



IPCC Inventory Software

Mapping of IPCC GHG Inventory Categories into UNFCCC Common Reporting Tables

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The MPGs, IPCC and UNFCCC

UNFCCC decisions implementing the enhanced transparency framework (ETF) of the Paris Agreement (decisions 18/CMA.1 and 5/CMA.3) indicate each Party:

- ✓ Shall use the *2006 IPCC Guidelines*.
- ✓ Encouraged to use the *2013 Wetlands Supplement*.
- ✓ Shall report following sectors: energy, IPPU, agriculture, LULUCF and waste.
- ✓ May use on a voluntary basis the *2019 Refinement*.

Decision 5/CMA.3 also:

- ✓ Adopts common reporting tables for electronic reporting.
- ✓ Requests the UNFCCC to facilitate interoperability with the IPCC Inventory Software.



Multi-year effort between IPCC and UNFCCC to enable two *Software* programs to “talk”



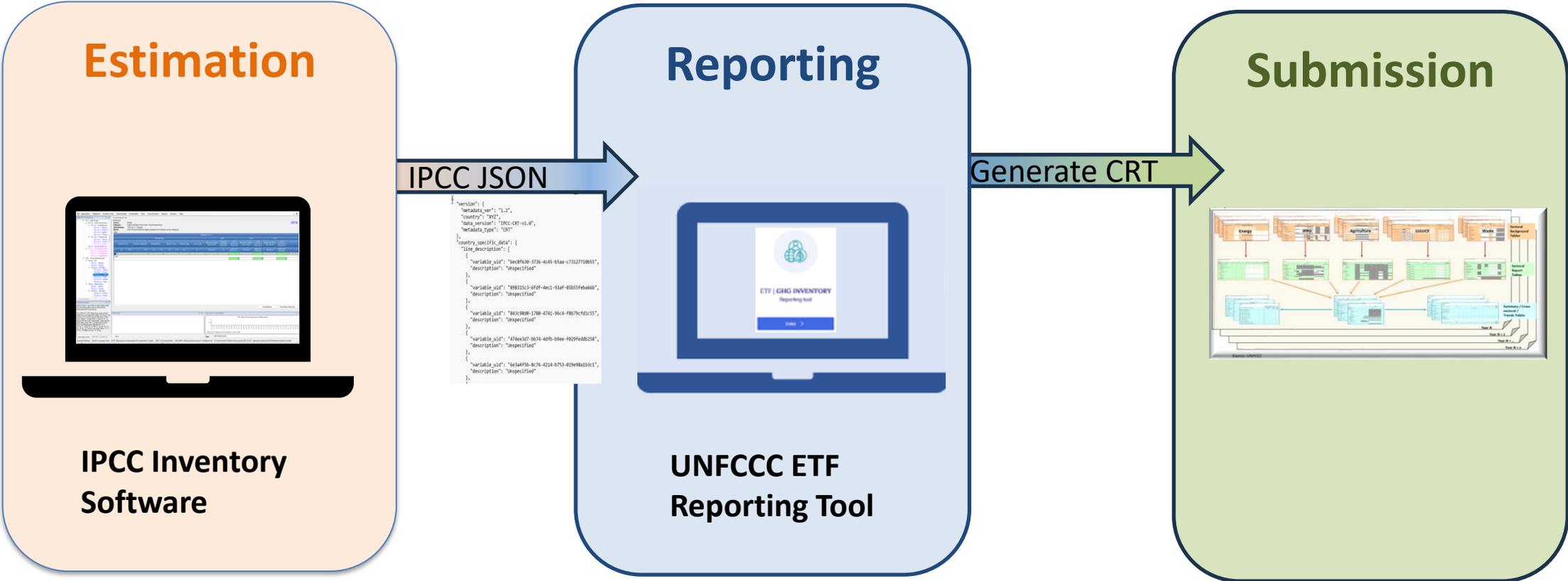
Required detailed cell-cell mapping between IPCC and UNFCCC

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Estimation versus Reporting - Interoperability



Source: Adapted from UNFCCC

Mapping between the IPCC and UNFCCC

Question: If the IPCC Software and UNFCCC reporting tool are both based on the IPCC Guidelines, what's the problem? Isn't there direct mapping between the two tools?

Answer: Generally, yes, but....

2006 IPCC Guidelines have AFOLU sector; MPGs require separate reporting of agriculture and LULUCF

CRT contains categories/ gases not specifically listed in IPCC Reporting Tables¹ (e.g. 2019 Refinement, Oil and Gas Extraction)

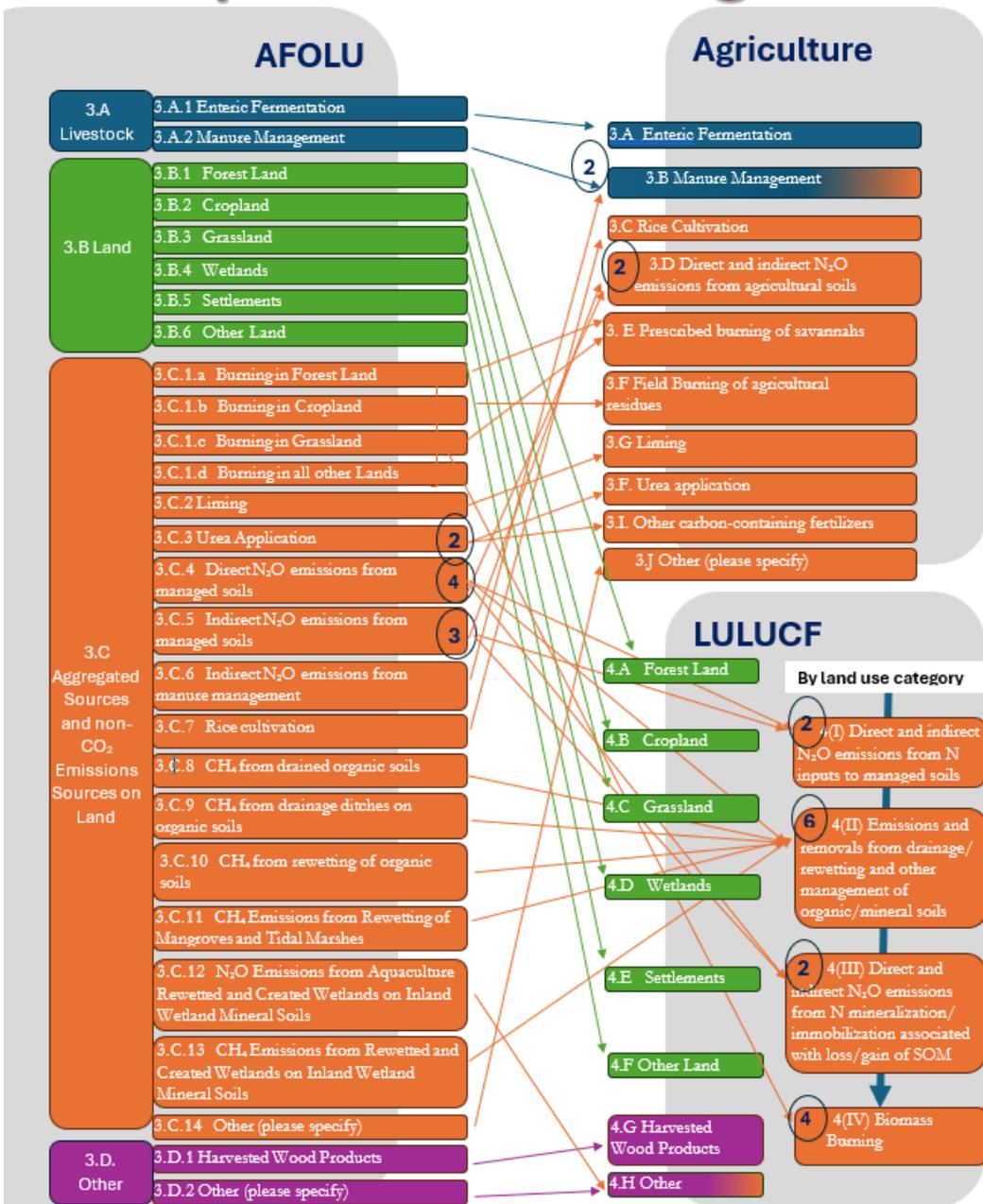
IPCC Inventory Software contains categories/ gases not specifically listed in CRT (e.g. N₂O Emissions from Aquaculture)

A single category in IPCC Software may map into multiple categories of CRT (e.g. IPCC 1.A.3.e.ii Off-road)

CRT structure may not fully align with all methods in IPCC Guidelines (e.g. CRT for 2.F.1 based on Tier 2 structure)

¹ Referring to Vol. 1 Annex 8A.2 of the 2006 IPCC Guidelines.

Example AFOLU to Agriculture / LULUCF



- Most obvious differences in mapping between 2006 IPCC Guidelines and CRT is the AFOLU sector.
- A single IPCC category may map to multiple tables of the CRT (e.g. the worksheets for IPCC category 3.C.4 map to four tables of the CRT and multiple categories within those tables).
- A single table of the CRT may contain mappings from multiple categories of the IPCC Inventory Software (e.g. CRT 4(II) maps from six categories in the *Software*).
- There are secondary mappings not appearing in this table, e.g. differences in categorization of livestock and manure management systems.
- To see the details, including specific mappings, see the Livestock and Land Representation User's Guidebooks.

Mapping between the IPCC and UNFCCC

The IPCC Software is an estimation tool. Not all data in the *Software* needs to map into UNFCCC ETF Reporting Tool...

The following time series data/information will transfer from IPCC Inventory Software to UNFCCC

- ✓ Activity data
- ✓ Emissions
- ✓ Other calculation parameters required by CRT
- ✓ Documentation boxes
- ✓ Official comments
- ✓ Method and emission factor information
- ✓ Notation key explanations

The following actions will take place in UNFCCC ETF Reporting Tool:

- ✓ Calculations in orange, green, blue cells of CRT
- ✓ Calculation of the key category analysis
- ✓ Quality control import
- ✓ Address few known issues (that will be fixed) (e.g. add descriptions for CRT 1.B / IPPU, add 4.H, if applicable)

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Resources for Users to Understand Mapping

Mapping Resource

Purpose and Scope

Availability

Annex
Table 1: Mapping of the category names in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Category names in the CRT	Category names in the 2006 IPCC Guidelines
Energy	1 Energy
1.A. Fuel combustion activities (sectoral approach)	1.A Fuel Combustion Activities
1.A.1. Energy industries	1.A.1 Energy Industries
1.A.1.a. Public electricity and heat production	1.A.1.a Main Activity Electricity and Heat Production
<i>Drop-down list:</i>	
1.A.1.a.i. Electricity generation	1.A.1.a.i Electricity Generation
1.A.1.a.ii. Combined heat and power generation	1.A.1.a.ii Combined Heat and Power Generation (CHP)
1.A.1.a.iii. Heat plants	1.A.1.a.iii Heat Plants
1.A.1.b. Petroleum refining	1.A.1.b Petroleum Refining
1.A.1.c. Manufacture of solid fuels and other energy industries	1.A.1.c Manufacture of Solid Fuels and Other Energy Industries
<i>Drop-down list:</i>	
1.A.1.c.i. Manufacture of solid fuels	1.A.1.c.i Manufacture of Solid Fuels
1.A.1.c.ii. Oil and gas extraction	---
1.A.1.c.iii. Other energy industries	1.A.1.c.ii Other Energy Industries

UNFCCC mapping exercise of categories in the *2006 IPCC Guidelines* and those in CRT to identify differences in category names

Prepared in response to Parties' request in para.29 of decision 5/CMA.3. The mapping compares all category names (including fuels) between the CRT and in the 2006 IPCC Guidelines.

<https://unfccc.int/documents/634242>

Annex
Table 1: Mapping of the category names in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

END-USE GAS SOURCE AND SECTOR	AGGREGATE ACTIVITY DATA	
	Consumption (EJ)	SCGCV ¹⁾
Transport	SCM(C11)	
Liquid fuels	SCM(C7+C8+C9+C10+C11+C12+C13+C14+C15+C16+C17)	
Solid fuels	C18	
Gas	C19+C20+C21+C22	
Other fossil fuels ²⁾	C23+C24+C25+C26	
Non-fossil ³⁾	C27+C28+C29+C30+C31	
3.A. Domestic aviation ⁴⁾	SCM(C7-C10)	
Aviation paraffin	IPC: 1.A.3.A - Fuel Consumption Data - Liquid Fuels - SCM by FUEL combustion process; Column 3C AND - Change and total emissions - Tier 2 - Liquid Fuels - SCM by FUEL combustion process; Column 3D	201 Table AAnn1
Jet kerosene	IPC: 1.A.3.A - Fuel Consumption Data - Liquid Fuels - SCM by FUEL combustion process; Column 3C AND - Change and total emissions - Tier 2 - Liquid Fuels - SCM by FUEL combustion process; Column 3D	201 Table AAnn1
Bitumen	IPC: 1.A.3.A - Fuel Consumption Data - SCM by Fuel Type (Domestic); Column 3E AND - Change and total emissions - Tier 2 - SCM by Fuel Type (Domestic); Column 3F	201 Table AAnn1

IPCC Software mapping tables appended to Sector Users' Guidebooks

Provides detailed cell-cell mapping showing for each cell of the CRT, how the information is calculated from worksheets of the IPCC Software.

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

Mappings are consistent with each other. Turning to each one in more detail....

UNFCCC Category-level Mapping

Annex

Table 1: Mapping of the category names in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and those in the common reporting tables (CRT)

Category names in the CRT	Category names in the 2006 IPCC Guidelines	Note
1. Energy		
Total Energy	1 Energy	
1.A. Fuel combustion activities (sectoral approach)	1 A Fuel Combustion Activities	
1.A.1. Energy industries	1 A 1 Energy Industries	
1.A.1.a. Public electricity and heat production	1 A 1 a Main Activity Electricity and Heat Production	
<i>Drop-down list:</i>		
1.A.1.a.i. Electricity generation	1 A 1 a i Electricity Generation	
1.A.1.a.ii. Combined heat and power generation	1 A 1 a ii Combined Heat and Power Generation (CHP)	
1.A.1.a.iii. Heat plants	1 A 1 a iii Heat Plants	
1.A.1.b. Petroleum refining	1 A 1 b Petroleum Refining	
1.A.1.c. Manufacture of solid fuels and other energy industries	1 A 1 c Manufacture of Solid Fuels and Other Energy Industries	
<i>Drop-down list:</i>		
1.A.1.c.i. Manufacture of solid fuels	1 A 1 c i Manufacture of Solid Fuels	
1.A.1.c.ii. Oil and gas extraction	—	This category is included in the IPCC "1 A 1 c ii Other energy industries" as a sub-element
1.A.1.c.iii. Other energy industries	1 A 1 c ii Other Energy Industries	
1.A.2. Manufacturing industries and construction	1 A 2 Manufacturing Industries and Construction	
1.A.2.a. Iron and steel	1 A 2 a Iron and Steel	
1.A.2.b. Non-ferrous metals	1 A 2 b Non-Ferrous Metals	
1.A.2.c. Chemicals	1 A 2 c Chemicals	
1.A.2.d. Pulp, paper and print	1 A 2 d Pulp, Paper and Print	

And what do Notes mean?

Category name/tree in agreed CRT

Corresponding category name in Vol.1Annex 8A.2 in 2006 IPCC Guidelines

Notes to help user understand mapping

UNFCCC Category-level Mapping

Main types of “Notes”	Meaning
<ul style="list-style-type: none">• This category is included in the IPCC category [insert category] as a sub-element.• This IPCC category covers multiple CRT categories.	This category is not a separate category in the IPCC reporting tables but can be separately estimated in the IPCC Software (e.g. there is a separate tab in the named IPCC worksheet, or a drop-down in the defined IPCC category to parse to different CRT categories) .
<ul style="list-style-type: none">• This CRT category is calculated based on sub-categories listed in the drop-down list.• This CRT category is calculated based on country-specific subcategories in the CRT.	This is a calculated cell in the CRT (either based on a drop-down or country specific categories added). The CRT will calculate this cell based on data input into the IPCC Software.
<ul style="list-style-type: none">• Notes indicating that the category does not exist as a “category” in IPCC Reporting tables, but information is available in background reporting tables.	A few examples where there is not a specific category, but information is available in background reporting tables of IPCC (e.g. reference approach, CCS).
<ul style="list-style-type: none">• The 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories includes [X].	The mapping was based on the 2006 IPCC Guidelines, and the category is from the 2019 Refinement. Category has been added to the IPCC Software.

Result: All category-level information will map from IPCC Software to the UNFCCC ETF Reporting Tool

UNFCCC Fuel Mapping

Table 2: Mapping of the fuel names in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and those in the common reporting tables (CRT)

Fuel names in the CRT	Fuel names in the 2006 IPCC Guidelines
Liquid fossil	
Crude oil	Crude Oil
Orimulsion	Orimulsion
Natural gas liquids	Natural Gas Liquids
Gasoline	Aviation Gasoline
	Jet Gasoline
	Motor Gasoline
Jet kerosene	Jet Kerosene
Other kerosene	Other Kerosene
Shale oil	Shale oil
Gas/diesel oil	Gas/diesel oil
Residual fuel oil	Residual Fuel oil
Liquefied petroleum gases (LPG)	Liquified Petroleum Gases
Ethane	Ethane
Naphtha	Naphtha
Bitumen	Bitumen
Lubricants	Lubricants
Petroleum coke	Petroleum Coke
Refinery feedstocks	Refinery Feedstocks
Other oil	Other Petroleum Products
	Paraffin Waxes
	Refinery Gas
	White Spirit and SBP
Other liquid fossil (please specify)	Country specific fuels possible

Fuel name in agreed
CRT

Fuel list in 2006 IPCC
Guidelines (Vol. 2,
Chpt 1, table 1.1)

Result: All fuel information will map from IPCC Software to the UNFCCC ETF Reporting Tool

In some cases, multiple fuels in the IPCC map into a single fuel in the CRT (e.g. gasoline).

IPCC Mapping: *Software* to UNFCCC Reporting Tool



**All IPCC methods (*all Tiers*)
and all IPCC approaches**



Adaptable to national circumstances

- Allows subnational level of reporting
- Use multiple tiers across inventory, even within a category
- Apply your own country-specific values wherever available

For each category, a user may:

-Apply multiple tiers

-Calculate emissions from multiple subdivisions

To enhance transparency, the CRT have been visualized in the IPCC Software following a detailed mapping.

Simple Illustration of Mapping

IPCC

Biological Treatment of Solid Waste
Worksheet

Sector: Waste
Category: Biological Treatment of Solid Waste
Subcategory: 4.B - Biological Treatment of Solid Waste
Sheet: Emissions from Biological Treatment of Solid Waste

2015

Data
Gas: METHANE (CH4)

Equation 4.1, 4.2

Subdivision	Biological Treatment System	Waste Category	Type of Waste	Total Annual amount treated by biological treatment facilities (Gg)	Emission Factor (g CH ₄ / kg waste treated)	Gross Annual Methane Generation (Gg)	Methane recovered (Gg)		Net Annual Methane Emissions (Gg)
							Flaring F	Energy use D	
				A	B	C = (A * B) / 1000	F	D	E = (C - F - D)
Unspecified	Anaerobic digestion at...	Municipal Wa...	Food waste	100	4	0.4	0.1	0.2	0.1
Total				100			0.1	0.2	0.1

CRT 5.B

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION	IMPLIED EMISSION FACTOR		EMISSIONS		RECOVERY ⁽¹⁾		
		Annual waste amount treated (kt dm)	CH ₄ ⁽²⁾	N ₂ O	CH ₄ ⁽³⁾	N ₂ O	CH ₄	CH ₄
			(g/kg waste)				Amount of CH ₄ flared (kt)	Amount of CH ₄ for energy recovery ⁽⁴⁾
5.B.1. Composting								
5.B.1.a. Municipal solid waste								
5.B.1.b. Other (please specify) ⁽⁵⁾								
5.B.2. Anaerobic digestion at biogas facilities ⁽⁴⁾								
5.B.2.a. Municipal solid waste								
5.B.2.b. Other (please specify) ⁽⁵⁾								

Some Mapping is More Elaborate

Biological Treatment of Solid Waste

Worksheet

Sector: Waste 2015

Category: Biological Treatment of Solid Waste

Subcategory: 4.B - Biological Treatment of Solid Waste

Sheet: Emissions from Biological Treatment of Solid Waste

Data

Gas: METHANE (CH4) (selected), METHANE (CH4), NITROUS OXIDE (N2O)

Equation 4.1, 4.2

Subdivision	Biological Treatment System	Waste Category	Type of Waste	Total Annual amount treated by biological treatment facilities (Gg)	Emission Factor (g CH4 / kg waste treated)	Gross Annual Methane Generation (Gg)	Methane recovered (Gg)		Net Annual Methane Emissions (Gg)
							Flaring F	Energy use D	
				A	B	C = (A * B) / 1000	F	D	E = (C - F - D)
Unspecified	anaerobic digestion at biogas facilities	Municipal Waste	Food waste	100	4	0.4	0.1	0.2	0.1
	Composting	Municipal Waste							
Total	Anaerobic digestion at biogas	Industrial Waste		100			0.1	0.2	0.1
		Sludge							
		Other waste							

Some categories have tabs covering different Tiers / method

Worksheet actually maps to multiple CRT categories

F-gas emitting categories can have many more gases

For AD, consideration may need to be made for different types of AD (here wet vs dry, but also from different tiers)

For some IPCC categories, recovery/ capture in a separate worksheet

IPCC Software Automatically Maps to CRT

The user need not worry about the mapping, but can review to enhance understanding...

Specific instructions vary depending on the category, but generally instruction directs user to:

- ✓ Specific IPCC category in the category tree
- ✓ Tab in that worksheet containing information
- ✓ Gas of interest
- ✓ Parameter of interest (e.g. waste type, fuel)
- ✓ Reference to column header containing information, with an indication of any mathematical operation needed (e.g. SUM, MULTIPLY BY, etc)
- ✓ Conversions needed to map correct units to the CRT (e.g. DIVIDE by 1,000,000 to convert kilograms to kilotonnes)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION	IMPLIED EMISSION FACTOR	
		CH ₄ ⁽²⁾	N ₂ O
		(g/kg waste)	
	Annual waste amount treated (kt dm)		
5.B.2. Anaerobic digestion at biogas facilities ⁽⁴⁾	C17 + C18		
5.B.2.a. Municipal solid waste	IPCC 4.B. <Biological treatment of solid waste> <gas = any> <Biological Treatment System = Anaerobic digestion at biogas facilities> <Waste Category = Municipal Waste> <Type of waste = all> <Waste Type Manager Type of weight of waste = dry weight> SUM of values in column A Where type of weight of waste is set as "Wet weight" in "Waste Type Manager", amounts of waste specified in column "A" will be multiplied by "Dry Matter Content" defined for selected Waste Type.		

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	EMISSIONS		RECOVERY ⁽¹⁾	
	CH ₄ ⁽³⁾	N ₂ O	CH ₄	
			Amount of CH ₄ flared	Amount of CH ₄ for energy recovery ⁽⁴⁾
(kt)				
5.B.2. Anaerobic digestion at biogas facilities ⁽⁴⁾	F17 + F18	H17 + H18	J17 + J18	L17 + L18
5.B.2.a. Municipal solid waste	IPCC 4.B. <Biological treatment of solid waste> <gas = methane> <Biological Treatment System = Anaerobic digestion at biogas facilities> <Waste Category = Municipal Waste> <Type of waste = all> SUM of values in column E	IPCC 4.B. <Biological treatment of solid waste> <gas = nitrous oxide> <Biological Treatment System = Anaerobic digestion at biogas facilities> <Waste Category = Municipal Waste> <Type of waste = all> SUM of values in column E	IPCC 4.B. <Biological treatment of solid waste> <gas = methane> <Biological Treatment System = Anaerobic digestion at biogas facilities> <Waste Category = Municipal Waste> <Type of waste = all>-SUM of values in column F	IPCC 4.B. <Biological treatment of solid waste> <gas = methane> <Biological Treatment System = Anaerobic digestion at biogas facilities> <Waste Category = Municipal Waste> <Type of waste = all>-SUM of values in column D

Key Takeaways

- Mapping between the IPCC Software and the CRT done to enable user to prepare a **complete GHG inventory**
- Tables have been made fully available for **transparency**
- **IPCC Software does all the work** to map between the IPCC Reporting Tables and UNFCCC CRT, so you don't have to!



Thank you

For further information:

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



UNFCCC ETF Reporting Tool: https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review/transparency-data-and-tools/etf-reporting-tools?gad_source=1&gclid=Cj0KCQjwwae1BhC_ARIsAK4JfryU-J6rOBUpbdZFEPxrglz3BdaDJuoXYNTtC6of-KbsSIKZaagfFxUaAuoPEALw_wcB

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