicon - 50%Si* - *Ferrosilicon - 75%Si* - *Ferrosilicon - 90%Si* - *Silicon metala* - *Ferromanganese* - *Silicon manganese* - *Ferrochromium*		How the emissions were obtained: e.g., - *Through material balance* - *Other*

Aluminium Production (2C3)	Emission Factor for CO_2
	
	 Precursor Gas Emission Factor
		Technology type: e.g.,
		 - *Prebaked Anode*
		    - Centre worked prebaked (CWPB)
		    - Side worked prebaked (SWPB)
		    - Point-Feed prebaked (PFPB)
		 - *Sørderberg Anode*
		    - Horizontal stud (HSS)
		    - Vertical stud (VSS)
				Amount of carbon (anode) consumed per ton of aluminium produced		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties

Aluminium Production (2C3)	Emission Factor for PFCs (CF_4, C_2F_6)	**Technology type:** e.g.,
		 - *Prebaked Anode*
		  - Centre worked prebaked (CWPB)
		  - Side worked prebaked (SWPB)
		  - Point-Feed prebaked (PFPB)
		 - *Sørderberg Anode*
		  - Horizontal stud (HSS)
		  - Vertical stud (VSS)
			Emission collection efficiency based on technology type (CWBP, SWPB, VSS, HSS)	**Age of technology used and degree of automation**
				
				 Depending on method used, e.g:
				 - *Anode effect frequency*
				 - *Anode effect duration*
				 - *Anode effect over voltage*
				 - *Current efficiency*
				
				 Average fraction CF_4 and C_2F_6
						Methodology used: e.g.,
						 - *Slope method*
						 - *Pechiney over-voltage method*
						 - *Continuous monitoring*
						 - *Smelter specific relationship*

SF_6 Used in Aluminium and Magnesium Foundries (2C4)	SF_6 Emission Factor for primary Magnesium Foundries	**Type of technology:** e.g., - *primary magnesium casting* - *diecasting*	Note: Usage of SF_6 per tonne of magnesium can be reduced by optimisation	Note: Emission factors, expressed as kg SF_6 emitted/kg SF_6 used, are generally 1 for magnesium.		Note: Emission factors should preferably be expressed as kg SF_6 emitted/kg SF_6 used.

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Other Production (2D)						

Pulp and Paper (2D1)	Non Combustion SO_2 Emissions from Pulp Production	**Technology/ Processes:** e.g.,
		- *Mechanical*
		- *Chemical; Sulphate (Kraft)*[6]
		  - Digestion[7]
		  - Cooking [7]
		  - Chemical recovery
		  - Washing [7]
		  - Evaporation
		  - Recausticising
		- *Chemical; Sulphite,*
		- *Chemical; Semi-chemical,*
		- *Secondary fibre*
			Type of control technology: e.g.,
			- *Primary measures (processes)*
			- *Secondary measures; Scrubbers,*
			- *Secondary measures; Incineration (Odorous Gas Boilers)*
				Recovery rate (%) for control technology
				
				Utilisation factor (%) for control technology
				
				Maintenance level
				
				Age of the plant
					Type of raw material: e.g.,
					- *Wood*
					- *Straw*	

Food and Drink (2D2)	NMVOC Emission Factor for Food and Drink Production			**Type of food or drink:** e.g., - *Wine* - *beer* - *bread* - *meat*	-	

[6] Partial processes with SO_2 emissions must be specified.

[7] No SO_2 emissions if gas is collected and from diffuse sources.

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Production of Halocarbons and Sulphur Hexafluoride (2E)						
By-product Emissions (2E1)	HFC-23 Emission Factor for HCFC-22 Manufacture		**HFC-23 recovery technology:** - *type* - *efficiency*			
Fugitive Emissions (2E2)	Emission Factors for HFC-.., PFC-.. and SF_6 Production	**Phase in process:** e.g., - *Production* - *Handling/packaging on-site*				Note: Clarify whether or not the emission factor includes handling losses.
Consumption of Halocarbons and Sulphur Hexafluoride (2F)	Emission Factors for HFC-…, PFC-…, SF_6 from Equipment	**Type of application/ equipment/Tier level** (as in IPCC Good Practice Guidance): e.g., - *Refrigeration (stationary /mobile/…)* - *Foam blowing (hard/soft)* - *Fire Extinguishers* - *Solvent use* - *Semiconductor manufacture* - *Electrical equipment* **Source type:** e.g., - *Filling* - *Use* - *Disposal*	<In disposal phase> **Recovery technology type and its efficiency** **Destruction technology type and its efficiency**	<In use phase> **Various relevant factors:** e.g., - *Delay factors* - *Lifetime of equipment* - *Mix of HFCs in the charge (when applicable)* as appropriate for the application		Note: SF_6 consumption in magnesium production and magnesium diecasting is allocated under 2C 'Magnesium foundries'

Table 3 Guidance on the "Properties" field: <u>Solvent and Other Product Use Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solvent and Other Product Use (3)	Emission Factors for CO_2, N_2O, NMVOC[8]	**<u>Exact Use of Solvent:</u>** e.g., <For CO_2> - *Production-based* - *Consumption-based* - *Solvent balance* <For other gases> - *N_2O usage (e.g., as anesthesia of a propellant)*	**<u>Abatement Technology Type</u>** Destruction through, thermal and catalytic incineration Transformation e.g. absorption in water	Production data Import/export data Use as raw material Solvent content (average chemical composition of product) Fraction emitted to air		

---

[8] Although the IPCC reporting tables do not provide an entry for CH4, potentially there can be methane sources in this category.

Table 4 Guidance on the "Properties" field: <u>Agriculture Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Enteric Fermentation (4A)	Emission Factor Methane Conversion Factor Digestible Energy Intake Coefficients for Net Energy Equations	**<u>Type of livestock management system:</u>** e.g., - *Pasture-based* - *Feedlot based* - *Rangeland* - *Combinations of these systems* **<u>Body weight, weight gain and subspecies classifications</u>** Description of ag production industry/economic indicators	Feed additives Vaccines Alternative feeds	**<u>Feed quantity and accessibility (ad libitum) and quality</u>** **<u>Milk production</u>** Seasonal variation in feeding or management practices Description of animal activity and energy requirements Milk quality Meat or other product production	**<u>Climatic conditions</u>**	
Manure Management (4B)	Emission Factors (methane/nitrous oxide) Volatile Solids (VS) Production Methane Conversion Factor (MCF) Methane-producing Potential (Bo) Value Nitrogen Excretion Rate	**<u>Type of waste management system:</u>** e.g., - *Lagoon* - *Solid storage* - *Other liquid systems* **<u>Livestock description:</u>** e.g., - *Weight* - *Subspecies* - *Number of animals in operation*	Collection/ flaring/ anaerobic digesters Diet modifications	**<u>Operational conditions of system:</u>** e.g., - *Retention time of waste* - *Recycling of waste* - *Solids separation* **<u>Diets and feed characteristics for animals</u>** Milk production	**<u>Climatic conditions</u>**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Rice Cultivation (4C)	Emission Factor	**Water management (type of irrigation)** **Type of fertilizer used and fertilizer management technique** **Crop management:** e.g., - *Till/no-till* - *Land preparation* - *Use of herbicides* **Organic management (manure/rice straw incorporation)**	**Use of water management as methane abatement strategy** Organic and inorganic fertilizer management Type of rice cultivar	**Soil characteristics:** e.g., - *Soil type* **Type of rice ecosystem:** e.g., - *Irrigated* - *Rain fed* - *Deep water* - *Upland* **Crop season:** e.g., - *Single rice* - *Early rice* - *Late rice* **Number of growing days** Planting density Cultivar type	**Climatic conditions**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Agricultural Soils (4D)	Emission Factor Fraction Crop Residue Burned/Removed Nitrogen Fixation Carbon/Nitrogen Ratios Residue/Crop Product Nitrogen Losses from Leaching and Volatilization	**Method of application** **Type of fertilizer and application rate and/or nitrogen deposition from animal waste** **Water management practices** **Plant species:** e.g., - *Legumes* - *Grasses* - *Crops* **Crop management practices:** e.g., - *Till* - *No-till*	Nitrification inhibitors Split fertilizer applications Optimization of application rates Method of application Liming of acid soils	**Soil properties: e.g.,** - *pH* - *Soil organic content* - *Soil nitrogen* - *Soil texture* - *Soil moisture content* Time of fertilizer application Water level	**Climatic conditions**	
Prescribed Burning of Savannas (4E)	Emission Factor Fuel Density Carbon/Nitrogen Ratio	**Type of fuel: e.g.,** - *Description of ecosystem* - *Density of fuel* - *Whether litter or living vegetation* Rate, frequency and area of burn		**Flaming conditions/fuel moisture** Combustion efficiency	**Climatic conditions:** e.g., - *Wet* - *Dry* - *Monsoonal systems* - *Mediterranean*	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Field Burning of Agricultural Residues (4F)	Emission Factor Fuel Density Carbon/Nitrogen Ratio	**Description of crop:** e.g., - *Type* - *Area* - *Crop yield* **Description of residue:** e.g., - *Biomass density at time of burning* Rate, frequency and area of burn		**Crop season** **Flaming condition/fuel moisture** Combustion efficiency	**Climatic conditions**	

Table 5 Guidance on the "Properties" field: <u>Land-Use Change and Forestry (LUCF) Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Changes in Forest and Other Woody Biomass Stocks (5A)						
Tropical Forests (5A1)	Annual Average CO$_2$ Uptake by Aboveground Biomass Annual Average CO$_2$ Uptake by Belowground Biomass Dead Biomass Production (woody debris, forest floor) Tree Diameter (under or over bark) Biomass Expansion Factor per Tree Species Above and Belowground Biomass Estimation Annual Average Accumulation of Dry Matter as Biomass (conversion factor) Harvested Wood	<For Natural Forest> **<u>Protected / accessed by communities</u>** **<u>Type of Management practices applied:</u>** e.g., - *harvesting* <For Forest Plantations> **<u>Type of management practices applied;</u>** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information*	**<u>What kind of control in operation:</u>** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting*	**<u>Forest conditions:</u>** e.g., - *Moist Forests;* - *Seasonal Forests;* - *Dry Forests* **<u>Forest age</u>** **<u>Forest type:</u>** e.g., - *Closed forest* - *Mixed (closed) and open (secondary)* - *Tree savanna* - *Mixed tree savanna* - *Primary/secondary* - *Gallery forest* - *Closed/open woodland* - *Dense/semi-dense forest* - *Woodland-miombo* - *Disturbed* - *Closed forest fallow* Effect by atmospheric condition, e.g., CO$_2$, N, S deposition, Ozone	**<u>Regions:</u>** e.g., - *Africa* - *Asia* - *America* **<u>Climatic zone:</u>** e.g., - *Dry* - *Semi-arid* - *Semi-moist* - *Very moist* **<u>Climatic conditions:</u>** e.g., - *Rainfall* - *Temperature* Sub-regions Countries and specific climate conditions	**<u>Any assumptions used to derive/use emission factors or other parameters</u>**

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Temperate Forests (5A2)	Annual Average CO_2 Uptake by Aboveground Biomass Annual Average CO_2 Uptake by Belowground Biomass Dead Biomass Production (woody debris, forest floor) Tree Diameter (under or over bark) Biomass Expansion Factor per Tree Species Above and Belowground Biomass Estimation Annual Average Accumulation of Dry Matter as Biomass (conversion factor) Harvested Wood	\<For Natural Forest\> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* \<For Forest Plantations\> **Type of management practices applied;** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information* - *Drainage*	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions:** e.g., - *Coniferous Temperate forest* - *Broadleaf* - *Mixed* **Forest age** **Forest type:** e.g., - *Closed forest* - *Mixed (closed) and open (secondary)* - *Primary/secondary* - *Closed/open woodland* - *Disturbed* - *Closed forest fallow* Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** e.g., - *Asia* - *North America* **Climatic zone:** e.g., - *Dry* - *Semi-arid* - *Semi-moist* - *Very moist* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* Sub-regions Countries and specific climate conditions	**Any assumptions used to derive/use emission factors or other parameters**

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Boreal Forests (5A3)	Annual Average CO_2 Uptake by Aboveground Biomass Annual Average CO_2 Uptake by Belowground Biomass Dead Biomass Production (woody debris, forest floor) Tree Diameter (under or over bark) Biomass Expansion Factor per Tree Species Above and Belowground Biomass Estimation Annual Average Accumulation of Dry Matter as Biomass (conversion factor) Harvested Wood	<For Natural Forest> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* <For Forest Plantations> **Type of management practices applied;** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information* - *Drainage*	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions:** e.g., - *Coniferous* - *Deciduous* - *Mixed* **Forest age** **Forest type:** e.g., - *Closed forest* - *Primary* - *Secondary* - *Disturbed* Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** e.g., - *North America* - *North Europe* **Climatic zone:** e.g., - *Tundra* - *Moist* - *Very moist* - *Arid* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* - *Winter period* Sub-regions Countries and specific climate conditions Altitude Vegetation period	**Any assumptions used to derive/use emission factors or other parameters**
Forest and Grassland Conversion (5B)	Emissions Ratios for Open Burning of Cleared Forests (CH_4, CO, N_2O, NO_x)					

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Tropical Forests (5B1)	Aboveground Biomass Estimates Biomass Stock Estimates Dead Biomass (woody debris, forest floor, Biomass Expansion Factor per Tree Species Harvested Wood Dry Matter in Aboveground Biomass (conversion factor)	<For Natural Forest> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* <For Forest Plantations> **Type of management practices applied;** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information*	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting*	**Forest conditions:** e.g., - *Moist Forests;* - *Seasonal Forests;* - *Dry Forests* **Forest age** **Forest type:** e.g., - *Closed forest* - *Tree savanna* - *Mixed tree savanna* - *Primary/secondary* - *Gallery forest* - *Closed/open woodland* - *Dense forest* - *Woodland-miombo* - *Disturbed* - *Semi-dense* - *Closed forest fallow* Effect by atmospheric condition, e.g., CO_2, N, S deposition, Ozone	**Regions:** e.g., - *Africa* - *Asia* - *America* **Climatic zone:** e.g., - *Dry* - *Semi-arid* - *Semi-moist* - *Very moist* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* Sub-regions Countries and specific climate conditions	**Any assumptions used to derive/use emission factors or other parameters**

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Temperate Forests (5B2)	Aboveground Biomass Estimates Biomass Stock Estimates Dead Biomass (woody debris, forest floor, Biomass Expansion Factor per Tree Species Harvested Wood Dry Matter in Aboveground Biomass (conversion factor)	<For Natural Forest> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* <For Forest Plantations> **Type of management practices applied;** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information*	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions:** e.g., - *Coniferous Temperate forest* - *Broadleaf* - *Mixed* **Forest age** **Forest type:** e.g., - *Closed forest* - *Mixed (closed) and open (secondary)* - *Primary* - *Secondary* - *Closed woodland* - *Open woodland* - *Disturbed closed* - *Disturbed open* - *Closed forest fallow* Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** e.g., - *Asia* - *North America* **Climatic zone:** e.g., - *Dry* - *Semi-arid* - *Semi-moist* - *Very moist* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* Sub-regions Countries and specific climate conditions	**Any assumptions used to derive/use emission factors or other parameters**

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Boreal Forests (5B3)	Aboveground Biomass Estimates Biomass Stock Estimates Dead Biomass (woody debris, forest floor, Biomass Expansion Factor per Tree Species Harvested Wood Dry Matter in Aboveground Biomass (conversion factor)	<For Natural Forest> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* <For Forest Plantations> **Type of management practices applied;** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information* -	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions:** e.g., - *Coniferous* - *Deciduous* - *Mixed* **Forest age** **Forest type:** e.g., - *Closed forest* - *Primary* - *Secondary* - *Disturbed* Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** e.g., - *North America* - *North Europe* **Climatic zone:** e.g., - *Forest-tundra* - *Moist* - *Very moist* - *Arid* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* - *Winter period* Sub-regions Countries and specific climate conditions Altitude Vegetation period	**Any assumptions used to derive/use emission factors or other parameters**
Abandonment of Managed Lands (5C)	Time of Abandonment Area of Abandoned Lands Annual Average CO_2 Uptake by Aboveground and Belowground Biomass by Natural Regeneration Biomass Expansion Factor per Tree Species Annual Average Accumulation of Dry Matter as Biomass (conversion factor)	<For Natural Forest> **Type of Management practices applied**	**What kind of control in operation:** e.g., - *Pest & disease control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions** **Forest age** **Forest type** Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** **Climatic zone:** **Climatic conditions:** e.g., - *Rainfall* - *Temperature*	**Any assumptions used to derive/use emission factors or other parameters**

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
CO_2 Emissions and Removals from Soil (5D)	Quantities of Soil Organic Carbon Under Native Vegetation (0-30 cm depth)			**Soil properties** **Fertilization type**	**Climate conditions**	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (BASE FACTOR)	**System:** e.g., - *Long-term cultivated* - *Improved pasture* - *Set aside (less than 20 years)* - *Set aside (more than 20 years)* - *Wetland (Paddy) rice* - *Shifting cultivation (including fallow)* - *Abandoned/degraded land* - *Unimproved pasture*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic* - *All soils*	**Region:** e.g., - *Tropical* - *Temperate* - *Others*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (INPUT FACTOR; HIGH INPUT)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (INPUT FACTOR; LOW INPUT)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (INPUT FACTOR; MEDIUM INPUT)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
CO_2 Emissions and Removals from Soil (5D)	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (INPUT FACTOR; MATURE FALLOW)	**System:** e.g., - *Shifting cultivation (including fallow)*		**Soil Group:** e.g., - *All soils*	**Region:** e.g., - *Tropical*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (INPUT FACTOR; SHORTENED FALLOW)	**System:** e.g., - *Shifting cultivation (including fallow)*		**Soil Group:** e.g., - *All soils*	**Region:** e.g., - *Tropical*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (TILLAGE FACTOR; FULL TILLAGE)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (TILLAGE FACTOR; NO TILLAGE)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	
	Coefficients Used in Default Calculation Procedures for Estimating Carbon Stocks in Mineral Soils (TILLAGE FACTOR; REDUCED TILLAGE)	**System:** e.g., - *Long-term cultivated*		**Soil Group:** e.g., - *High activity* - *Low activity* - *Sandy* - *Volcanic* - *Aquic*	**Region:** e.g., - *Tropical* - *Temperate*	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Other (Flooding and Wetland Drainage) (5E)	Average Methane Emissions and Production Periods of Natural Wetlands Average CO_2 Emissions due to Drainage Average N_2O Emissions due to Drainage	Time of drainage Drainage management	- *Raising ground water level*	Soil fertility (e.g. peat, pH, C/N ratio) Ground water level Depth of organic layer	**Wetland Categories:** e.g., - *Bogs* - *Fens* - *Swamps* - *Marshes* - *Floodplains* - *Lakes* - *Others* **Climate conditions:** e.g., - *Rainfall,* - *Temperature* - *Winter period*	
Other (Shifting Cultivation) (5E)	Root-to-Shoot Ratios that can be Applied (multiplier) to Aboveground Biomass to Estimate the Belowground Biomass.		-	**Forest type:** e.g., - *Moist forest growing on spodosols* - *Lowland very moist forests* - *Montane moist forest* - *deciduous forest* - *Coniferous* - *Broadleaf* - *Coniferous* - *Broadleaf* - *Forest-tundra*	**Region:** e.g., - *Tropical* - *Temperate* - *Boreal*	

Table 6 Guidance on the "Properties" field: <u>Waste Sector</u>

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Municipal Solid Waste (MSW) Generation Rate		Waste reduction measures	Specify whether industrial waste is included	**<u>Country or Region</u>** **<u>Urban and/or rural areas included</u>** Population for local data (size of community)	Explanation of data collection: e.g., - *Surveys (comprehensive or extrapolated)* - *waste management company data (based on measurements/ weighing or estimates)*
	Fraction of Municipal Solid Waste (MSW) disposed to Solid Waste Disposal Sites (SWDS)		Information on other waste treatment and recycling	Specify by waste type	**<u>Country or Region</u>** **<u>Urban and/or rural areas included</u>** Population for local data (size of community)	Explanation of data collection: e.g., - *Surveys (comprehensive or extrapolated)* - *waste management company data (based on measurements/ weighing or estimates)*
	Fraction of Degradable Organic Carbon (DOC) of Municipal Solid Waste (MSW) (average values)		Information on other waste treatment and recycling	Waste composition	**<u>Country or Region</u>** Urban and/or rural areas included Population for local data (size of community)	
	Fraction of Degradable Organic Carbon (DOC) of Other Waste (Industrial, agricultural, etc.) (average values)		Information on other waste treatment and recycling	Waste composition	**<u>Country or Region</u>** Urban and/or rural areas included Population for local data (size of community)	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Municipal Solid Waste (MSW) disposal rate		Information on other waste treatment and recycling	Specify by waste type	**Country or Region** **Urban and/or rural areas included** Population for local data (size of community)	Explanation of data collection: e.g., - *Surveys (comprehensive or extrapolated)* - *waste management company data (based on measurements/ weighing or estimates)*
	Fraction DOC Dissimilated (DOC$_F$)		Information on other waste treatment and recycling	**Waste composition** - *Site conditions (unless national average): **e.g.,**temperature in the anaerobic zone of the landfill*	Country or Region	
	Per cent Degradable Organic Carbon **in specific waste fractions** (DOC) (by weight)			**Waste type:** e.g., - *Paper and textiles,* - *Garden and park waste, and other (non-food) organic putrescibles,* - *Food waste* - *Wood and straw waste* - *Other (specify)*		**Wet waste or dry waste or unknown** Lignin included or not

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Methane Generation Potential (L_0)			**Waste type:** e.g., - *Paper and textiles,* - *Garden and park waste, and other (non-food) organic putrescibles,* - *Food waste* - *Wood and straw waste* - *Other (specify)* **Waste composition** **Site conditions** (unless national average)**:** e.g., - *Dry/wet site* - *Temperature* - *Size (depth)* - *Other*	**Country or Region**	
	Methane Emission Factor for Sludge Disposed into Landfills			**Type of sludge** **Climatic Zone**		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Methane Generation Rate Constant (k)			**Waste type:** e.g., - *Paper and textiles,* - *Garden and park waste, and other (non-food) organic putrescibles,* - *Food waste* - *Wood and straw waste* - *Other (specify)* **Waste composition** **Site conditions** (unless national average)**:** e.g., - *Dry/wet site* - *Temperature* - *Size (depth)* - *Other*		Number of measurements and measurement technique Uncertainty estimate
Managed Waste Disposal on Land (6A1), Unmanaged Waste Disposal Sites (6A2), Other (6A3)	Methane Correction Factor (MCF)			**Type of waste disposal site:** e.g., - *Managed,* - *Unmanaged - deep (> 5metres waste),* - *Unmanaged - shallow (< 5 metres waste)* - *Other (specify)* **Site conditions:** e.g., - *Fires in the landfill or not*		New values for this parameter should be accompanied with explanations on how the data is estimated
	Fraction of Waste Disposed to Different Types of SWDSs (Managed, Unmanaged, Uncategorised)				**Country or Region** **Urban and/or rural areas included**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Oxidation Factor		- *Recovery* Type of cover	**Type of waste disposal site:** e.g., - *Managed,* - *Unmanaged - deep (> 5metres waste),* - *Unmanaged - shallow (< 5 metres waste)* - *Other (specify)* **Site conditions** (unless national average)**:** e.g., - *Depth* - *Temperature* - *Type of cover* - *Recovery* - *other*		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Half Life of Different Waste Components			**Type of Waste:** e.g., - *Paper and textiles,* - *Garden and park waste, and other (non-food) organic putrescibles,* - *Food waste* - *Wood and straw waste* - *Other (specify)* **Type of waste disposal site:** e.g., - *Managed,* - *Unmanaged - deep (> 5metres waste),* - *Unmanaged - shallow (< 5 metres waste)* - *Other (specify)* **Site conditions:** e.g., - *Dry/wet site* - *Temperature* - *Size (depth)* - *other*		
	Combustion of Waste in SWDS (as management practice not incineration) – EF for CO_2 (non-biogenic)			Waste composition (% non-biogenic) Composition of non-biogenic waste		

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Solid Waste Disposal on Land (6A)	Methane per Ton of Waste		- *Recovery*	**Type of waste disposal site:** e.g., - *Managed,* - *Unmanaged - deep (> 5metres waste),* - *Unmanaged - shallow (< 5 metres waste)* - *Other (specify)* **Site conditions** (unless national average)**:** e.g., - *Depth* - *Temperature* - *Type of cover* - *Recovery* - *Other* **Waste composition**	**Country/Region**	Number of measurements and measurement technique
	Fraction of Methane in Landfill Gas			**Type of waste disposal site:** e.g., - *Managed,* - *Unmanaged - deep (> 5metres waste),* - *Unmanaged - shallow (< 5 metres waste)* - *Other (specify)* **Waste composition**		Number of measurements and measurement technique
Wastewater Handling (6B)						
Industrial Wastewater (6B1)	Wastewater Produced/Wastewater Generation		Wastewater reduction measures	**Industry type** Process	**Country or Region**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Industrial Wastewater (6B1)	Biochemical Oxygen Demand (BOD)			**Industry type** Process	Country or Region	If not BOD$_5$ then specify
	Chemical Oxygen Demand (COD) Value			**Industry type** Process	Country or Region	
	Fraction of Wastewater Treated by type of treatment	**Treatment type:** e.g., - *Untreated* - *Primary treatment* - *Secondary treatment* Specific treatment type: e.g., - *Lagoons* - *Anaerobic reactors (specify type)* - *Other*		**Industry type**	**Country or Region**	
	Methane Conversion Factor (MCF), percentage of anaerobic treatment	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*		**Industry type**	**Country or Region**	
	Methane Emission Factor	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary* Specific treatment type: e.g., - *Lagoons* - *Anaerobic reactors (specify type)* - *Other*	- *Recovery* - *Other*	**Industry type** COD or BOD per kg production COD or BOD per m^3 effluent	**Country or Region**	
	Methane Emission Factor for Sludge Treatment	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*	- *Recovery* - *Other*		**Country or Region**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Industrial Wastewater (6B1)	Nitrous Oxide Emission Factor	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*		**Industry type**	**Country or Region**	Additional data on how the factors have been developed and how they could be used
Domestic and Commercial Wastewater (6B2)	(Biochemical Oxygen Demand) BOD, daily per capita value				**Country or Region**	If not BOD_5 then specify
	Fraction of Wastewater Treated	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary* Specific treatment type: e.g., - *Lagoons* - *Latrines* - *Septic Tanks* - *Imhoff Tank* - *Anaerobic reactors (specify type)* - *Other*			**Country or Region**	
	Methane Conversion Factor (MCF), percentage of anaerobic treatment	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*	Treatment type (if the treatment type is used to control the emissions)		**Country or Region**	
	Methane Emission Factor	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary* Specific treatment type: e.g., - *Lagoons* - *Latrines* - *Septic Tanks*	- *Recovery* - *Other*	BOD per capita BOD per m^3 effluent	**Country or Region**	

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
		- *Imhoff Tank* - *Anaerobic reactors (specify type)* - *Other*				
Domestic and Commercial Wastewater (6B2)	Methane Emission Factor for Sludge Treatment	Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*	- *Recovery* - *Other*		**Country or Region**	
	Nitrous Oxide Emission Factor	**Denitrification/ Nitrification, if used** Treatment type: e.g., - *Untreated* - *Primary* - *Secondary*			**Country or Region**	**Specify what is included in the emission factor:** e.g., - *emissions from treatment and/or emissions from discharge* Additional data on how the factors have been developed and how they could be used, if different from IPCC default method
Waste Incineration (6C)	N_2O and CH_4 Emission Factors from Waste Incineration	**Incineration plant type:** e.g., - *Stepgrate,* - *Fluidised bed,* - *5 stokers (20-400 tonnes/day),* - *Rotary kiln (120 tonnes/day),* - *Hearth or grate* - *other*		**Type of waste:** e.g., - *Municipal Solid Waste (MSW)* - *Sewage Sludge* - *Clinical Waste* - *Hazardous Waste* - *Other* Temperature	Country or Region	Wet waste or dry waste Additional data on how the factors have been developed

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Waste Incineration (6C)	CO_2 Emission Factors from Waste Incineration	Incineration plant type: e.g., - *Stepgrate,* - *Fluidised bed,* - *5 stokers (20-400 tonnes/day),* - *Rotary kiln (120 tonnes/day),* - *Hearth or grate* - *other*		**Type of waste or waste composition** Carbon (C) Content of Waste Fossil Carbon as % of Total Carbon Efficiency of combustion		Wet waste or dry waste
	Carbon (C) Content of Waste			**Type of waste or waste composition:** e.g., - *Municipal Solid Waste (MSW)* - *Sewage Sludge* - *Clinical Waste* - *Hazardous Waste* - *Other categories or classifications possible*	**Country or Region**	Wet waste or dry waste
	Fossil Carbon as % of Total Carbon			**Type of waste or waste composition:** e.g., - *Municipal Solid Waste (MSW)* - *Sewage Sludge* - *Clinical Waste* - *Hazardous Waste* - *Other categories or classifications possible*	Country or Region	Wet waste or dry waste

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Waste Incineration (6C)	Efficiency of Combustion	**Incineration plant type:** e.g., - *Stepgrate,* - *Fluidised bed,* - *5 stokers (20-400 tonnes/day),* - *Rotary kiln (120 tonnes/day),* - *Hearth or grate* - *other*		**Type of waste or waste composition:** e.g., - *Municipal Solid Waste (MSW)* - *Sewage Sludge* - *Clinical Waste* - *Hazardous Waste* - *Other categories or classifications possible*	Country or Region	Wet waste or dry waste
	Exhaust Gas Volumes	**Incineration plant type:** e.g., - *Stepgrate,* - *Fluidised bed,* - *5 stokers (20-400 tonnes/day),* - *Rotary kiln (120 tonnes/day),* - *Hearth or grate* - *other*		**Type of waste or waste composition:** e.g., - *Municipal Solid Waste (MSW)* - *Sewage Sludge* - *Clinical Waste* - *Hazardous Waste* - *Other categories or classifications possible*		