



**CBIT-GSP**  
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# Workshop on Enhanced Transparency Framework under the Paris Agreement IPCC Software Energy Sector Demonstration Slides: Pacific Region

Venue: Crown Beach Resort & Spa,  
Rarotonga, Cook Islands  
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# Outline

**Step A: Set up Fuel Manager**

**Step B: Fuel Consumption Data**

**Step C: Fuel Consumption Emissions**

**Step C: Fuel Consumption Emissions – EFs**



**Step D: Fuel Combustion Emissions- Results**

**Comparing Sectoral and Reference Approaches (skip)**

**Access CRT Interface in Software**

**Create New CRT Data Set**

**Open CRTs**

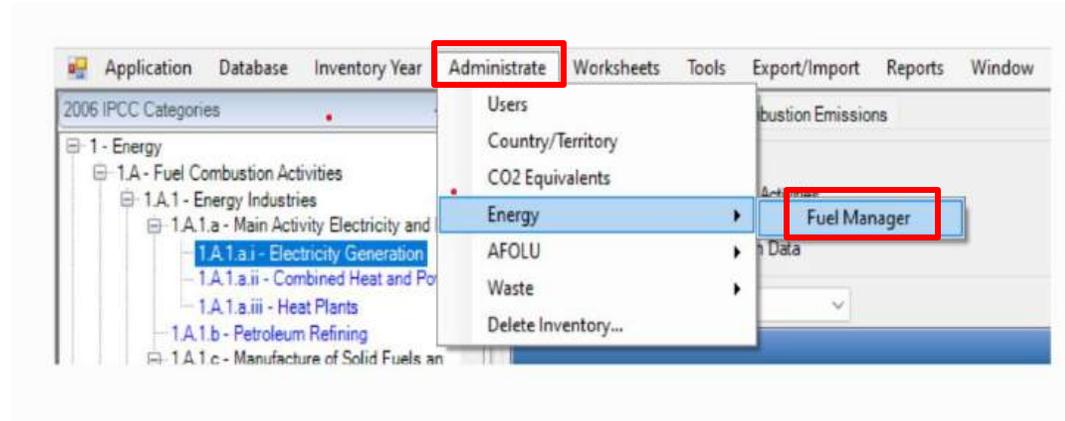
**Open CRTs – Functionalities**

**Generate JSON**

# Step A: Set-up Fuel Manager

The **Fuel Manager** contains the following for each fuel:  
-- name, carbon content and calorific value.

- Access **Fuel Manager** from main menu or any category level worksheet before you start a GHG Inventory, can modify **Fuel Manager** later.



 If you change parameters, data in worksheets automatically linked from the **Fuel Manager** are updated.

- Select **NCV (Net Calorific Value)** or **GCV (Gross Calorific Value)** as the Conversion Factor Type.

Note that:

- For each IPCC default fuel, when NCV is selected, the Calorific Value and Carbon Content are pre-filled with IPCC default values, may overwrite with user-specific values.
- For GCV, no IPCC default values are available, requires data to be entered by the user.

Fuel Manager

Conversion Factor Type:  NCV  GCV  Show user-defined fuels only

Fuel Type	Fuel Name	Primary Fuel	Net Calorific Value (TJ / Gg)	Carbon content (NCV) (kg C / GJ)
Liquid Fuels	Aviation Gasoline	<input type="checkbox"/>	44.3	19.1
	Bitumen	<input type="checkbox"/>	40.2	22
	Crude Oil	<input checked="" type="checkbox"/>	42.3	20
	Ethane	<input type="checkbox"/>	46.4	16.8
	Gas/Diesel Oil	<input type="checkbox"/>	43	20.2
	Jet Gasoline	<input type="checkbox"/>	44.3	19.1
	Jet Kerosene	<input type="checkbox"/>	44.1	19.5
	Liquefied Petroleum Gases	<input type="checkbox"/>	47.3	17.2
	Lubricants	<input type="checkbox"/>	40.2	20
	Motor Gasoline	<input type="checkbox"/>	44.3	18.9
	Naphtha	<input type="checkbox"/>	44.5	20
	Natural Gas Liquids	<input checked="" type="checkbox"/>	44.2	17.5
	Orimulsion	<input checked="" type="checkbox"/>	27.5	21
	Other Kerosene	<input type="checkbox"/>	43.8	19.6
	Other Petroleum Products	<input type="checkbox"/>	40.2	20
	Paraffin Waxes	<input type="checkbox"/>	40.2	20
	Petroleum Coke	<input type="checkbox"/>	32.5	26.6
	Refinery Feedstocks	<input type="checkbox"/>	43	20
Refinery Gas	<input type="checkbox"/>	49.5	15.7	
Residual Fuel Oil	<input type="checkbox"/>	40.4	21.1	
Shale Oil	<input type="checkbox"/>	38.1	20	
White Spirit and SBP	<input type="checkbox"/>	40.2	20	
Solid Fuels	Anthracite	<input checked="" type="checkbox"/>	26.7	26.8
	Blast Furnace Gas	<input type="checkbox"/>	2.47	70.8
	Brown Coal Briquettes	<input type="checkbox"/>	20.7	26.6
	Coal Tar	<input type="checkbox"/>	28	22

Type and Name of default fuels cannot be changed and default fuels cannot be deleted.  
Selected Conversion Factor Type is automatically applied in all the relevant worksheets across all the Inventory Years.  
Any user-specific biomass-derived fuel, e.g. dung, not covered in the definitions in table 1.1 (Vol.2, Chapter 1 of the 2006 IPCC Guidelines) shall be classified as "biomass-other"; these fuels are all considered "waste derived".  
Any user-specific fossil fuel not covered in the definitions in table 1.1 (Vol.2, Chapter 1 of the 2006 IPCC Guidelines) shall be classified as "Other fossil fuels"; these fuels are all considered "waste derived".

Save Undo Close

# Step A: Set-up Fuel Manager

- For each new (user-specific) fuel entry the following steps apply:

- Click on the **asterisk** in the bottom-most row to add the user-specific fuel.
- Select **fuel type** from the drop-down menu.
- Enter specific **fuel name**.
- Indicate (checkbox) if a **primary fuel** or not.
- Enter its **calorific value** in TJ/Gg, (either NCV or GCV according to the selection made for entire Fuel Manager).
- Enter **carbon content** in kg C/GJ.
- Save**

[To single out user-defined fuels only, the corresponding box

on the window's top border shall be marked].

**Example:** New fuel type: Northern Coal Mine, primary fuel, NCV=20 and CC=27

**Conversion Factor Type**  NCV  GCV  Show user-defined fuels only

Fuel Type	Fuel Name	Primary Fuel	Net Calorific Value (TJ / Gg)	Carbon content (NCV) (kg C / GJ)
	Gas Works Gas	<input type="checkbox"/>	38.7	12.1
	Lignite	<input checked="" type="checkbox"/>	11.9	27.6
	Oil Shale / Tar Sands	<input checked="" type="checkbox"/>	8.9	29.1
	Other Bituminous Coal	<input checked="" type="checkbox"/>	25.8	25.8
	Oxygen Steel Furnace Gas	<input type="checkbox"/>	7.06	49.6
	Patent Fuel	<input type="checkbox"/>	20.7	26.6
	Sub-Bituminous Coal	<input checked="" type="checkbox"/>	18.9	26.2
Gaseous Fuels	Natural Gas (Dry)	<input checked="" type="checkbox"/>	48	15.3
Other Fossil Fuels	Industrial Wastes	<input checked="" type="checkbox"/>	11	39
	Municipal Wastes (nonbiomass fraction)	<input checked="" type="checkbox"/>	10	25
	Waste Oils	<input checked="" type="checkbox"/>	40.2	20
Peat	Peat	<input checked="" type="checkbox"/>	5.76	28.9
Biomass - solid	Charcoal	<input type="checkbox"/>	29.5	30.5
	Other Primary Solid Biomass	<input type="checkbox"/>	11.6	27.3
	Wood/Wood Waste	<input type="checkbox"/>	15.6	30.5
Biomass - liquid	Biodiesels	<input type="checkbox"/>	27	19.3
	Biogasoline	<input type="checkbox"/>	27	19.3
Biomass - liquid	Hydropower	<input checked="" type="checkbox"/>		
Biomass - liquid	Other Liquid Biofuels	<input type="checkbox"/>	27.4	21.7
Biomass - liquid	Solar Power	<input checked="" type="checkbox"/>	0	0
Biomass - liquid	Sulphite lyes (Black Liquor)	<input type="checkbox"/>	11.8	26
Biomass - gas	Landfill Gas	<input type="checkbox"/>	50.4	14.9
	Other Biogas	<input type="checkbox"/>	50.4	14.9
	Sludge Gas	<input type="checkbox"/>	50.4	14.9
Biomass - other	Municipal Wastes (biomass fraction)	<input type="checkbox"/>	11.6	27.3
Solid Fuels	Northern Coal Mine	<input checked="" type="checkbox"/>	20	27

Type and Name of default fuels cannot be changed and default fuels cannot be deleted.  
Selected Conversion Factor Type is automatically applied in all the relevant worksheets across all the Inventory Years.  
Any user-specific biomass-derived fuel, e.g. dung, not covered in the definitions in table 1.1 (Vol.2, Chapter 1 of the 2006 IPCC Guidelines) shall be classified as "biomass-other"; these fuels are all considered "waste derived".  
Any user-specific fossil fuel not covered in the definitions in table 1.1 (Vol.2, Chapter 1 of the 2006 IPCC Guidelines) shall be classified as "Other fossil fuels"; these fuels are all considered "waste derived".

Save Undo Close

# Step B: Fuel Consumption Data

Then, compile worksheet **Fuel Consumption Data** either with a single row of data for the entire category or with subnational aggregations.

Then, for each subdivision in Column |S| data are entered row by row as follows:

**1. Column |F|:** select each fuel used from the drop-down menu (one row for each fuel)  
(Note that fuels shown in the dropdown are those listed in the Fuel Manager. User can filter fuels shown in the “Fuel Type” bar at the top)

**2. Column |U|:** enter unit of fuel consumption data (e.g. Gg, TJ, m<sup>3</sup>). To enter a user-specific unit (e.g. m<sup>3</sup>) select Gg (Manual CF) from the dropdown menu and overwrite Gg with the user-specific unit.

**3. Column |C|:** enter corresponding amount of fuel consumed.

**4. Column |CF|:** enter conversion factor to convert the consumption unit to an energy unit (TJ). Note that where Gg of fuel are entered, the NCV/GCV is automatically sourced from the Fuel Manager; while if the consumption unit is TJ the Software compiles the conversion factor with the value 1. Where other units are applied (e.g. m<sup>3</sup>) the user shall enter the relevant conversion factor here.

Subdivision	Fuel	Consumption Unit	Consumption (Mass, Volume or Energy Unit)	Conversion Factor (TJ/Unit) (NCV)	Total consumption (TJ)
S	F	U	C	CF	TC = C * CF
Northern	Municipal Wastes (nonbiomass fraction)	TJ	4,000	1	4,000
Power City 1	Charcoal	TJ	200	1	200
Power City 1	Liquefied Petroleum Gases	TJ	2,900	1	2,900
Unspecified	Anthracite	TJ	40,000	1	40,000
Unspecified	Gas/Diesel Oil	TJ	1,000	1	1,000
Unspecified	Natural Gas (Dry)	TJ	10,000	1	10,000
Unspecified	Peat	TJ	3,500	1	3,500
Total					61,600

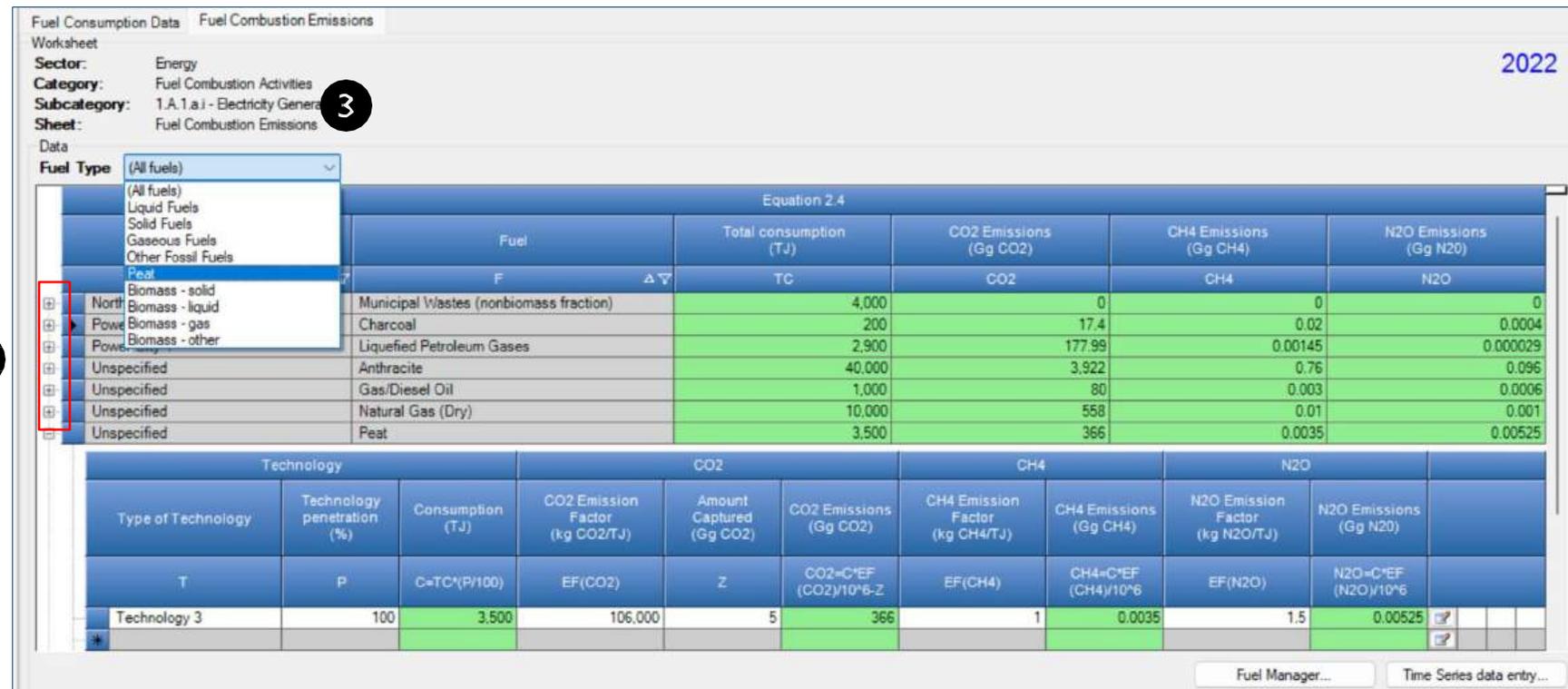
# Step C: Fuel Consumption Emissions

Then, the **Fuel Combustion Emissions** worksheet is pre-filled by the *Software* with rows corresponding to the number of subdivision/fuel combinations entered in worksheet **Fuel Consumption Data**.

1. For each row, users click the symbol “田” on the left of the row to open a drop-down table where EF values are to be compiled.

2. Drop-down table can be filled: either with a single row of data, this is the case for IPCC default method; or with several rows, one row for each technology type, this is the case for IPCC Tier 3 method.

3. Again the “Fuel Type” bar available to enter data for each fuel one by one.



Worksheet: Fuel Consumption Data - Fuel Combustion Emissions

Sector: Energy  
 Category: Fuel Combustion Activities  
 Subcategory: 1.A.1.a.i - Electricity Generation  
 Sheet: Fuel Combustion Emissions

Data

Fuel Type: (All fuels)

Equation 2.4

Fuel	Total consumption (TJ)	CO2 Emissions (Gg CO2)	CH4 Emissions (Gg CH4)	N2O Emissions (Gg N2O)
F	TC	CO2	CH4	N2O
Peat				
North Biomass - solid	Municipal Wastes (nonbiomass fraction)	4,000	0	0
Power Biomass - liquid	Charcoal	200	17.4	0.0004
Power Biomass - gas	Liquefied Petroleum Gases	2,900	177.99	0.000029
Power Biomass - other				
Unspecified	Anthracite	40,000	3,922	0.76
Unspecified	Gas/Diesel Oil	1,000	80	0.0006
Unspecified	Natural Gas (Dry)	10,000	558	0.001
Unspecified	Peat	3,500	366	0.00525

Technology

Type of Technology	Technology penetration (%)	Consumption (TJ)	CO2 Emission Factor (kg CO2/TJ)	Amount Captured (Gg CO2)	CO2 Emissions (Gg CO2)	CH4 Emission Factor (kg CH4/TJ)	CH4 Emissions (Gg CH4)	N2O Emission Factor (kg N2O/TJ)	N2O Emissions (Gg N2O)
T	P	C=TC*(P/100)	EF(CO2)	Z	CO2=C*EF (CO2)/10*6-Z	EF(CH4)	CH4=C*EF (CH4)/10*6	EF(N2O)	N2O=C*EF (N2O)/10*6
Technology 3	100	3,500	106,000	5	366	1	0.0035	1.5	0.00525

Fuel Manager... Time Series data entry...

# Step C: Fuel Consumption Emissions - EFs

Compile each row as follows:

- 1. Column |T|:** enter technology type. Where the IPCC default method is applied, the notation “unspecified” is selected.
- 2. Column |P|:** enter technology penetration rate (%) associated with each technology type. The technology penetration rate apportions the total fuel consumed in the subdivision among technology types. Where the IPCC default method is applied, the value 100 is automatically entered by the Software. (For each fuel in each subdivision, summing up technology penetration rates shall = 100%)

**3. Column |EF(CO<sub>2</sub>)|:** select from the drop-down menu the IPCC default value or, for user-specific fuels entered in the **Fuel Manager**, the value calculated by the Software as the carbon content multiplied by 44/12; otherwise enter the technology-type-specific value, in kg of CO<sub>2</sub> per TJ.

**4. Column |EF(CH<sub>4</sub>)| and Column |EF(N<sub>2</sub>O)|:** select from the drop-down menu the IPCC default value or enter the technology-type-specific value, in kg of CH<sub>4</sub> per TJ or kg of N<sub>2</sub>O per TJ, respectively.

Equation 2.4		Total consumption (TJ)	CO2 Emissions (Gg CO2)	CH4 Emissions (Gg CH4)	N2O Emissions (Gg N2O)
Subdivision	Fuel	TC	CO2	CH4	N2O
Northern	Municipal Wastes (nonbiomass fraction)	4,000	0	0	0
Power City 1	Charcoal	200	17.4	0.02	0.0004
Power City 1	Liquefied Petroleum Gases	2,900	177.99	0.00145	0.000029

Equation 2.4		CO2		CH4		N2O			
Type of Technology	Technology penetration (%)	Consumption (TJ)	CO2 Emission Factor (kg CO2/TJ)	Amount Captured (Gg CO2)	CO2 Emissions (Gg CO2)	CH4 Emission Factor (kg CH4/TJ)	CH4 Emissions (Gg CH4)	N2O Emission Factor (kg N2O/TJ)	N2O Emissions (Gg N2O)
T	P	C=TC*(P/100)	EF(CO2)	Z	CO2=C*EF (CO2)/10 <sup>6</sup> -Z	EF(CH4)	CH4=C*EF (CH4)/10 <sup>6</sup>	EF(N2O)	N2O=C*EF (N2O)/10 <sup>6</sup>
Technology 4	100	2,900	63,100	5	177.99	0.5	0.00145	0.01	0.000029
<b>Total</b>		<b>2,900</b>			<b>177.99</b>		<b>0.00145</b>		<b>0.000029</b>

# Step D: Fuel Combustion Emissions- Results

1. To estimate the total CO<sub>2</sub> emitted into the atmosphere, the amount of CO<sub>2</sub> captured instead of emitted into the atmosphere is to be entered in Gg CO<sub>2</sub> in **Column [Z]** of worksheet **Fuel Combustion Emissions**.

2. Then, for each GHG, emissions from each source are calculated by the *Software*, in mass unit (Gg). Total emissions from each source of stationary combustion is the sum of all emissions from combustion of all fuels listed in all subdivisions.

Fuel Consumption Data Fuel Combustion Emissions

Worksheet

Sector: Energy 2022

Category: Fuel Combustion Activities

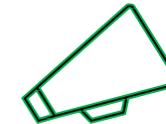
Subcategory: 1.A.1.a.i - Electricity Generation

Sheet: Fuel Combustion Emissions

Data

Fuel Type: (All fuels)

Subdivision		Fuel	Total consumption (TJ)	CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> )	CH <sub>4</sub> Emissions (Gg CH <sub>4</sub> )	N <sub>2</sub> O Emissions (Gg N <sub>2</sub> O)			
S	F	TC	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O				
Northern	Municipal Wastes (nonbiomass fraction)	4,000	383.48	0.132	0.0176				
Technology		CO <sub>2</sub>		CH <sub>4</sub>		N <sub>2</sub> O			
Type of Technology	Technology penetration (%)	Consumption (TJ)	CO <sub>2</sub> Emission Factor (kg CO <sub>2</sub> /TJ)	Amount Captured (Gg CO <sub>2</sub> )	CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> )	CH <sub>4</sub> Emission Factor (kg CH <sub>4</sub> /TJ)	CH <sub>4</sub> Emissions (Gg CH <sub>4</sub> )	N <sub>2</sub> O Emission Factor (kg N <sub>2</sub> O/TJ)	N <sub>2</sub> O Emissions (Gg N <sub>2</sub> O)
T	P	C=TC*(P/100)	EF(CO <sub>2</sub> )	Z	CO <sub>2</sub> =C*EF(CO <sub>2</sub> )/10 <sup>6</sup> -Z	EF(CH <sub>4</sub> )	CH <sub>4</sub> =C*EF(CH <sub>4</sub> )/10 <sup>6</sup>	EF(N <sub>2</sub> O)	N <sub>2</sub> O=C*EF(N <sub>2</sub> O)/10 <sup>6</sup>
Technology 1	60	2,400	91,700	10	210.08	30	0.072	4	0.0096
Technology 2	50	2,000	91,700	10	173.4	30	0.06	4	0.008
Total		4,400			383.48		0.132		0.0176



Do you notice the error in the image?

The *Software* has alerted you that the technology penetration rates are greater than 100%.

# Comparing Sectoral and Reference Approaches

- You have just estimated GHG emissions from electricity generation – this estimation methodology is based on sectoral consumption, and part of the **Sectoral Approach**.

- The Reference Approach** is designed to calculate CO<sub>2</sub> emissions from fuel combustion, starting from high-level energy supply data. This approach does not distinguish between different source categories within the energy sector and only estimates total emissions from source category 1.A Fuel Combustion.

- The *Software* can calculate the Reference Approach and make a comparison between emissions estimated using the Reference and Sectoral Approaches.
- In the **Comparison tab** of the Reference Approach menu, the energy consumption and emissions from the data entered for electricity generation (under Sectoral Approach).

## Main menu → Tools → Reference

The screenshot shows the software interface with the 'Tools' menu open, highlighting the 'Reference Approach' option. Below the menu, a table compares the Reference Approach and Sectoral Approach for CO<sub>2</sub> emissions from fuel combustion.

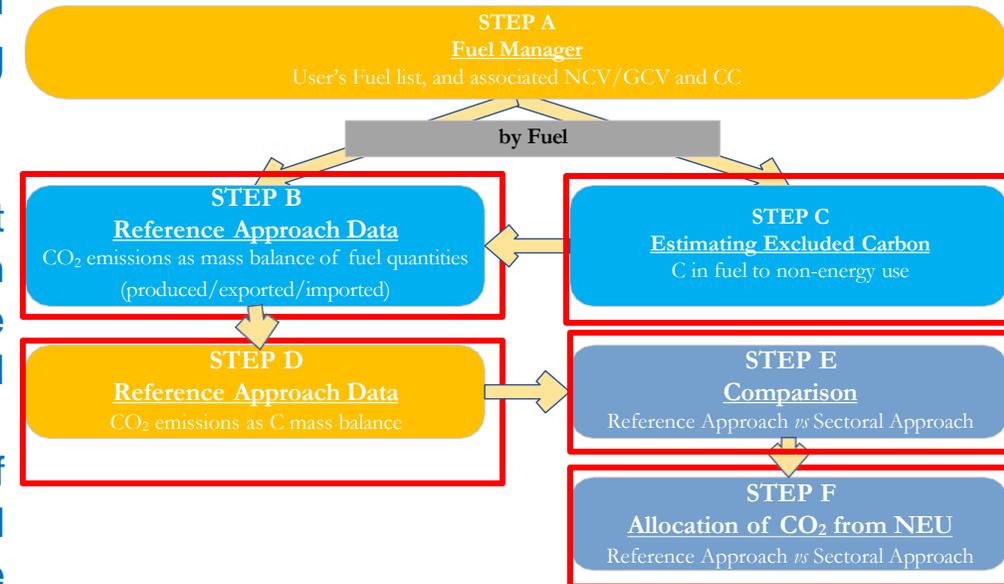
Fuel Types	Reference Approach				Sectoral Approach		Difference	
	Apparent Consumption (TJ)	Excluded consumption (TJ)	Apparent Consumption (excluding non-energy use and feedstocks) (TJ)	CO <sub>2</sub> Emissions (Gg)	Energy Consumption (TJ)	CO <sub>2</sub> Emissions (Gg)	Energy Consumption (%)	CO <sub>2</sub> Emissions (%)
Liquid Fuels: 22 item(s)	0	0	0	0	3,900	257.99	-100	-100
Solid Fuels: 16 item(s)	0	0	0	0	40,000	3,922	-100	-100
Gaseous Fuels: 1 item(s)	0	0	0	0	10,000	558	-100	-100
Other Fossil Fuels: 3 item(s)	0	0	0	0	4,400	383.48	-100	-100
Primary Fuels	0	0	0	0	0	0	0	0
Industrial Wastes	0	0	0	0	0	0	0	0
Municipal Wastes (nonbio...)	0	0	0	0	4,400	383.48	-100	-100
Waste Oils	0	0	0	0	0	0	0	0
Total	0	0	0	0	4,400	383.48	-100	-100
Peat: 1 item(s)	0	0	0	0	3,500	366	-100	-100
Total	0	0	0	0	61,800	5,487.47	-100	-100

# Comparing Sectoral and Reference Approaches



The *Software* calculates CO<sub>2</sub> emissions from fuel combustion categories for the top-down reference approach using the following worksheets:

- **Fuel Manager:** information on *carbon content* and *calorific value*
- **Reference Approach Data:** for each fuel type calculates apparent consumption; uses data *calorific value* and *carbon content* (filled in automatically from the **Fuel Manager**), the excluded carbon, and the fraction oxidized. From this information the worksheet calculates actual CO<sub>2</sub> emissions.
- **Estimating Excluded Carbon:** contains for specific fuels the amount of the total estimated quantity of carbon which does not lead to fuel combustion emissions, calculates the amount of carbon that shall be excluded from the emissions.
- **Comparison:** Compares summary information on total estimated AD and CO<sub>2</sub> emissions from the Reference and Sectoral approaches.
- **Allocation of CO<sub>2</sub> from NEU** summarizes the total CO<sub>2</sub> excluded from the reference approach, by fuel. This worksheet allows for reporting the CO<sub>2</sub> emissions from NEU reported elsewhere in the NGHGI, identifying in which category they are reported.



# Step B. Reference Approach Data

We have already explored the Fuel Manager, so here we start with Step B. Reference Approach Data. For each fuel, enter the following information:

- Column [Unit]:** select or enter manually the measurement unit used (e.g. Gg, TJ, m<sup>3</sup>). (see “+” sign to expand to the full fuel list)
- Column [A]:** input the amount of production of the fuel (primary fuels only)
- Column [B]:** input the amount of imported fuel
- Column [C]:** input the amount of exported fuel
- Column [D]:** input the amount of fuel used for international bunkers, if applicable
- Column [E]:** input the amount of stock change. Note that an increase in stocks is a positive stock change which withdraws supply from consumption. A stock reduction is a negative stock change which, when subtracted in the equation, causes an increase in apparent consumption

		Unit	A	B	C	D	E	F	G	H	I	J	K	L	M
Fuel Types								F+A+B-C-D-E		H+H*G		J+H*J*1000		L+J-K	
Liquid Fuels: 22 item(s)															
Primary Fuels	Crude Oil	Gg						0	423	0	20	0		0	
	Natural Gas Liquids	Gg						0	44.3	0	21.5	0		0	
	Orimulsion	Gg						0	27.5	0	19.1	0		0	
Secondary Fuels	Aviation Gasoline	Gg						0	44.3	0	19.1	0		0	
	Bitumen	Gg						0	40.2	0	22	0		0	
	Ethane	Gg						0	46.4	0	16.8	0		0	
	Gas/Diesel Oil	TJ		100			10	90	1	90	20.2	1,818		1,818	1
	Jet Gasoline	Gg						0	44.3	0	19.1	0		0	
	Jet Kerosene	Gg						0	44.1	0	19.5	0		0	
	Liquefied Petroleum Gases	TJ		3,000				3,000	1	3,000	17.2	51.6		51.6	1
	Lubricants	Gg						0	40.2	0	20	0		0	
	Motor Gasoline	Gg						0	44.3	0	18.9	0		0	
	Naphtha	Gg						0	44.5	0	20	0		0	
	Other Kerosene	Gg						0	43.8	0	19.5	0		0	
	Other Petroleum Products	Gg						0	40.2	0	20	0		0	
	Paraffin Waxes	Gg						0	40.2	0	20	0		0	
	Petroleum Coke	Gg						0	32.5	0	26.6	0		0	
	Refinery Feedstocks	Gg						0	43	0	20	0		0	
	Refinery Gas	Gg						0	49.5	0	15.7	0		0	
	Residual Fuel Oil	Gg						0	40.4	0	21.1	0		0	
	Shale Oil	Gg						0	38.1	0	20	0		0	
	White Spirit and SBP	Gg						0	40.2	0	20	0		0	
Solid Fuels: 16 item(s)															
Primary Fuels	Anthracite	TJ	41,000				500	40,500	1	40,500	26.8	1,085.4		1,085.4	1
	Coking Coal	Gg						0	28.2	0	25.8	0		0	
	Lignite	Gg						0	11.9	0	27.6	0		0	
	Northern Coal Mine	Gg						0	20	0	27	0		0	
	Oil Shale / Tar Sands	Gg						0	8.9	0	29.1	0		0	
	Other Bituminous Coal	Gg						0	25.8	0	25.8	0		0	

# Step B. Reference Approach Data

For each fuel, enter the following information (*continued*):

**7. Column [F]:** the *Software* estimates the amount of apparent consumption of the fuel.

**8. Column [G]:** conversion factor in (TJ/Unit) is filled automatically from the Fuel Manager.

*Note that where Gg of fuel are converted to TJ, the NCV/GCV is sourced from the Fuel Manager and compiled by the Software as a conversion factor; while if the consumption unit is TJ, the Software compiles the conversion factor cell with the value 1. Where other units are applied (e.g. m<sup>3</sup>) the user shall enter relevant conversion unit here.*

		Step 1					Step 2		Step 3		Step 4		Step 5		
		Production (Unit)	Imports (Unit)	Exports (Unit)	International bunkers (Unit)	Stock change (Unit)	Apparent Consumption (Unit)	Conversion Factor (TJ/Unit)	Apparent Consumption (TJ)	Carbon content (t C/TJ)	Total Carbon (Gg C)	Excluded Carbon (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidised	
Fuel Types		Unit	A	B	C	D	E	F	G	H	I	J	K	L	M
Liquid Fuels: 22 item(s)										3,090		53,418		53,418	
Primary Fuels	Crude Oil	Gg					0	42.3	0	20	0	0	0	0	
	Natural Gas Liquids	Gg					0	44.2	0	17.5	0	0	0	0	
	Orimulsion	Gg					0	27.5	0	21	0	0	0	0	
Secondary Fuels	Aviation Gasoline	Gg					0	44.3	0	19.1	0	0	0	0	
	Bitumen	Gg					0	40.2	0	22	0	0	0	0	
	Ethane	Gg					0	46.4	0	16.8	0	0	0	0	
	Gas/Diesel Oil	TJ		100		10	90	1	90	20.2	1,818	1,818	1,818	1	
	Jet Gasoline	Gg					0	44.3	0	19.1	0	0	0	0	
	Jet Kerosene	Gg					0	44.1	0	19.5	0	0	0	0	
	Liquefied Petroleum Gases	TJ		3,000			3,000	1	3,000	17.2	51.6	51.6	51.6	1	
	Lubricants	Gg					0	40.2	0	20	0	0	0	0	
	Motor Gasoline	Gg					0	44.3	0	18.9	0	0	0	0	
	Naphtha	Gg					0	44.5	0	20	0	0	0	0	
	Other Kerosene	Gg					0	43.8	0	19.5	0	0	0	0	
	Other Petroleum Products	Gg					0	40.2	0	20	0	0	0	0	
	Paraffin Waxes	Gg					0	40.2	0	20	0	0	0	0	
	Petroleum Coke	Gg					0	32.5	0	26.6	0	0	0	0	
	Refinery Feedstocks	Gg					0	43	0	20	0	0	0	0	
	Refinery Gas	Gg					0	49.5	0	15.7	0	0	0	0	
	Residual Fuel Oil	Gg					0	40.4	0	21.1	0	0	0	0	
	Shale Oil	Gg					0	38.1	0	25	0	0	0	0	
	White Spirit and SBP	Gg					0	40.2	0	20	0	0	0	0	
Solid Fuels: 16 item(s)										40,500		1,085.4		1,085.4	
Primary Fuels	Anthracite	TJ		41,000		500	40,500	1	40,500	26.8	1,085.4	1,085.4	1,085.4	1	
	Coking Coal	Gg					0	28.2	0	25.8	0	0	0	0	
	Lignite	Gg					0	11.9	0	27.6	0	0	0	0	
	Northern Coal Mine	Gg					0	20	0	27	0	0	0	0	
	Oil Shale / Tar Sands	Gg					0	8.9	0	29.1	0	0	0	0	
	Other Bituminous Coal	Gg					0	25.8	0	25.0	0	0	0	0	

1) Values in column K are taken from column E of Estimating Excluded Carbon worksheet

# Step C. Estimating Excluded Carbon

For each fuel in the Column [Fuel Types], enter the following information:

1. **Column [A]:** enter the estimated quantity of the fuel not used for combustion purposes (e.g. natural gas used as a feedstock for ammonia production, or coking coal used in the iron and steel industry).

2. **Column [Unit]:** select or enter manually the measurement unit used (e.g. Gg, TJ, m<sup>3</sup>).

3. **Column [B]:** conversion factor in TJ/Unit is filled automatically from the Fuel Manager.

4. **Column [D]:** carbon content is filled automatically from the Fuel Manager in t C/TJ.

5. Excluded carbon in **Column [E]** is then automatically included in **Column [K]** of the **Reference Approach Data** tab.

Fuel Types	Estimated Quantities (Unit)	Unit	Conversion Factor (TJ/Unit)	Estimated Quantities (TJ)	Carbon content (t C/TJ)	Excluded Carbon (Gg C)
	A		B	C = A * B	D	E = C * D / 1000
<b>Liquid Fuels: 22 item(s)</b>				1,000		17.2
Aviation Gasoline		Gg	44.3	0	19.1	0
Bitumen		Gg	40.2	0	22	0
Crude Oil		Gg	42.3	0	20	0
Ethane		Gg	46.4	0	16.8	0
Gas Diesel Oil		Gg	43	0	20.2	0
Jet Gasoline		Gg	44.3	0	19.1	0
Jet Kerosene		Gg	44.1	0	19.5	0
<b>Liquid Petroleum Gases</b>	1,000	TJ	1	1,000	17.2	17.2
Lubricants		Gg	40.2	0	20	0
Motor Gasoline		Gg	44.3	0	18.9	0
Naphtha		Gg	44.3	0	20	0
Natural Gas Liquids		Gg	44.2	0	17.5	0
Orymoluxion		Gg	27.5	0	21	0
Other Kerosene		Gg	43.8	0	19.6	0
Other Petroleum Products		Gg	40.2	0	20	0
Paraffin Waxes		Gg	40.2	0	20	0
Petroleum Coke		Gg	32.5	0	26.6	0
Refinery Feedstocks		Gg	43	0	20	0
Refinery Gas		Gg	49.5	0	15.7	0
Residual Fuel Oil		Gg	40.4	0	21.1	0
Shale Oil		Gg	38.1	0	20	0
White Spirit and SBP		Gg	40.2	0	20	0
<b>Solid Fuels: 16 item(s)</b>				0		0
<b>Gaseous Fuels: 1 item(s)</b>				200		3.06
Natural Gas (Dry)	200	TJ	1	200	15.3	3.06
<b>Other Fossil Fuels: 3 item(s)</b>				0		0
<b>Peat: 1 item(s)</b>				0		0
<b>Biomass - solid: 3 item(s)</b>				0		0
<b>Biomass - liquid: 5 item(s)</b>				0		0
<b>Biomass - gas: 3 item(s)</b>				0		0
<b>Biomass - other: 1 item(s)</b>				0		0

# Step D. Reference Approach Data Tab

Input of EFs for the Reference Approach requires the following steps:

1. **Column [I]:** carbon content is filled automatically from the Fuel Manager in t C/TJ.
2. Excluded carbon in **Column [K]** is taken automatically from the **Excluded Carbon** worksheet

3. **Column [M]:** enter fraction of oxidized carbon.

*Note if no information on this factor is available, the value "1" shall be entered to proceed with calculations*

4. Software estimate CO<sub>2</sub> emissions following the Reference Approach

		Production (Unit)	Imports (Unit)	Exports (Unit)	International Stocks (Unit)	Stock change (Unit)	Apparent Consumption (Unit)	Conversion Factor (TJ/Unit)	Apparent Consumption (TJ)	Carbon content (t C/TJ)	Total Carbon (Gg C)	Excluded Carbon (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidized	Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> )	
Fuel Types:		Unit	A	B	C	D	E	F=A+B-C-D-E	G	H=F*G	I	J=H*I/1000	K	L=J-K	M	N=L*M/1000
Liquid Fuels: 22 item(s)										3,090	53,418		36,218		132,799,333	
Primary Fuels	Crude Oil	Gg					0	42.3	0	20	0	0	0	0	0	
	Natural Gas Liquids	Gg					0	44.2	0	17.5	0	0	0	0	0	
	Orimulsion	Gg					0	27.5	0	21	0	0	0	0	0	
Secondary Fuels	Aviation Gasoline	Gg					0	44.3	0	19.1	0	0	0	0	0	
	Bitumen	Gg					0	40.2	0	22	0	0	0	0	0	
	Ethane	Gg					0	46.4	0	16.8	0	0	0	0	0	
	Gas/Diesel Oil	TJ		100		10	90	1	50	20.2	1,818		1,818	1	6,666	
	Jet Gasoline	Gg					0	44.3	0	19.1	0	0	0	0	0	
	Jet Kerosene	Gg					0	44.1	0	19.5	0	0	0	0	0	
	Liquefied Petroleum Gases	TJ		3,000			3,000	1	3,000	17.2	51.6	17.2	34.4	1	126,133,333	
	Lubricants	Gg					0	40.2	0	20	0	0	0	0	0	
	Motor Gasoline	Gg					0	44.3	0	19.9	0	0	0	0	0	
	Naphtha	Gg					0	44.5	0	20	0	0	0	0	0	
	Other Kerosene	Gg					0	43.8	0	19.6	0	0	0	0	0	
	Other Petroleum Products	Gg					0	40.2	0	20	0	0	0	0	0	
	Paraffin Waxes	Gg					0	40.2	0	20	0	0	0	0	0	
	Petroleum Coke	Gg					0	32.5	0	26.6	0	0	0	0	0	
	Refinery Feedstocks	Gg					0	43	0	20	0	0	0	0	0	
	Refinery Gas	Gg					0	49.5	0	15.7	0	0	0	0	0	
Residual Fuel Oil	Gg					0	40.4	0	21.1	0	0	0	0	0		
Shale Oil	Gg					0	38.1	0	20	0	0	0	0	0		
White Spirit and SBP	Gg					0	40.2	0	20	0	0	0	0	0		
Solid Fuels: 15 item(s)									40,500		1,085.4		1,085.4		3,919.8	
Gaseous Fuels: 1 item(s)									11,900		182.07		179.01		656.37	
Other Fossil Fuels: 3 item(s)									4,000		100		100		363	
Peat: 1 item(s)									3,500		101.15		101.15		367,1745	
Biomass - solid: 3 item(s)									400		12.2		12.2		43,391,333,333	
Biomass - liquid: 5 item(s)									0		0		0		0	
Biomass - gas: 3 item(s)									0		0		0		0	



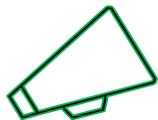
**Recall:** gray shading means that data contained in that cell are automatically pooled from somewhere else.

# Step E. Comparison

The *Software* provides results of CO<sub>2</sub> estimations under the Reference and Sectoral approaches and performs a comparison between the two approaches by each fuel, fuel type and total for the NGHGI. For each fuel, enter following information:

- Worksheet **Comparison** presents the results for the **Reference Approach**, as well as main AD (apparent consumption). This worksheet also summarizes the main AD and CO<sub>2</sub> emissions calculated under the **Sectoral Approach**, by fuel type. In the Columns [**Difference**], the *Software* provides the comparative difference between the Reference and Sectoral approaches in terms of energy consumption and CO<sub>2</sub> emissions.
- The [2006 IPCC Guidelines, Section 6.8](#), provide possible reasons for a gap between the two approaches, (expected to be less than 5%). For higher percent differences, reporting programs typically require users to provide a clear explanation and justification.

Fuel Types	Reference Approach				Sectoral Approach		Difference	
	Apparent Consumption (TJ)	Excluded consumption (TJ)	Apparent Consumption (excluding non-energy use and feedstocks) (TJ)	CO <sub>2</sub> Emissions (Gg)	Energy Consumption (TJ)	CO <sub>2</sub> Emissions (Gg)	Energy Consumption (%)	CO <sub>2</sub> Emissions (%)
Liquid Fuels: 22 item(s)	3,090	1,000	2,090	132,799,333	3,900	257,99	-46.41025641	-48.52539504
Solid Fuels: 16 item(s)	40,500	0	40,500	3,979.8	40,000	3,922	1.25	1.47373789
Gaseous Fuels: 1 item(s)	11,900	200	11,700	656.37	10,000	558	17	17.62903226
Other Fossil Fuels: 3 item(s)	4,000	0	4,000	363	4,400	383.48	-9.09090909	-5.34056535
Peat: 1 item(s)	3,500	0	3,500	367.1745	3,500	366	0	0.32090164
<b>Total</b>	<b>62,990</b>	<b>1,200</b>	<b>61,790</b>	<b>5,499,14383</b>	<b>61,800</b>	<b>5,487.47</b>	<b>-0.01618123</b>	<b>0.21273617</b>



*In this example, which reason might you provide for the sectoral approach being greater than the reference approach for liquid fuels?*

# Step F. Allocation of CO<sub>2</sub> from NEU

For each relevant fuel in Column |Fuel Types| that is used for NEU and for which CO<sub>2</sub> emissions from the use of that fuel are reported elsewhere, enter the following information:

1. Column |CO<sub>2</sub>neu|: enter the quantity of CO<sub>2</sub> emissions from NEU that is reported elsewhere in the NGHGI, in GgCO<sub>2</sub> (e.g. CO<sub>2</sub> emissions from the liquified petroleum gases used in petrochemical production).

2. Column |CAT|: for each relevant fuel, click on the editing box in the left-hand side of the column and select one or more categories of the inventory where these CO<sub>2</sub> emissions are reported.

Reference Approach Data				Estimating Excluded Carbon		Comparison		Allocation of CO <sub>2</sub> from NEU		2022
Sector		Energy		Category		Fuel combustion activities		Category code		1.A
Sheet		Allocation of CO <sub>2</sub> from NEU								
Fuel Types	CO <sub>2</sub> Excluded from Reference Approach (Gg CO <sub>2</sub> )	EXCLUs	CO <sub>2</sub> emissions from NEUs reported in the inventory (Gg CO <sub>2</sub> )	CO <sub>2</sub> neu	Categories under which CO <sub>2</sub> emissions from NEU are reported					
					CAT					
<b>Liquid Fuels: 22 item(s)</b>	<b>63.06666667</b>		<b>63</b>							
Aviation Gasoline										
Bitumen										
Crude Oil										
Ethane										
Gas-Diesel Oil										
Jet Gasoline										
Jet Kerosene										
Liquefied Petroleum Gases	63.06666667			63				Ethylene		
Lubricants										
Motor Gasoline										
Naphtha										
Natural Gas Liquids										
Oxymulsion										
Other Kerosene										
Other Petroleum Products										
Paraffin Waxes										
Petroleum Coke										
Refinery Feedstocks										
Refinery Gas										
Residual Fuel Oil										
Shale Oil										
White Spirit and SBP										
<b>Solid Fuels: 16 item(s)</b>	<b>0</b>		<b>0</b>							
<b>Natural Gas (Dry)</b>	<b>11.22</b>		<b>11</b>					Methanol		

# Allocation of CO<sub>2</sub> from Non-energy

## use

In the **Comparison slide**, the apparent consumption in the Reference approach was **higher than energy** consumption in the Sectoral Approach for gaseous fuels.

- One possible reason, could be that there is double counting of the natural gas used for combustion in the energy sector, and that used as a feedstock for the petrochemical industry (and thus reported in the IPPU sector). Recall, in the Estimating Excluded Carbon worksheet, we estimated 1,000 TJ were excluded?

- In this tab “Allocation of CO<sub>2</sub> from Non-energy use” you can indicate where this LPG was used.

1. CO<sub>2</sub> is automatically populated from “**Estimating Excluded carbon**”

2. Enter the CO<sub>2</sub> emissions reported elsewhere

3. To select the category(ies) where reported select and check appropriate category(ies)

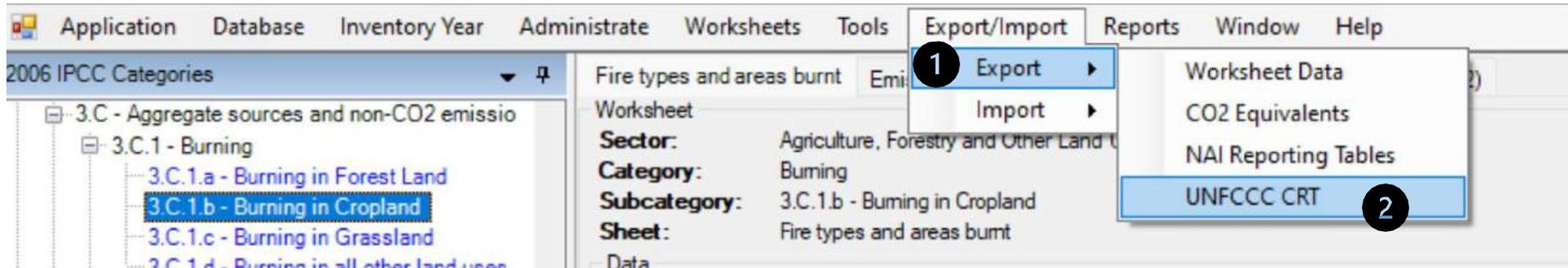
Fuel Types	CO2 Excluded from Reference Approach (Gg CO2)	CO2 emissions from NEUs reported in the inventory (Gg CO2)	Categories under which CO2 emissions from NEUs are reported
	ENCLIN	CO2INV	GAT
Liquid Fuels: 22 item(s)	63 0665667	63	
Aviation Gasoline			
Bitumen			
Crude Oil			
Ethane			
Gas/Diesel Oil			
Jet Gasoline			
Jet Kerosene			
Liquefied Petroleum Gases	63 0665667	63	Ethylene
Motor Gasoline			
Naphtha			
Natural Gas Liquids			
Onsimulane			
Other Kerosene			
Other Petroleum Products			
Paraffin Waxes			
Petroleum Coke			
Refinery Feedstocks			
Refinery Gas			
Residual Fuel Oil			
Shale Oil			
White Spirit and SBP			
Solid Fuels: 16 item(s)	0	0	
Gaseous Fuels: 1 item(s)	11.22	11	
Natural Gas (Dry)	11.22	11	Methanol
Other Fossil Fuels: 3 item(s)	0	0	
Peat: 1 item(s)	0	0	
Biomass - solid: 3 item(s)	0	0	
Biomass - liquid: 6 item(s)	0	0	
Biomass - gas: 3 item(s)	0	0	

For UNFCCC CRT Reporting, the categories entered in the column "Categories under which CO2 emissions from NEU are reported" should be the category names of the UNFCCC CRT

in the dropdown. This information will be used the UNFCCC ETF Reporting Tool

# Access CRT Interface in Software

1. **Navigate to Main Menu and select “Export/Import”**
2. **Select “Export” and “UNFCCC CRT”**

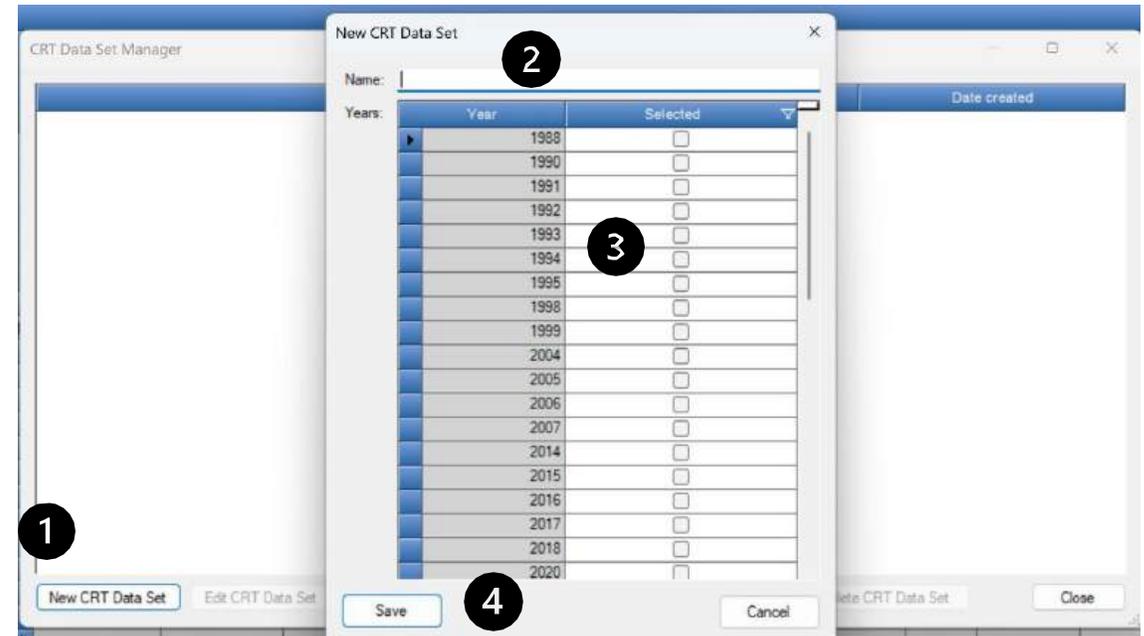


- This opens the **CRT Data Set Manager** interface



# Create New CRT Data Set

1. **Select New CRT Data Set:** This action button opens a screen where properties of the new CRT Data Set are specified, managed and exported to JSON independently.
2. **Name** – Enter name of new CRT Data Set
3. **Years** – Select years to include in your data set
4. **Save** – Select Save
5. A new data set is created



## NOTES:

- The list of years for selection will include only those years that you have created in the *Software*
- You may save in the JSON a subset of years you have in your CRT data set

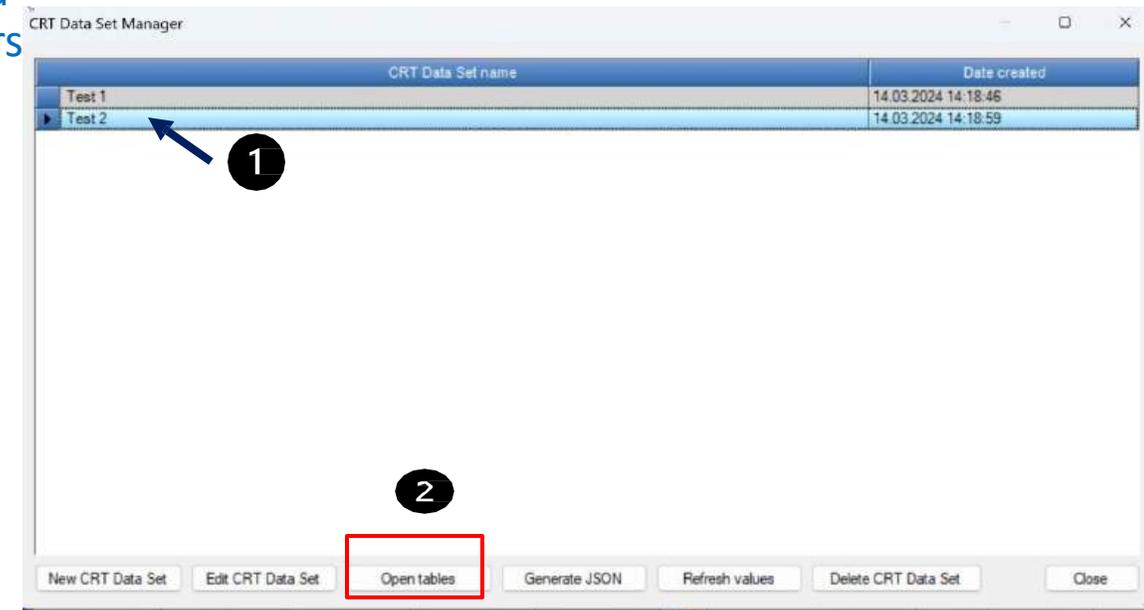
# Open CRTs

- **Open Tables** is an interface that visualizes the CRT and allows you to review, manage and finalize the data for the CRT across sectors and years for your selected CRT Data Set

1. Highlight the **CRT Data Set** you want to review

2. Select **Open Tables**

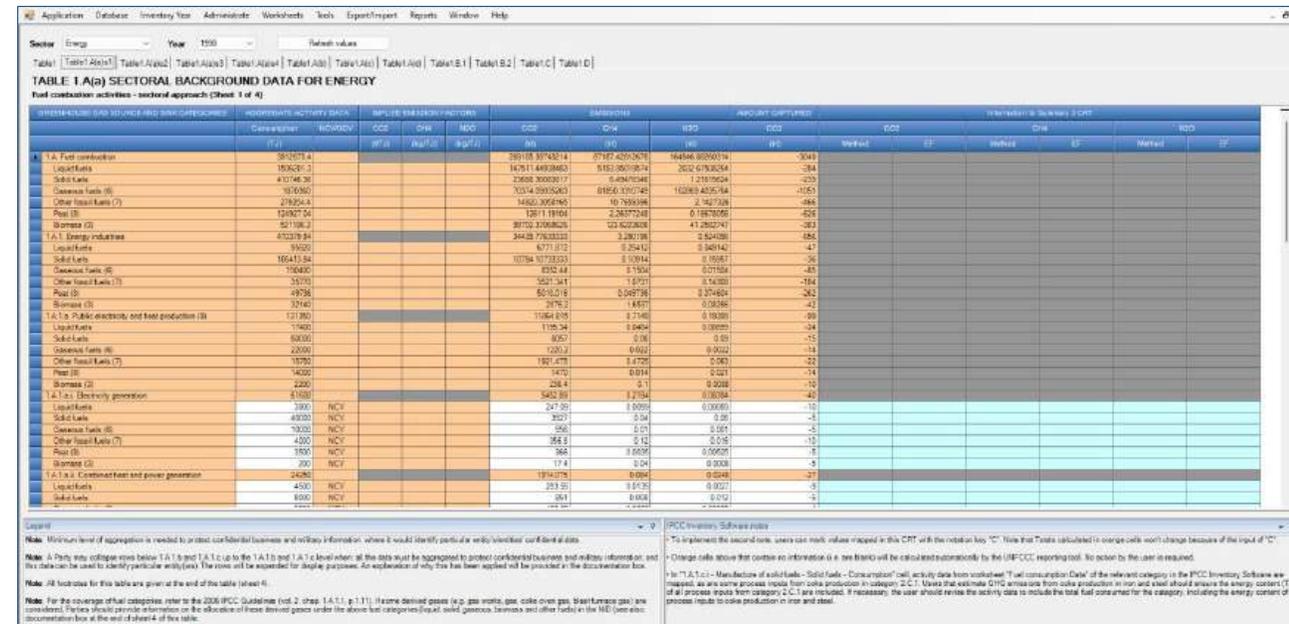
- This action button opens a screen containing CRT for the currently selected CRT Data Set.
- This screen will open in a mode that allows you to switch between the visualized CRT and other *Software* screens (e.g. Worksheets). Only one visualized CRT for one CRT Data Set can be open at a time.



Recall, to access this screen navigate to the **Main Menu** and select **Export/Import / Export / UNFCCC CRT**

# Open CRTs - Functionalities

- In Open Tables, you can separately visualize each table for each sector and each year and provide additional information that will be needed for your submission in the UNFCCC ETF Reporting Tool.
- In the visualized CRT, you may:
  - **Review** your data, including data aggregations
  - **Change notation keys**
  - **Provide explanations for use of the notation keys “IE” (included elsewhere) and “NE” (not estimated) for CRT table 9**
  - Provide information on the **method and EFs used**, for Summary 3 of the CRT
  - Designate information as confidential (notation key “C”)
  - Draft **“Official” comments**
  - Provide information for **documentation boxes**
  - Review **CRT footnotes**
  - Review **IPCC Inventory Software Notes**



**TABLE 1(A) SECTORAL BACKGROUND DATA FOR ENERGY**  
Fuel combustion activities - sectoral approach (Sheet: 1 of 4)

Sector	Emission (GtCO <sub>2</sub> e)	Generation (GtCO <sub>2</sub> e)	CO <sub>2</sub>			CH <sub>4</sub>		N <sub>2</sub> O		HFC		PFC		SF <sub>6</sub>		Total
			IPCC	Other	IPCC	Other	IPCC	Other	IPCC	Other	IPCC	Other				
<b>I.A. Fuel combustion</b>	50,273.4															
Liquid fuels	18,067.2															
Solid fuels	4,174.36															
Gas	10,646.0															
Other liquid fuels (C)	2,792.4															
Coal (B)	12,627.04															
Gas (B)	52,119.2															
I.A.1. Energy industries	4,523,94															
Liquid fuels	9,620															
Solid fuels	166,413.84															
Gas	70,600															
Other liquid fuels (C)	33,170															
Coal (B)	49,738															
Gas (B)	32,140															
I.A.1.a. Public electricity and heat production (B)	1,71,280															
Liquid fuels	1,740															
Solid fuels	8,000															
Gas	28,000															
Other liquid fuels (C)	10,700															
Coal (B)	14,200															
Gas (B)	2,200															
I.A.1.a.1. Electricity generation	81,000															
Liquid fuels	3,800	NCV														
Solid fuels	49,700	NCV														
Gas	78,000	NCV														
Other liquid fuels (C)	4,000	NCV														
Coal (B)	3,800	NCV														
Gas (B)	700	NCV														
I.A.1.a.1. Combined heat and power generation	24,280															
Liquid fuels	4,500	NCV														
Solid fuels	8,000	NCV														

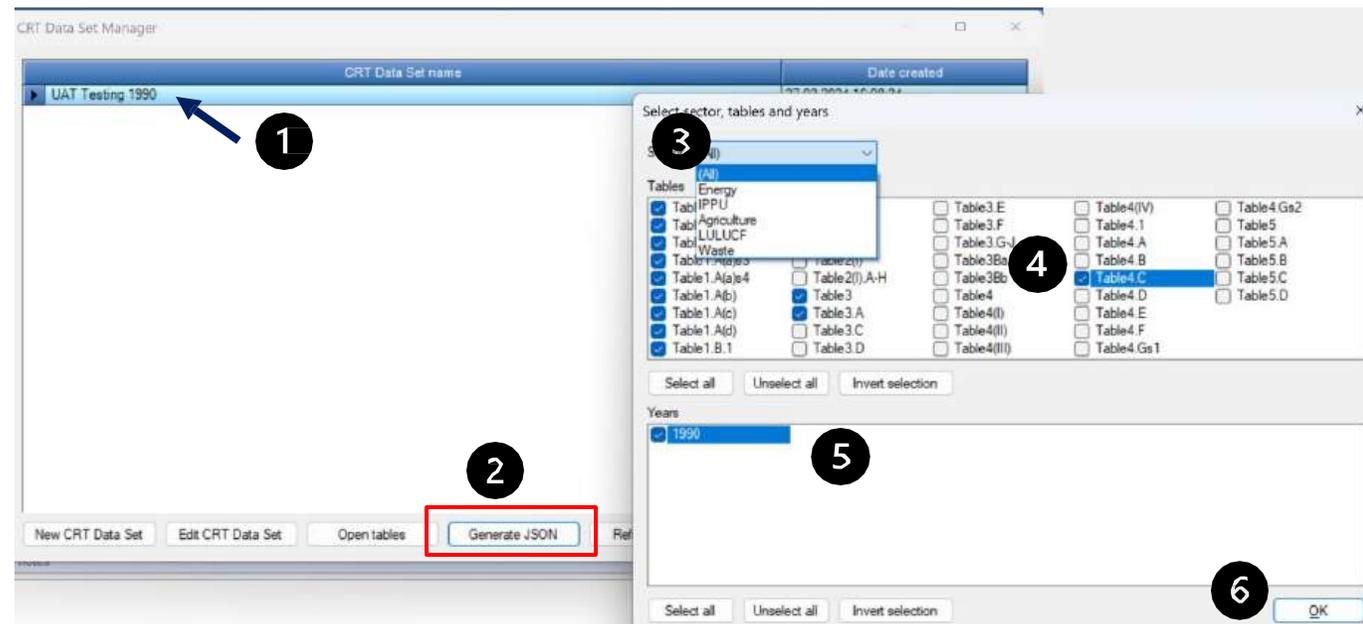
**Legend:**

- IPCC Inventory Software Notes
- Note: Minimum level of aggregation is needed to protect confidential business and other information, where it would identify particular entity/industry/sectoral data.
- Note: If Party only reports data below I.A.1 and I.A.1.c up to the I.A.1.b and I.A.1.c level, then all the data must be aggregated to protect confidential business and other information, and the data can be used to identify particular entity/sector. The rows will be expanded for display purposes. An explanation of why this has been applied will be provided in the documentation box.
- Note: All footnotes for this table are given at the end of the table (sheet 4).
- Note: For the coverage of fuel categories, refer to the 2006 IPCC Guidelines (vol. 2, chap. I.A.1.1, p.111). Home-derived gases (e.g. gas from the, one, coke oven gas, blast furnace gas) are considered. Parties should provide information on the allocation of these derived gases under the above fuel categories (e.g. solid, gaseous biomass and other fuels) in the NE (see also documentation box at the end of sheet 4 of this table).
- Note: To implement the second note, users can mark values flagged in this CRT with the notation key "C". Note that "Data calculated in open cells won't change because of the input of 'C'".
- Note: Change cells show that certain information (e.g. fuel factor) will be calculated automatically by the IPCC reporting tool. No input by the user is required.
- Note: I.A.1.c.1 - Manufacture of solid fuels - Solid fuels - Consumption (cell) activity data from worksheet "Fuel consumption Data" of the relevant category in the IPCC Inventory Software are flagged as are some processed liquid fuel production in category 2.C.1. Users that estimate CO<sub>2</sub>e from coal production in iron and steel should ensure the energy content (GJ) of all process inputs from category 2.C.1 are included. If necessary, the user should revise the activity data to include the total fuel consumed for the category, including the energy content of process inputs to coke production in iron and steel.

# Generate JSON

- Selecting this button allows you to generate a JSON file for export and subsequent upload to the UNFCCC ETF Reporting Tool.
- All tables of the CRT that belong to the selected CRT Data Set and settings selected below, will be serialized into the JSON file for selected years.

1. **Highlight** the **CRT Data Set** for which you want to generate a JSON file.
2. **Select Generate JSON**
3. **Select Sector(s)** you would like to include in the JSON file. You may include one, multiple, or all sectors
4. **Select specific table(s)** of the CRT you would like to include in the JSON file.
5. **Select** the **Year(s)** you want to include in the JSON file. You may, but do not have to, include all years that are in your CRT Data Set.
6. **Select “OK”**



## Notes:



Recall, to access this screen navigate to the **Main Menu** and select **Export/Import / Export / UNFCCC CRT**

- At the time of drafting, the F gas tables of the IPPU sector are not yet available for export in JSON format.

# Generate JSON

Save the JSON file to your computer. This is the file you can then upload to the ETF Reporting Tool

