IPCC Inventory Software

How to use the IPCC Inventory Software

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INTERGOVERNMENTAL PANEL ON climate change

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Teach a compiler to “fish”…

“Give a man a fish and you feed him for a day.

Teach a man to fish and you feed him for a lifetime.”

— *Chinese Proverb*

“Give a *compiler* an *inventory* and you feed them for one *submission*.

Teach a compiler how to use the *IPCC Inventory Software* and they’ll keep *improving* their inventory *forever*.”

— *TFI TSU Proverb*

Webinar objectives

- Understand the **purpose** and **structure** of the **IPCC Inventory Software.**
- Learn how to navigate and use the **main features** of the software.
- Recognize how **supporting materials** enhance the use of the software.
- See how the software operationalizes the **IPCC Guidelines** in practice.

Key message:

This session it's about **learning how to use the tool effectively** so that, with the Guidelines, you can "*learn how to fish*":

- understand what the software does,
- how it helps you, and
- where to look when you need support.

Inside the IPCC Inventory Software

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The need for an Inventory Tool

- Preparing a **GHG inventory** is more than emission & removals estimates it is running a **system**.
- Estimating emissions & removals from **all human activities** in a country is a **large-scale**, **diverse**, and **resource-intensive** task
- Countries must **organize data**, **apply methods**, **document processes**, and **coordinate** across institutions
- Building such a system **takes time** — even countries with more than two decades of experience still **face challenges** in core inventory tasks
- A structured tool is needed to ensure **consistency**, **transparency**, and **repeatability**

IPCC Inventory Software

- Developed by the IPCC **to help countries** manage the complexity of **GHG inventory preparation**
- **Supports the full cycle**: from organizing data to estimating emissions & removals, to preparing reports for submission
- Designed to help countries **structure their systems** — especially where institutional capacity is limited or evolving
- Built around the **IPCC Guidelines** to ensure **methodological consistency** and **transparency**

Adaptability to National Circumstances

Country-specific parameters

Use national values for emission factors or activity data wherever available.

Flexible method selection

Apply different tiers where needed — even within the same category.

National and subnational data

Use regional or national data — the software adapts to the level of detail available.

Multiple compilers, multiple sectors

Inventory teams can divide work by sector, working in parallel within the same system.

Institutional continuity

The database serves as a national archive, helping you preserve work across inventory cycles.

IPCC Inventory Software Environment

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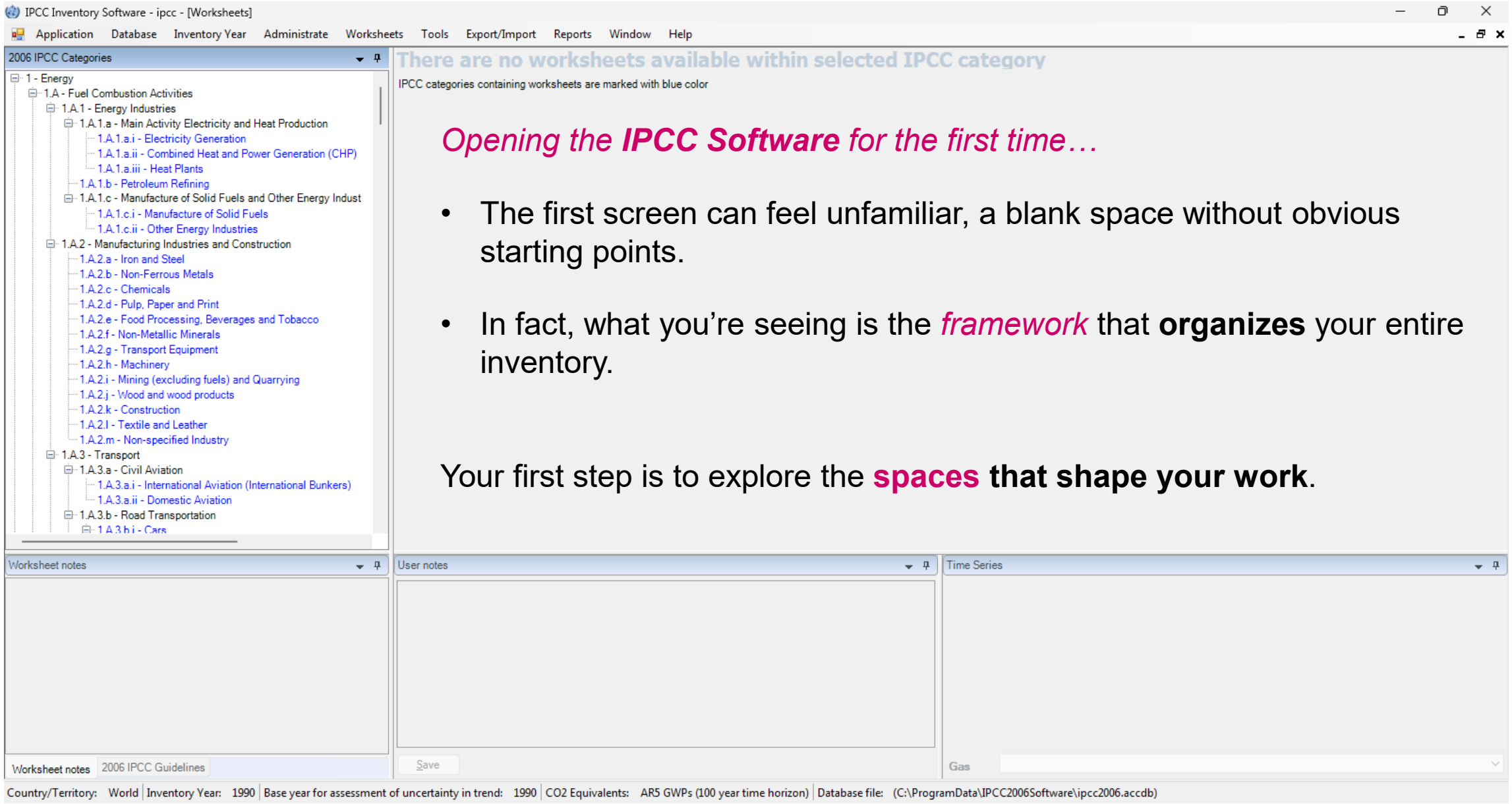
Inside the IPCC Software

SYSTEM ARCHITECTURE

- Built with **MS Access** and **.NET**
- Runs on Windows
- Works **offline** – no internet required
- All data saved locally in *.accdb* file
- Password protected

IPCC Inventory Software



*Opening the **IPCC Software** for the first time…*

- The first screen can feel unfamiliar, a blank space without obvious starting points.
- In fact, what you're seeing is the *framework* that **organizes** your entire inventory.

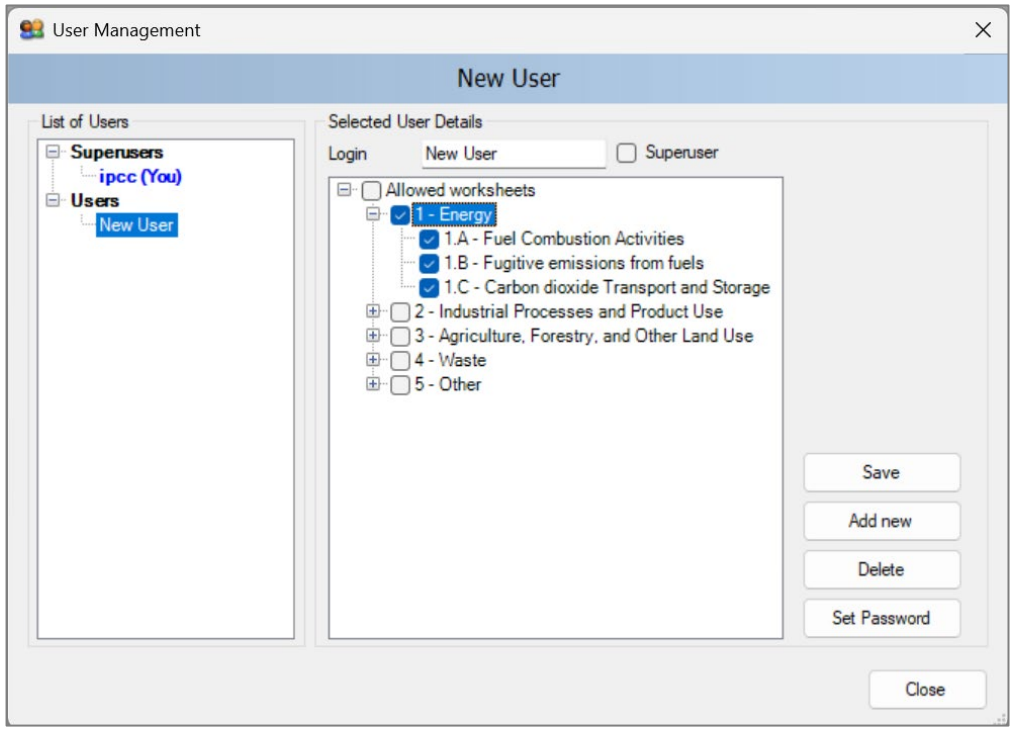
Your first step is to explore the **spaces** **that shape your work**.

Conceptual Spaces

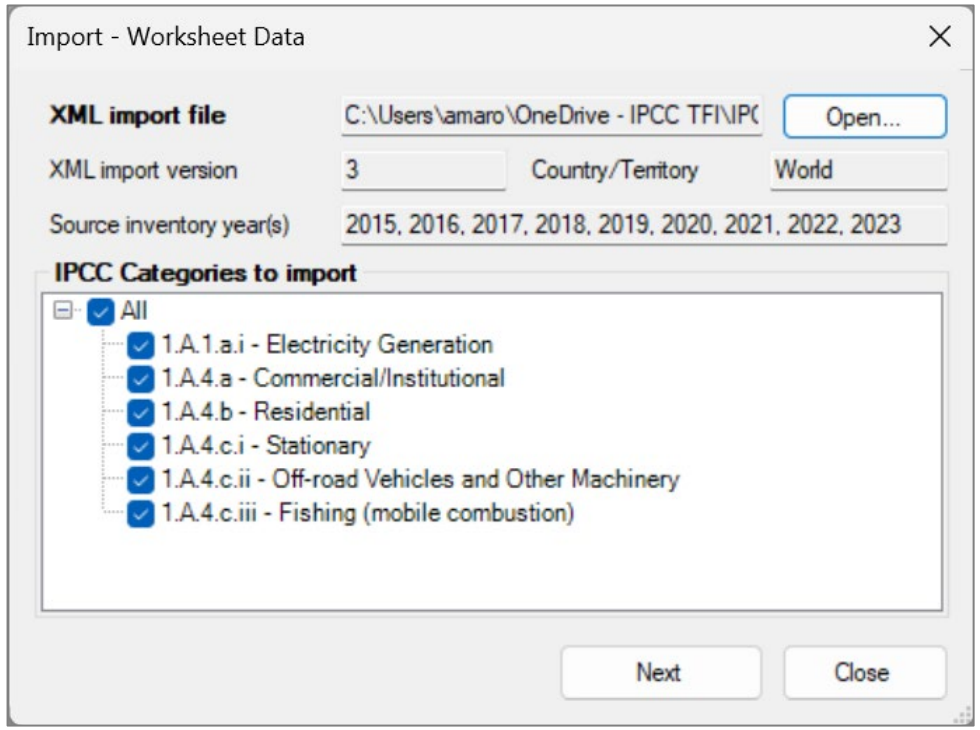
Concept	What it is	What allow the user to do
Database	Main **container** of the inventory	**Store all data**, years, and categories together
Inventory Years	**Time** dimension	Build and manage **time series**
Data Managers	Shared managers for parameters and classifications	**Simplify data entry** and maintain **consistency** across years and categories
Worksheets	Category-level **calculation** sheets	Enter **data**, select **Emission Factors**, view **results**
Reports	Standardized **outputs** summarizing inventory results	Generate tables consistent with **IPCC** and **UNFCCC**
Tools	Analytical utilities	Uncertainty, Key Category, Reference Approach

Database

At its core, the software is a *customized inventory* database. It manages inputs, supports estimation, and helps compile outputs — all in a structured, step-wise way



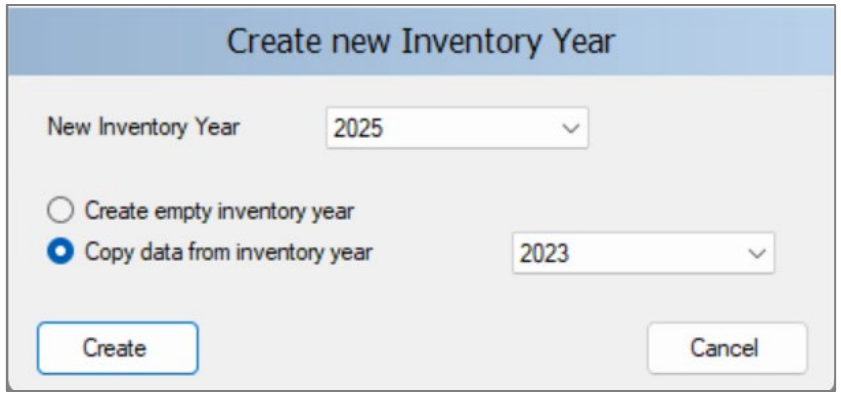
Supports *user management* — defining access levels and permissions

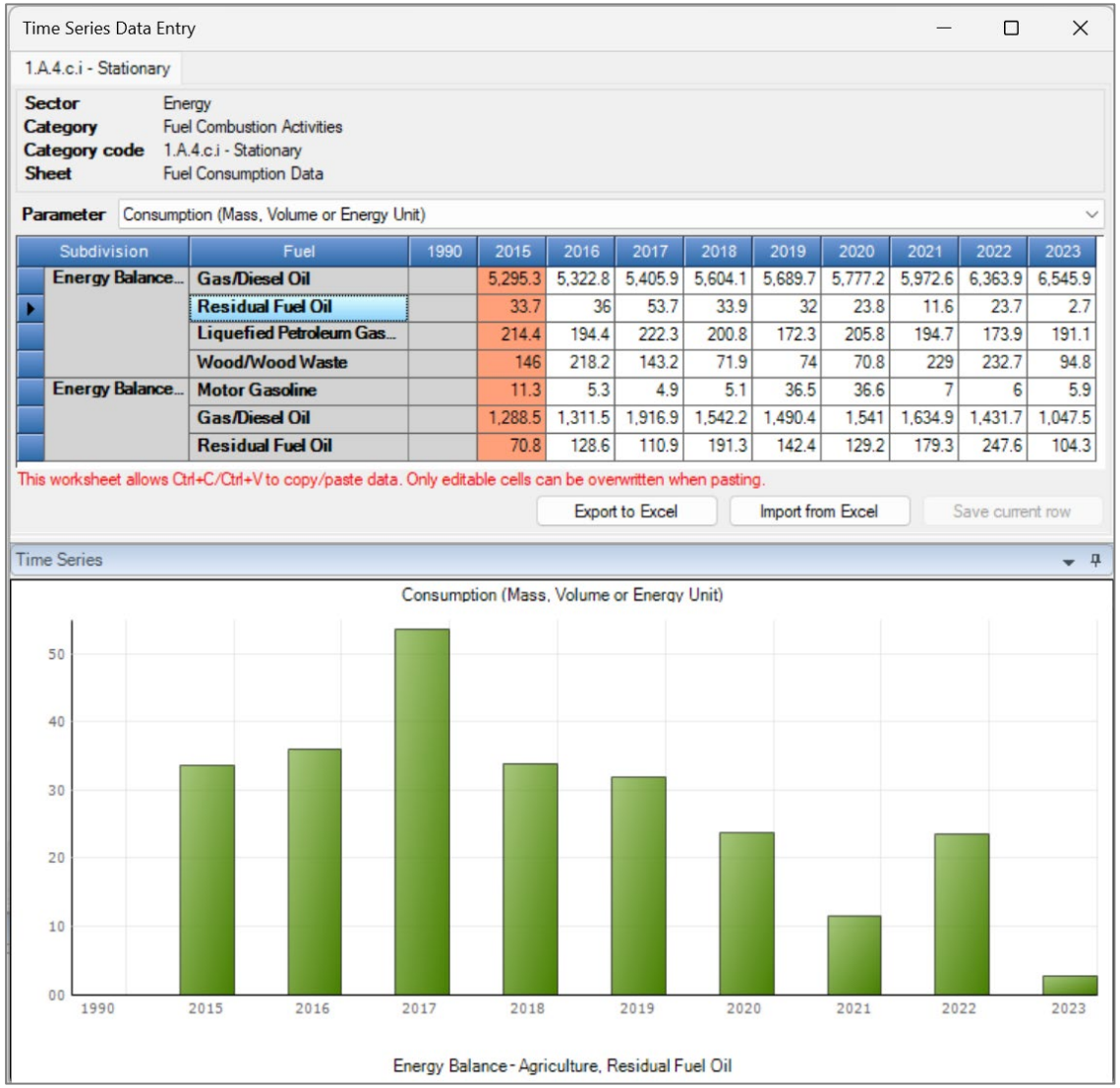


Handles *data exchange* through XML import & export

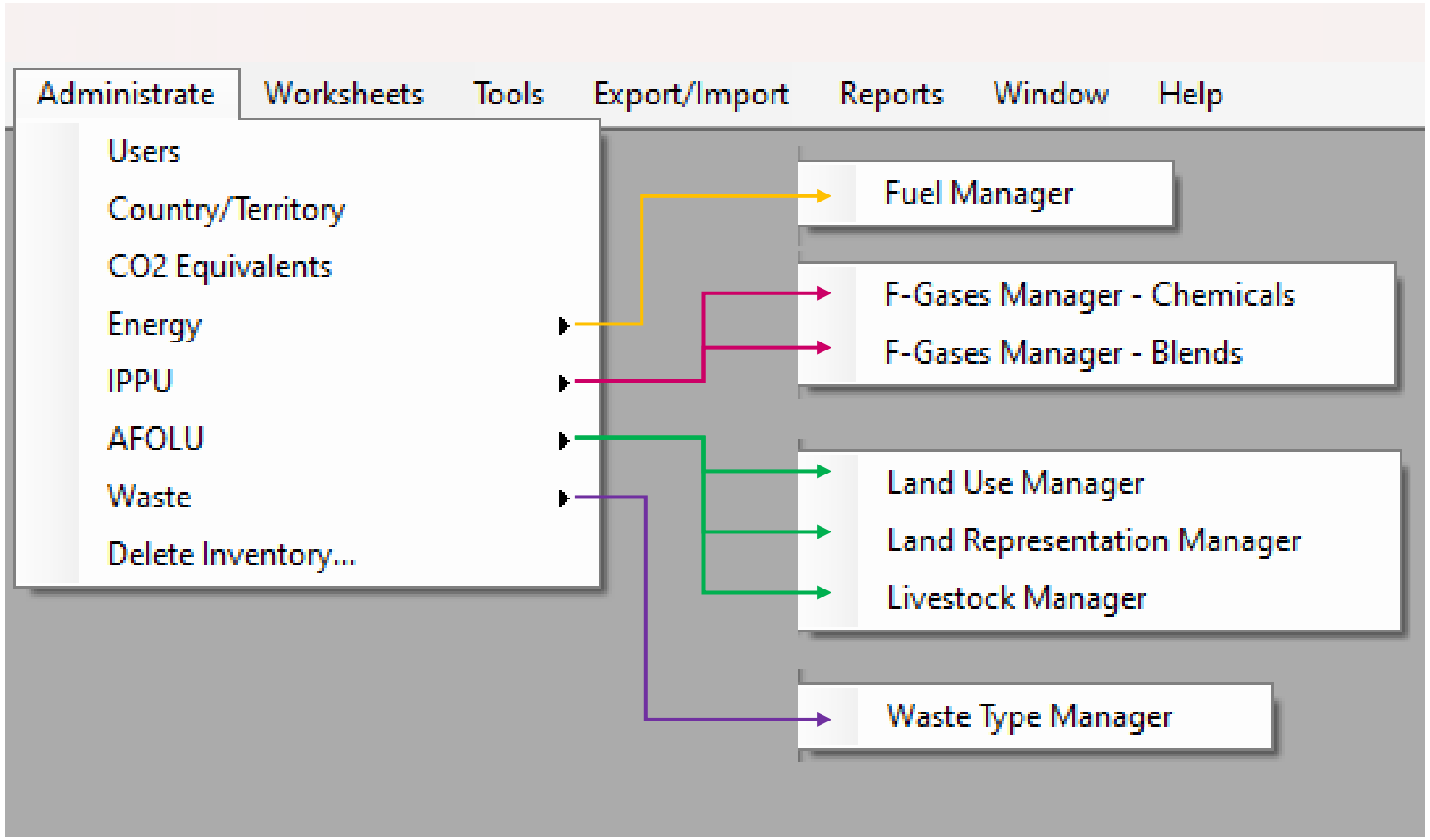
Inventory Years

- Defines the **temporal layer** of the inventory
- Enables *trend building*, *comparison*, and update tracking over time



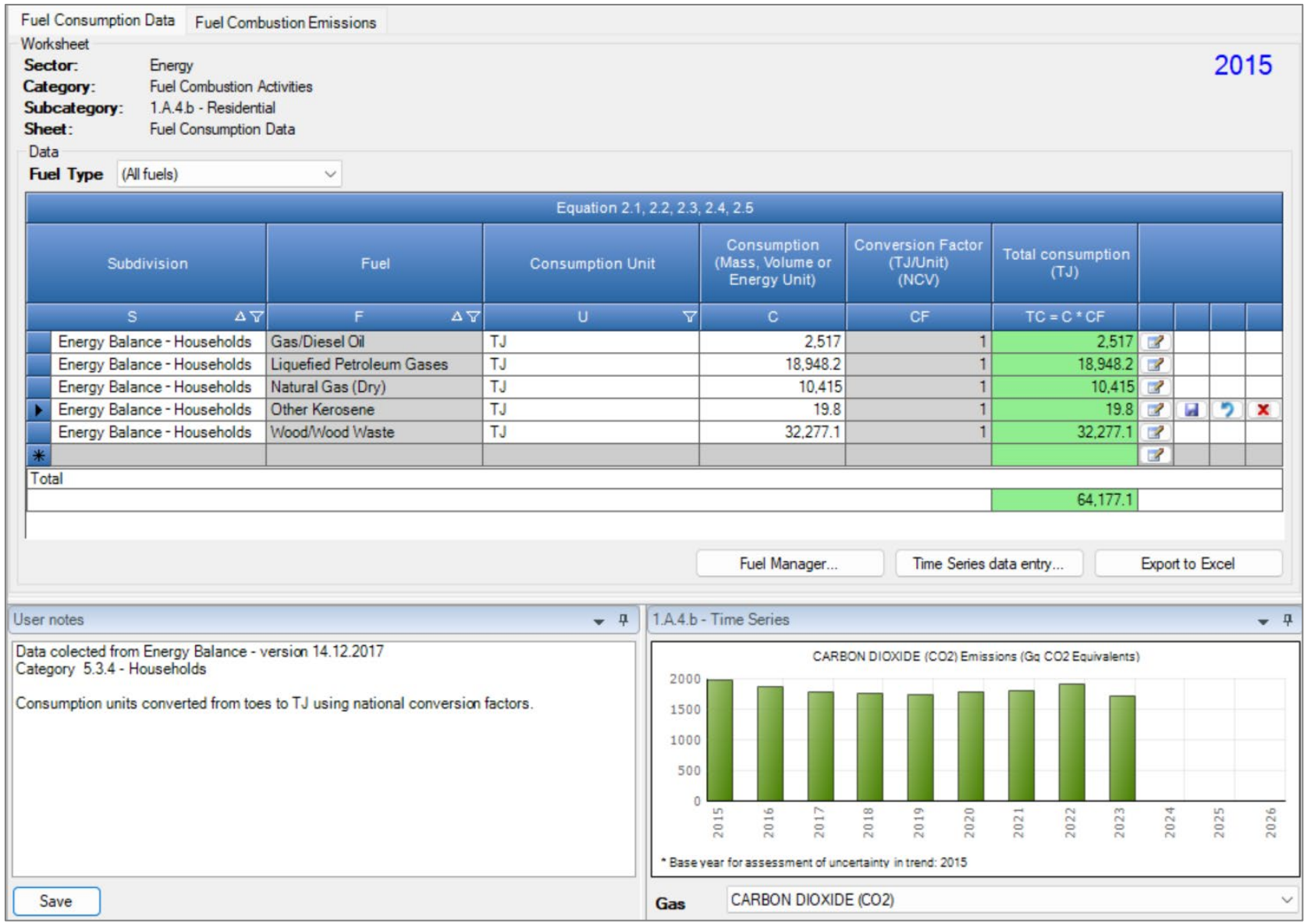


Data Managers



- *Define parameters* used across categories and years
- *Streamline data entry* and management, reducing manual effort and errors.
- *Automatically link updates* to worksheets

Worksheets



Each category in the software has a *dedicated* ***worksheet structure*** tailored to its estimation process, based on the **2006 IPCC Guidelines**

Includes *methods*, *equations*, and *default values* from the Guidelines

Varies by category, some worksheets are simple, others more detailed

Worksheets

Capture and storage or other reduction

CO2 Emissions in Slag forming material - Tier 2/3 | CO2 Emissions in Products - Tier 2/3 | CO2 Emissions in Non-product outgoing streams - Tier 2/3 | CO2 Emissions summary - Tier 2/3

CO2 and CH4 Emissions from Ferroalloy Production | CO2 Emissions in Reducing Agents - Tier 2 | CO2 Emissions in Reducing Agents - Tier 3 | CO2 Emissions in Ore - Tier 2/3

EQUATION 4.17
CO_2 EMISSIONS FOR FERROALLOY PRODUCTIION BY TIER 3 METHOD

$$E_{CO2} = \sum_i \left(M_{reducing\ agent,i} \bullet CContent_{reducing\ agent,i}\right) \bullet \frac{44}{12}$$

$$+ \sum_h \left(M_{ore,h} \bullet CContent_{ore,h}\right) \bullet \frac{44}{12}$$

$$+ \sum_j \left(M_{slag\ forming\ material,j} \bullet CContent_{slag\ forming\ material,j}\right) \bullet \frac{44}{12}$$

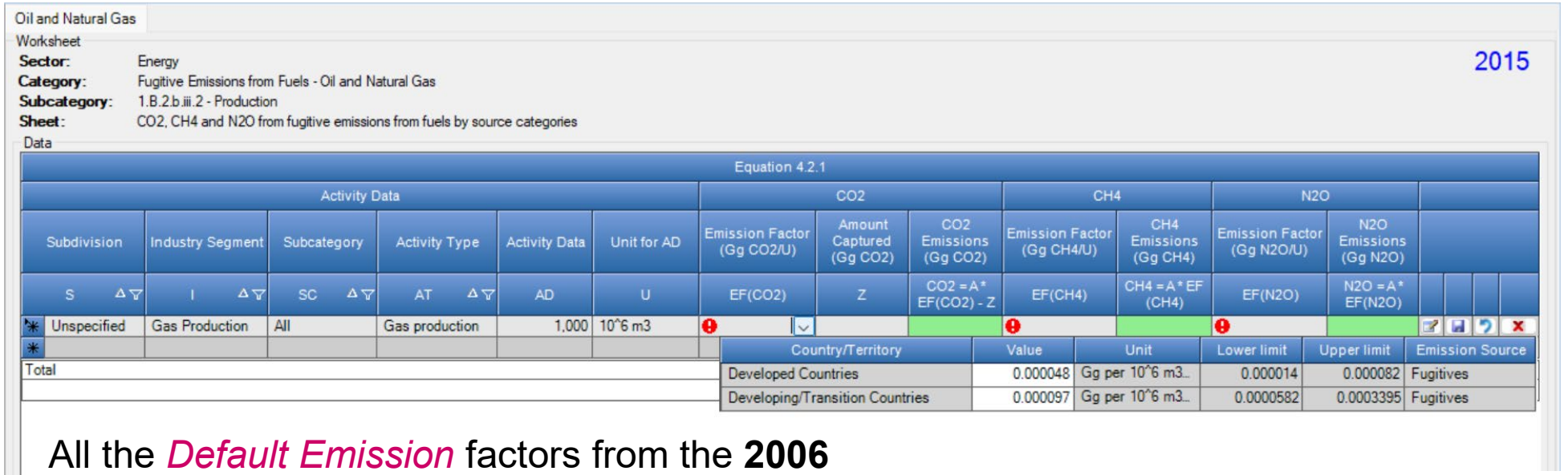
$$- \sum_k \left(M_{product,k} \bullet CContent_{product,k}\right) \bullet \frac{44}{12}$$

$$- \sum_l \left(M_{non-product\ outgoing\ stream,l} \bullet CContent_{non-product\ outgoing\ stream,l}\right) \bullet \frac{44}{12}$$

IPPU | 2.C.2 Ferroalloys Production | **Worksheets:**

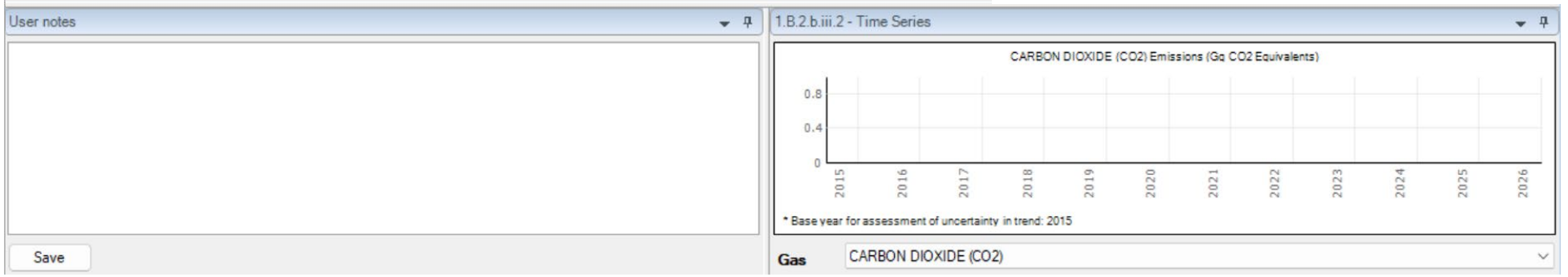
- CO2 Emissions in Reducing Agents - Tier 3
- CO2 Emissions in Ore - Tier 2/3
- CO2 Emissions in Slag forming material - Tier 2/3
- CO2 Emissions in Products - Tier 2/3
- CO2 Emissions in Non-product outgoing streams - Tier 2/3

Worksheets – Default Factors



All the *Default Emission* factors from the **2006 IPCC Guidelines** and 2019 **Refinement** included in the Software can be accessed in the *Worksheets*

When *prompted to select* an emission factor, the software *displays a table* with the relevant default values from the Guidelines — one *click* fills the Emission Factor cell automatically.



Reports

Sector Energy **Year** 2015 Refresh values Update mode **Current year (2015)**

Table1 | Table1.A(a)s1 | Table1.A(a)s2 | Table1.A(a)s3 | Table1.A(a)s4 | Table1.A(b) | Table1.A(c) | Table1.A(d) | Table1.B.1 | Table1.B.2 | Table1.C | Table1.D

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY

Fuel combustion activities - sectoral approach (Sheet 4 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS			AMOUNT CAPTURED (4)		
	Consumption	NCV/GCV (5)	CO2 (1)	CH4	N2O	CO2 (2,3)	CH4	N2O	CO2	CO2	
	(TJ)		(t/TJ)	(kg/TJ)	(kg/TJ)	(kt)	(kt)	(kt)	(kt)	Method	EF
1.A.4 Other sectors	98,345.4	NCV				4,012.979745	10.5460753	0.3040432	NE		
Liquid fuels	41,659.8	NCV	65.62521676	6.3902922	3.98990058	2,733.933405	0.2662183	0.16621846	NE		
Solid fuels	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Gaseous fuels (6)	22,799.4	NCV	56.1	5	0.1	1,279.04634	0.113997	0.00227994	NE		
Other fossil fuels (7)	NE, NO	NCV	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE		
Peat (8)	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Biomass(3)	33,886.2	NCV	112	300	4	3,795.2544	10.16586	0.1355448	NE		
1.A.4.a. Commercial/institutional (14)	19,162.5	NCV				946.27398	0.534415	0.00910462	NE		
Liquid fuels	5,315	NCV	47.32062841	6.31476952	0.37888617	251.50914	0.033563	0.00201378	NE		
Solid fuels	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Gaseous fuels (6)	12,384.4	NCV	56.1	5	0.1	694.76484	0.061922	0.00123844	NE		
Other fossil fuels (7)	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Peat (8)	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Biomass (3)	1,463.1	NCV	112	300	4	163.8672	0.43893	0.0058524	NE		
1.A.4.a.i. Stationary combustion	19,162.5	NCV				946.27398	0.534415	0.00910462	NE		
Liquid fuels	5,315	NCV	47.32062841	6.31476952	0.37888617	251.50914	0.033563	0.00201378	NE	T1	D
Solid fuels	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Gaseous fuels (6)	12,384.4	NCV	56.1	5	0.1	694.76484	0.061922	0.00123844	NE	T2	CS
Other fossil fuels (7)	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Peat (8)	NE	NCV	NE	NE	NE	NE	NE	NE	NE		
Biomass (3)	1,463.1	NCV	112	300	4	163.8672	0.43893	0.0058524	NE	T1	D
1.A.4.a.ii. Off-road vehicles and other machinery	NE	NCV				NE	NE	NE			
Liquid fuels	NE	NCV	NE	NE	NE	NE	NE	NE			
Solid fuels	NE	NCV	NE	NE	NE	NE	NE	NE			
Gaseous fuels (6)	NE	NCV	NE	NE	NE	NE	NE	NE			
Other fossil fuels (7)	NE	NCV	NE	NE	NE	NE	NE	NE			
Biomass (3)	NE	NCV	NE	NE	NE	NE	NE	NE			

Legend

(1) The IEFs for CO2 are estimated on the basis of gross emissions, i.e. CO2 emissions plus the absolute amount captured.

(2) Final CO2 emissions after subtracting the amounts of CO2 captured.

(3) Although CO2 emissions from biomass are reported in this table, they will not be included in the total CO2 emissions from fuel combustion. The value for total CO2 emissions from biomass is

Documentation box

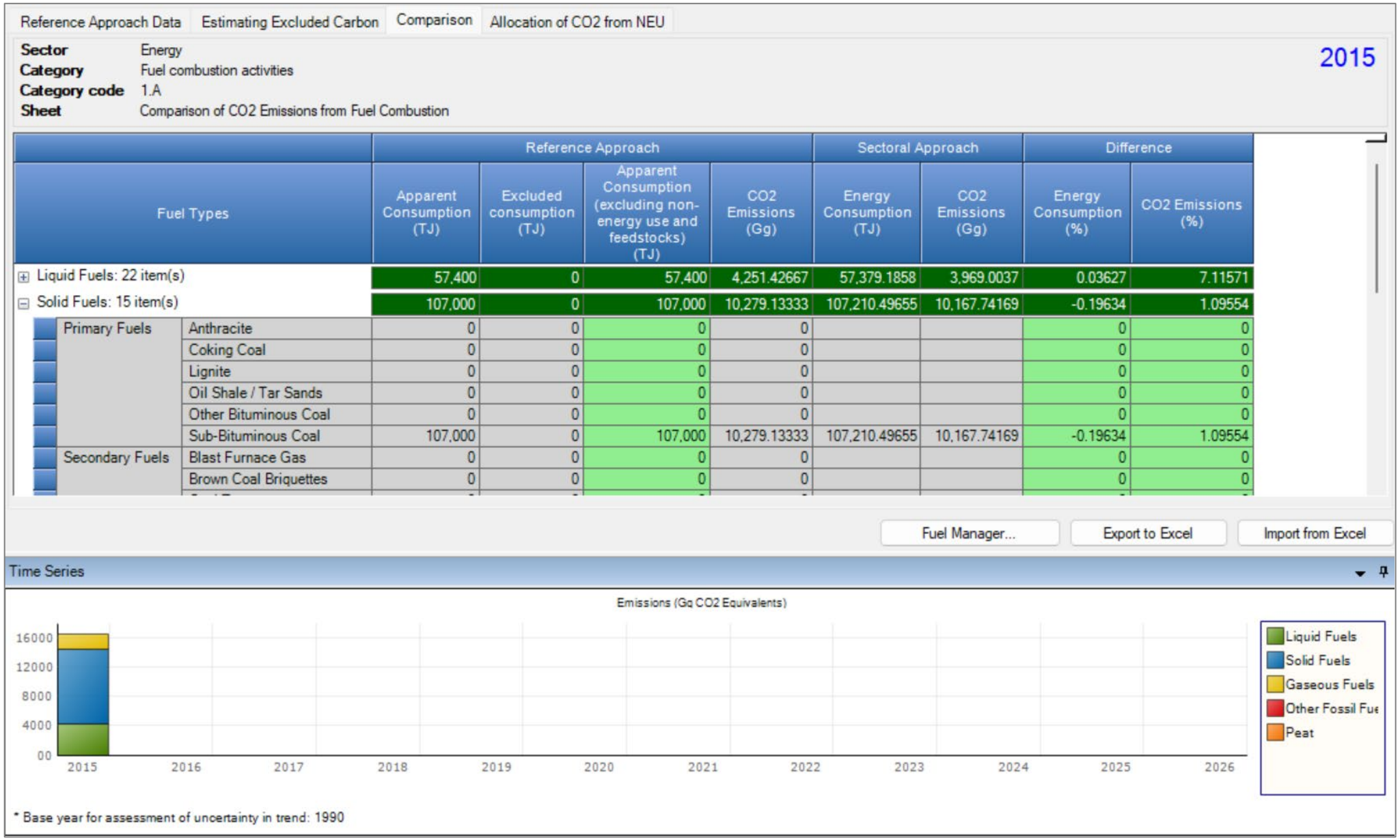
• Parties should provide a detailed description of the fuel combustion subsector in the relevant section of chapter 3 ("Energy" (CRT subsector 1.A)) of the NID. Use this documentation box to provide references to relevant sections of the NID, if any additional information and/or further details are needed to explain the contents of this table.
• If estimates are based on GCVs, provide in this documentation box a reference to the relevant section of the NID where the information necessary for calculating the AD based on NCVs can be found.

IPCC Inventory Software notes

• To implement the first note above, users can replace values mapped in this CRT with the notation key "C". Note that totals calculated in orange cells at the level of 1.A.4 Other Sectors and 1.A.5 Other will not change because of the input of "C".

• Please describe in the "Documentation Box" the liquid fuels included in the estimates reported in row "Other liquid fuels [IPCC Software 1.A.4.c.ii]" and " Other liquid fuels [IPCC Software 1.A.4.c.iii]".

Tools – Reference Approach



Reference Approach Data | Estimating Excluded Carbon | Comparison | Allocation of CO2 from NEU

Sector Energy
Category Fuel combustion activities
Category code 1.A
Sheet Comparison of CO2 Emissions from Fuel Combustion

2015

Fuel Types		Reference Approach: Apparent Consumption (TJ)	Reference Approach: Excluded consumption (TJ)	Reference Approach: Apparent Consumption (excluding non-energy use and feedstocks) (TJ)	Reference Approach: CO2 Emissions (Gg)	Sectoral Approach: Energy Consumption (TJ)	Sectoral Approach: CO2 Emissions (Gg)	Difference: Energy Consumption (%)	Difference: CO2 Emissions (%)
⊞ Liquid Fuels: 22 item(s)		57.400	0	57.400	4,251.42667	57,379.1858	3,969.0037	0.03627	7.11571
⊟ Solid Fuels: 15 item(s)		107,000	0	107,000	10,279.13333	107,210.49655	10,167.74169	-0.19634	1.09554
	Primary Fuels: Anthracite	0	0	0	0			0	0
	Primary Fuels: Coking Coal	0	0	0	0			0	0
	Primary Fuels: Lignite	0	0	0	0			0	0
	Primary Fuels: Oil Shale / Tar Sands	0	0	0	0			0	0
	Primary Fuels: Other Bituminous Coal	0	0	0	0			0	0
	Primary Fuels: Sub-Bituminous Coal	107,000	0	107,000	10,279.13333	107,210.49655	10,167.74169	-0.19634	1.09554
	Secondary Fuels: Blast Furnace Gas	0	0	0	0			0	0
	Secondary Fuels: Brown Coal Briquettes	0	0	0	0			0	0

Fuel Manager... | Export to Excel | Import from Excel

Time Series

* Base year for assessment of uncertainty in trend: 1990

User role

The *compiler* **remains at the center** of the *compilation process*.

- The IPCC Inventory Software *doesn't decide for you* — it makes your choices work.
- **You** define the **methods**, **data**, and **assumptions** based on the **Guidelines**.
- The IPCC Software simply ensures ***your work*** *stays consistent* and *transparent*.

How to use the IPCC Inventory software

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Recipe for using the IPCC Software

“Preparing a national inventory with the IPCC Software follows the logic of following a recipe.”

1. Read the IPCC Guidelines and Software guides
2. Assess data availability and set up Data Managers
3. Select method using guidance and decision trees
4. Enter activity data in the relevant worksheet
5. Enter emission factors and parameters
6. Check results and perform QA/QC
7. Generate CRT Tables and JSON submission files

The knowledge you build upon

To use the IPCC Inventory Software effectively, you first need a *basic understanding* of what a **national GHG inventory** is and how it is structured.

It is therefore expected that you are at least **familiar with Volume 1** of the **2006 IPCC Guidelines**, especially:

- How source categories are organized
- The relationship between **activity data**, **emission factors**, and **emissions**
- The overall **inventory process** and **reporting tables**

Example Introduction: Breweries

Scenario: You've been assigned to estimate GHG emissions *from food and beverage industries* (***breweries***) in your country, using the **IPCC Inventory Software**.

What you already did:

- Collected *basic information* about the brewery sector: number of facilities, production scale, and typical energy use.
- Reviewed *available data sources*, such as **industry reports**, **annual energy reports**, or **national statistics**, to understand what kind of *activity data are available*

Before opening the software

Start with the IPCC Guidelines: identify your *category*, *method*, *required data*

If you're not sure where to look... *Start by reading the **introductions** of the relevant volumes. They explain the scope, logic, and boundaries between sectors.*

You might wonder: *Are emissions from brewery boilers industry process or energy emissions?*

Reading the **Energy Introduction** (Vol.2 Ch.1, Section 1.2) and the **IPPU Introduction** (Vol.3 Ch.1, Section 1.2.1) clarifies that:

- Fuel burned to generate heat or steam for the process is **Energy**
- Only chemical reactions belong to **IPPU**

Look for guidance in

Vol.2 Chapter 2 – Stationary Combustion

IPCC 2006 Guidelines

Vol.2 Chapter 2 – Stationary Combustion

- Identify source emissions category:
  - 1.A.2.e – Food Processing, Beverages and Tobacco

1 A 2	*Manufacturing Industries and Construction*		Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1 A 1 c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1 A 3). Emissions arising from off-road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants. A suggested list of categories is outlined below.
1 A 2	a	Iron and Steel	ISIC Group 271 and Class 2731
1 A 2	b	Non-Ferrous Metals	ISIC Group 272 and Class 2732
1 A 2	c	Chemicals	ISIC Division 24
1 A 2	d	Pulp, Paper and Print	ISIC Divisions 21 and 22
1 A 2	e	Food Processing, Beverages and Tobacco	ISIC Divisions 15 and 16

Table 2.1 – Detailed sector split for stationary combustion

Vol.2 Chapter 2 – Stationary Combustion

Page 2.7

IPCC 2006 Guidelines

Vol.2 Chapter 2 – Stationary Combustion

- Identify source emissions category:
  - 1.A.2.e – Food Processing, Beverages and Tobacco

- Identify Methods & Equations:
  - T1,T2,T3: Equations 2.1, 2.2, 2.3, 2.4 and 2.5

EQUATION 2.1
GREENHOUSE GAS EMISSIONS FROM STATIONARY COMBUSTION

$$Emissions_{GHG,\,fuel} = Fuel\ \ Consumption_{fuel} \bullet Emission\ \ Factor_{GHG,\,fuel}$$

EQUATION 2.2
TOTAL EMISSIONS BY GREENHOUSE GAS

$$Emissions_{GHG} = \sum_{fuels} Emissions_{GHG,\,fuel}$$

EQUATION 2.3
GREENHOUSE GAS EMISSIONS BY TECHNOLOGY

$$Emissions_{GHG,\,fuel,\,technology} = Fuel\,Consumption_{fuel,\,technology} \bullet Emission\ \ Factor_{GHG,\,fuel,\,technology}$$

EQUATION 2.4
FUEL CONSUMPTION ESTIMATES BASED ON TECHNOLOGY PENETRATION

$$Fuel\,Consumption_{fuel,\,technology} = Fuel\,Consumption_{fuel} \bullet Penetration_{technology}$$

EQUATION 2.5
TECHNOLOGY-BASED EMISSION ESTIMATION

$$Emissions_{GHG,\,fuel} = \sum_{technologies} Fuel\,Consumption_{fuel,\,technology} \bullet Emission\ \ Factor_{GHG,\,fuel,\,technology}$$

Tier 1, 2 and 3 Equations for Stationary Combustion

Vol.2 Chapter 2 – Stationary Combustion

Page 2.11, 2.12 and 2.13

IPCC 2006 Guidelines

Vol.2 Chapter 2 – Stationary Combustion

- Identify source emissions category:
  - 1.A.2.e – Food Processing, Beverages and Tobacco
- Identify Methods & Equations:
  - T1,T2,T3: Equations 2.1, 2.2, 2.3, 2.4 and 2.5
  - Choice of Methods: Decision Tree
- Identify data required:
  - Tier 1: Amount of fuel combusted + Default EF
  - Tier 2: Amount of fuel combusted + Country Specific EF
  - Tier 3: Technology-specific models and detailed input data

2.3.1.1 TIER 1 APPROACH

Applying a Tier 1 emission estimate requires the following for each source category and fuel:

- Data on the amount of fuel combusted in the source category
- A default emission factor

2.3.1.2 TIER 2 APPROACH

Applying a Tier 2 approach requires:

- Data on the amount of fuel combusted in the source category;
- A country-specific emission factor for the source category and fuel for each gas.

2.3.1.3 TIER 3 APPROACH

The Tier 1 and Tier 2 approaches of estimating emissions described in the previous sections necessitate using an average emission factor for a source category and fuel combination throughout the source category. In reality, emissions depend on the:

- fuel type used,
- combustion technology,
- operating conditions,
- control technology,
- quality of maintenance,
- age of the equipment used to burn the fuel.

Data requirements for each approach

Vol.2 Chapter 2 – Stationary Combustion

Page 2.11 and 2.12

*If you **understand** what the **method needs**, the use of the software becomes straightforward.*

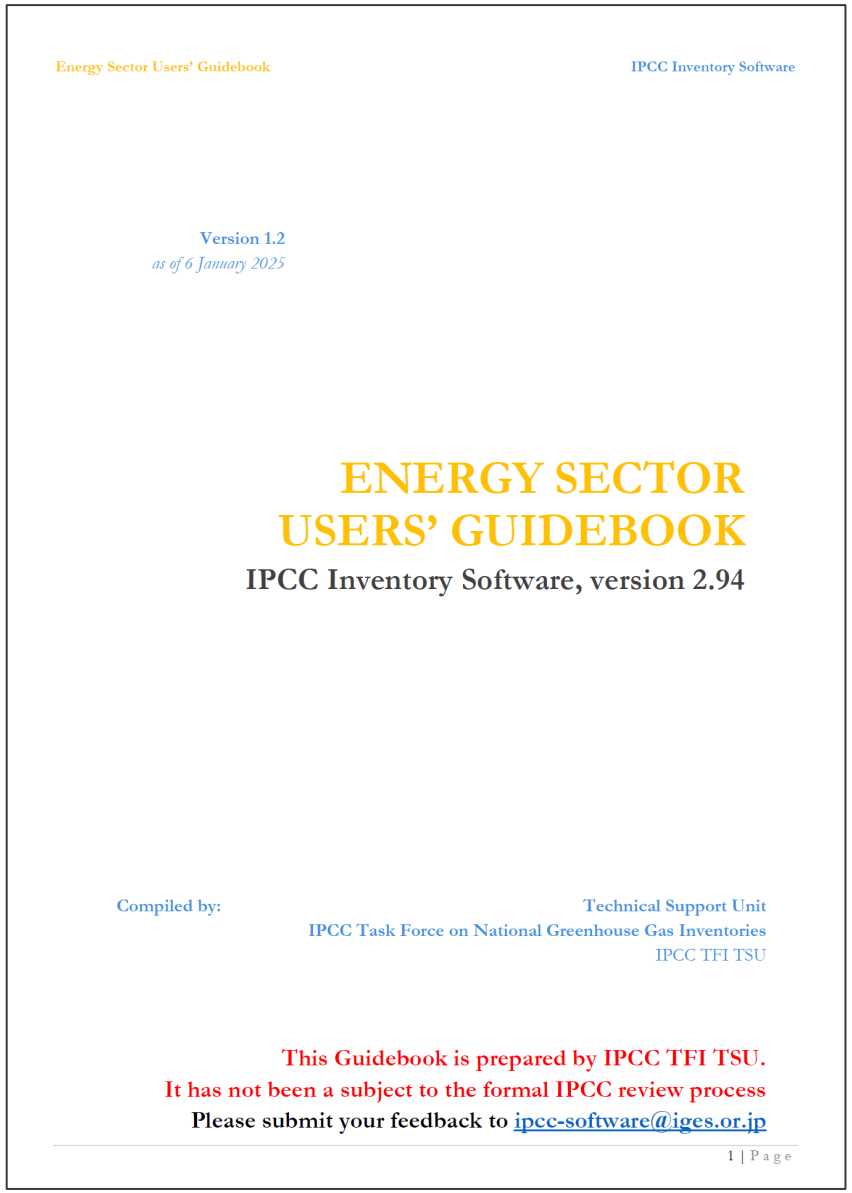
Energy Sector Users' Guidebook

Now that you know *how emissions are estimated*…It's time to understand *how the **IPCC Inventory Software** applies the Guidelines*.

The **Software Sectoral Guidebooks** explain how each method is implemented, how data are organized, and how to enter or review results inside the software.

Each sector has its own guidebook, they include:

- Structure of worksheets and data managers
- Links to the corresponding Guidelines chapters
- Step-by-step examples of data entry



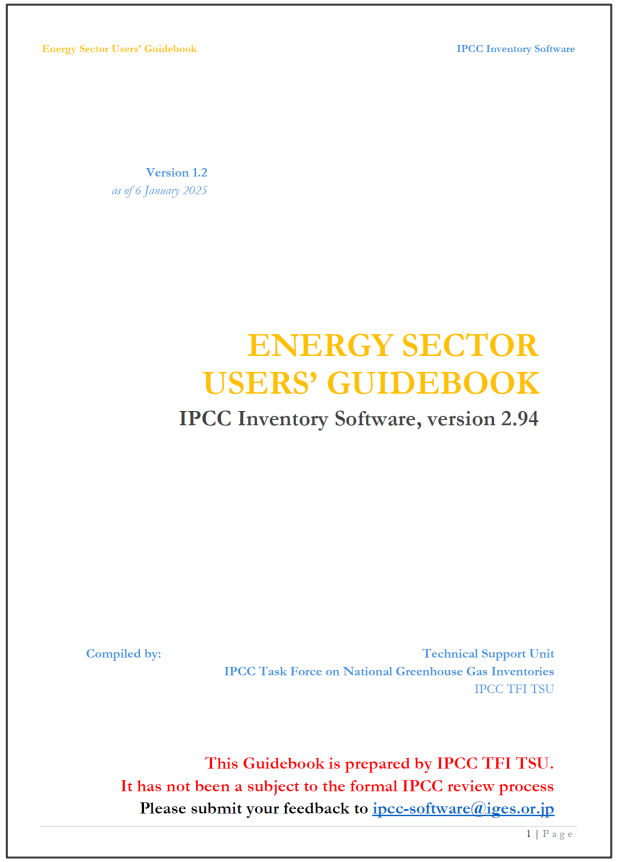
Energy Sector Users' Guidebook

You already know *how emissions are estimated* from the **Guidelines**.

Now, the *Sectoral Guidebooks* show you how those methods are *implemented* inside the **IPCC Inventory Software**.

Each guidebook includes:

- How *worksheets* and *data managers* are structured
- How each *method* links to the relevant *Guidelines* sections
- Step-by-step examples of data entry and checks



Energy Sector - Guidebook

Can be downloaded in the TFI website together with other sectoral guidebooks

Sectoral Guidebook: Identify Guidance

The *Sectoral Guidebook* provides both **category-specific references** (where to find guidance) and **general instructions** on organizing data, managing tiers, and handling uncertainties.

Energy Sector Users' Guidebook — IPCC Inventory Software

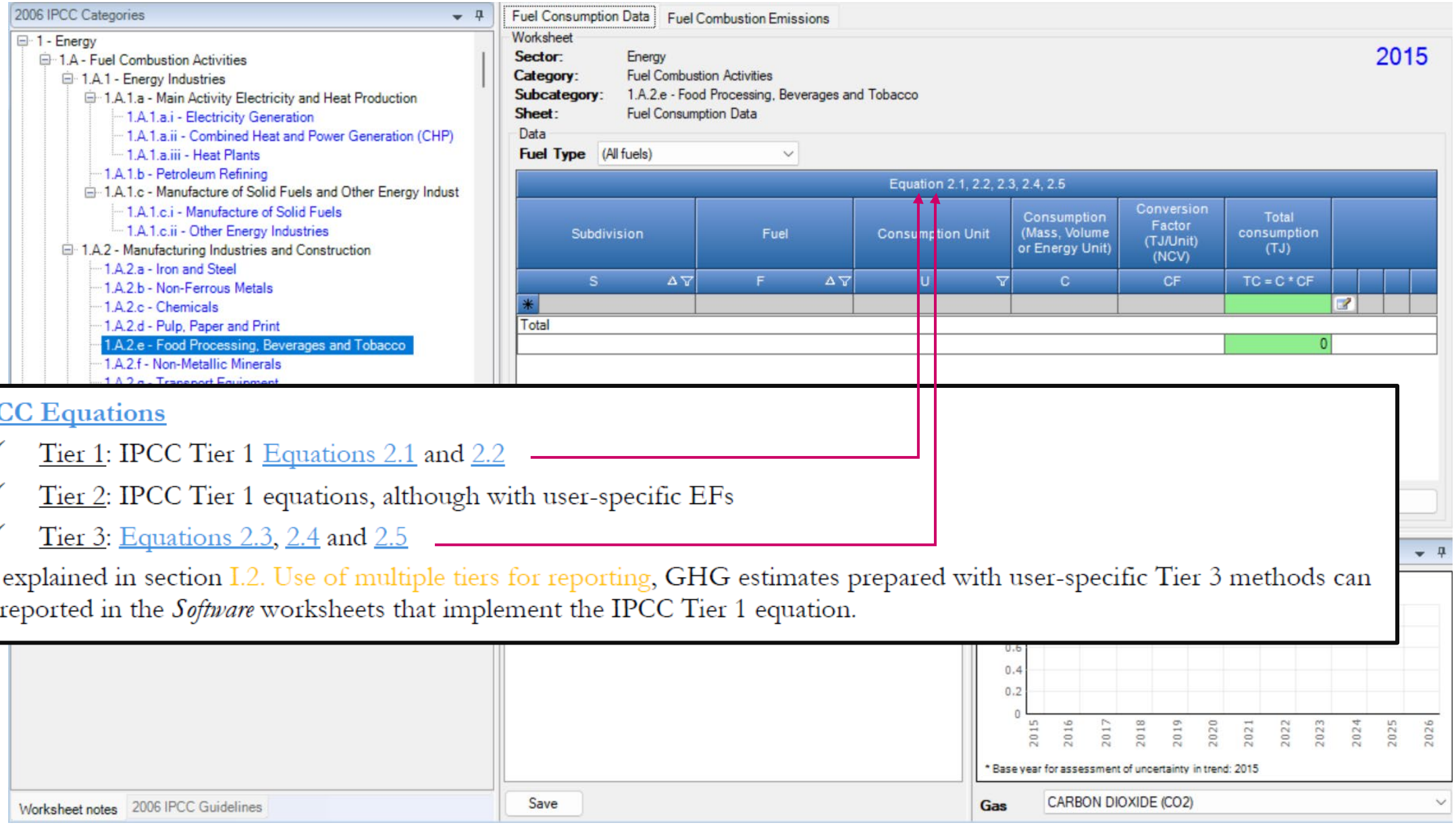
Categories	Definitions	Guidebook
1.A.2.a - Iron and Steel	ISIC Group 271[11] and Class 2731	1.A - Stationary Combustion Source Categories
1.A.2.b - Non-Ferrous Metals	ISIC Group 272 and Class 2732	1.A - Stationary Combustion Source Categories
1.A.2.c - Chemicals	ISIC Division 24	1.A - Stationary Combustion Source Categories
1.A.2.d - Pulp, Paper and Print	ISIC Divisions 21 and 22	1.A - Stationary Combustion Source Categories
1.A.2.e - Food Processing, Beverages and Tobacco	ISIC Divisions 15 and 16	1.A - Stationary Combustion Source Categories
1.A.2.f - Non-Metallic Minerals	Includes products such as glass, ceramic, cement, etc.; ISIC Division 26.	1.A - Stationary Combustion Source Categories
1.A.2.g - Transport Equipment	ISIC Divisions 34 and 35	1.A - Stationary Combustion Source Categories

Table 1. all categories included in the Energy sector

ENERGY SECTOR USERS' GUIDEBOOK

Page 2.8 – 2.15

Sectoral Guidebook: Identify Equations

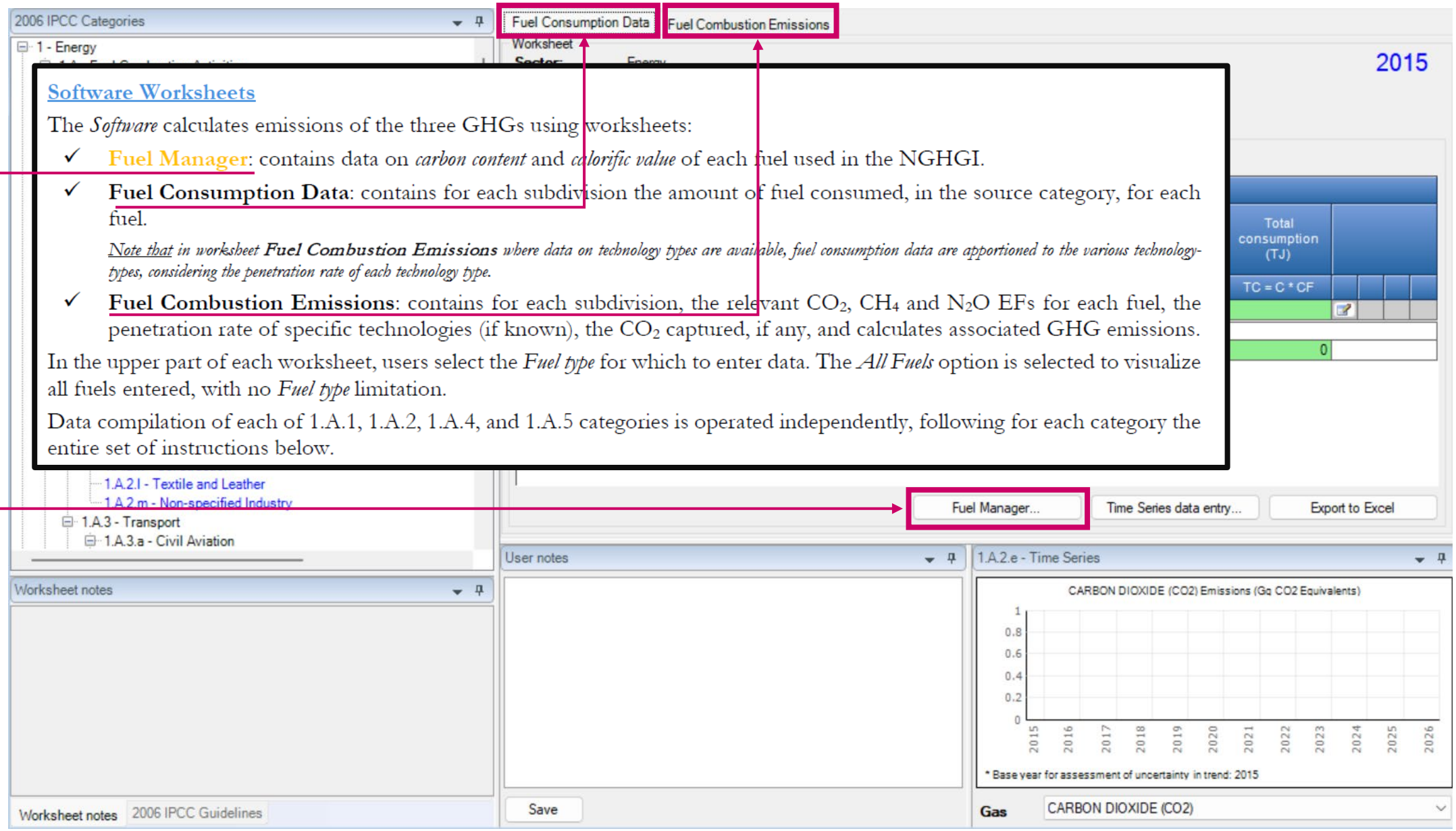


IPCC Equations

- ✓ Tier 1: IPCC Tier 1 Equations 2.1 and 2.2
- ✓ Tier 2: IPCC Tier 1 equations, although with user-specific EFs
- ✓ Tier 3: Equations 2.3, 2.4 and 2.5

As explained in section I.2. Use of multiple tiers for reporting, GHG estimates prepared with user-specific Tier 3 methods can be reported in the *Software* worksheets that implement the IPCC Tier 1 equation.

Sectoral Guidebook: Identify Worksheets



Software Worksheets

The *Software* calculates emissions of the three GHGs using worksheets:

- ✓ **Fuel Manager**: contains data on *carbon content* and *calorific value* of each fuel used in the NGHGI.
- ✓ **Fuel Consumption Data**: contains for each subdivision the amount of fuel consumed, in the source category, for each fuel.

  Note that in worksheet ***Fuel Combustion Emissions*** *where data on technology types are available, fuel consumption data are apportioned to the various technology-types, considering the penetration rate of each technology type.*
- ✓ **Fuel Combustion Emissions**: contains for each subdivision, the relevant CO_2, CH_4 and N_2O EFs for each fuel, the penetration rate of specific technologies (if known), the CO_2 captured, if any, and calculates associated GHG emissions.

In the upper part of each worksheet, users select the *Fuel type* for which to enter data. The *All Fuels* option is selected to visualize all fuels entered, with no *Fuel type* limitation.

Data compilation of each of 1.A.1, 1.A.2, 1.A.4, and 1.A.5 categories is operated independently, following for each category the entire set of instructions below.

Sectoral Guidebook: Workflow

The Sectoral Guidebook walks you through **each step of the workflow**, explaining **what to do**, **where to enter data**, and how each part connects to the Guidelines.

Energy Sector Users' Guidebook — IPCC Inventory Software

User's work Flowchart

Consistent with the key category analysis and the decision tree in Figure 2.1 of the *2006 IPCC Guidelines*, GHG estimates are calculated using a single methodological tier or by applying a combination of tiers according to the availability of AD and of user-specific[18] and/or technology-specific EFs.

To ease the use of the *Software* as well as to avoid its misuse, for each source category, the users apply steps described in the following flowchart:

Thus, for the relevant source-category:

Step A, Fuel Manager, users collect and enter data on each fuel used in the relevant source category: its name, if not present among IPCC defaults, and the *calorific value* and the *carbon content* of each fuel, including for IPCC default fuels if user-specific values are available.

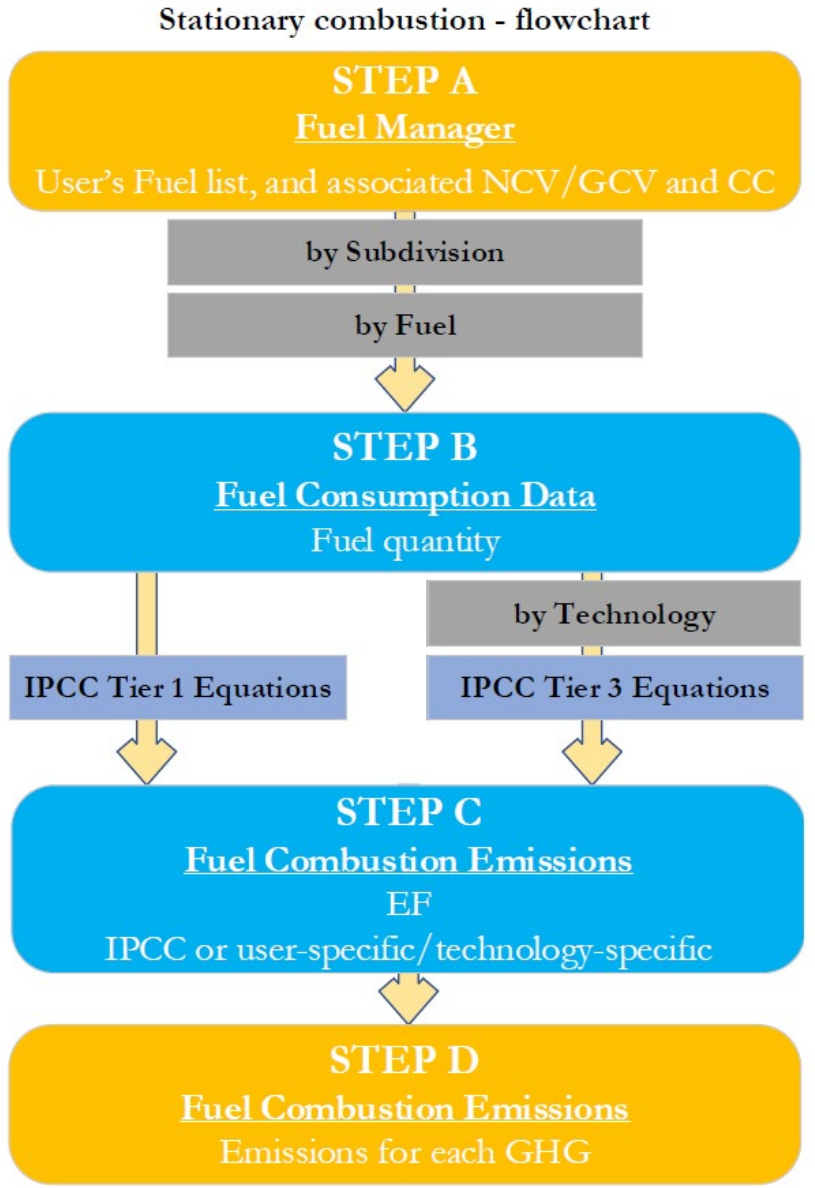
Then, for each subdivision, if any:

Step B, worksheet **Fuel Consumption Data**, users collect and enter data on the amount consumed of each fuel.

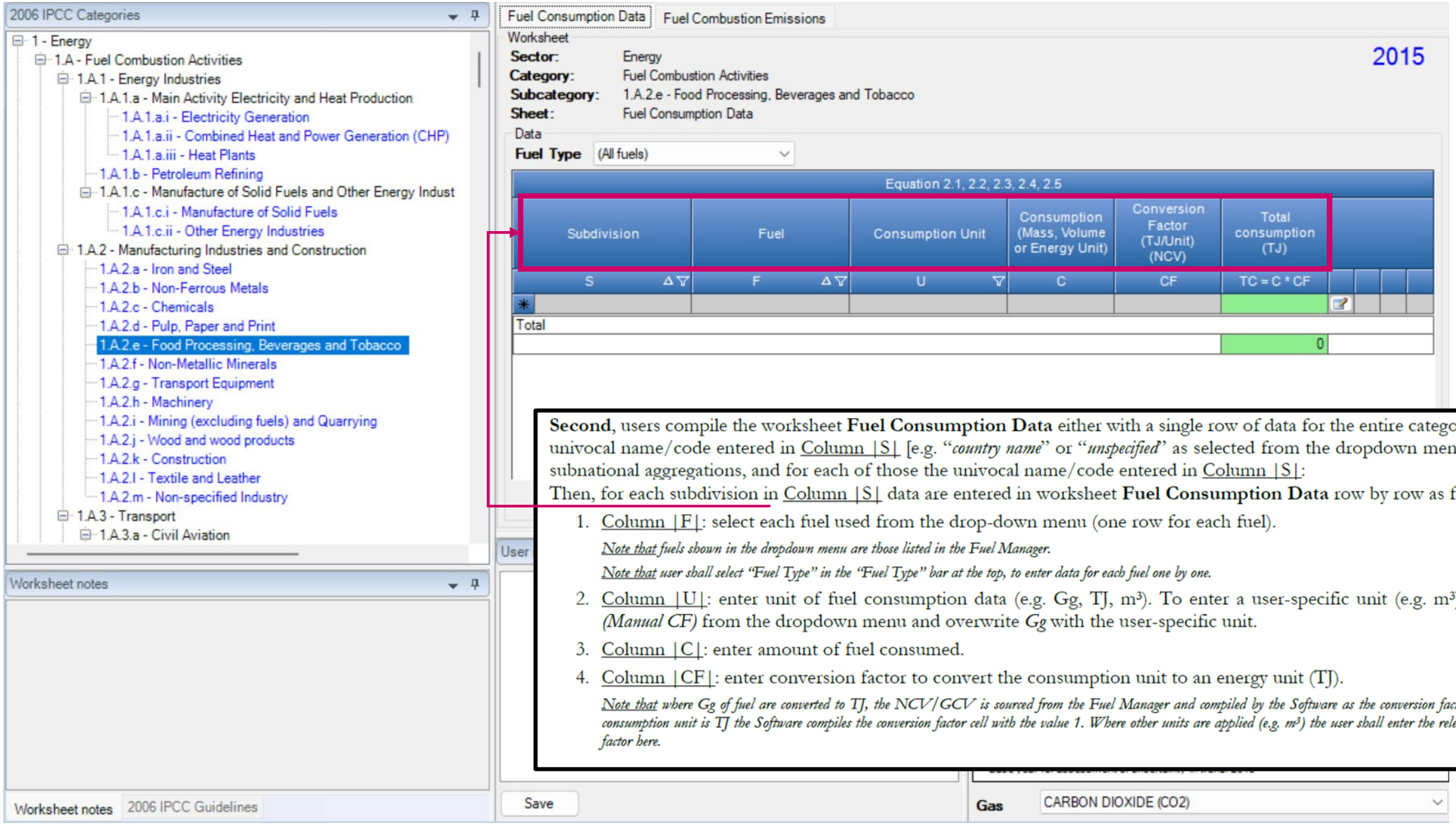
Step C, worksheet **Fuel Combustion Emissions**, users collect and enter in each row associated EFs for each GHG. Where technology-specific EFs are available, fuel consumption data are apportioned to the various technology-types, considering the penetration rate of each technology type.

Step D, worksheet **Fuel Combustion Emissions**, for each row of data and GHG, the *Software* calculates emissions in mass units (Gg). In addition, for each GHG, total emissions are calculated.

Where data are available, CO_2 capture can be reported in **Fuel Combustion Emissions** worksheet. CO_2 capture is only expected to be reported when applying a Tier 3 method, and information on the amount of CO_2 captured is known. The CO_2 captured is then entered at the level at which corresponding emissions are calculated.



Sectoral Guidebook: AD Input



Second, users compile the worksheet **Fuel Consumption Data** either with a single row of data for the entire category, with its univocal name/code entered in Column |S| [e.g. "*country name*" or "*unspecified*" as selected from the dropdown menu], or with subnational aggregations, and for each of those the univocal name/code entered in Column |S|:
Then, for each subdivision in Column |S| data are entered in worksheet **Fuel Consumption Data** row by row as follows:

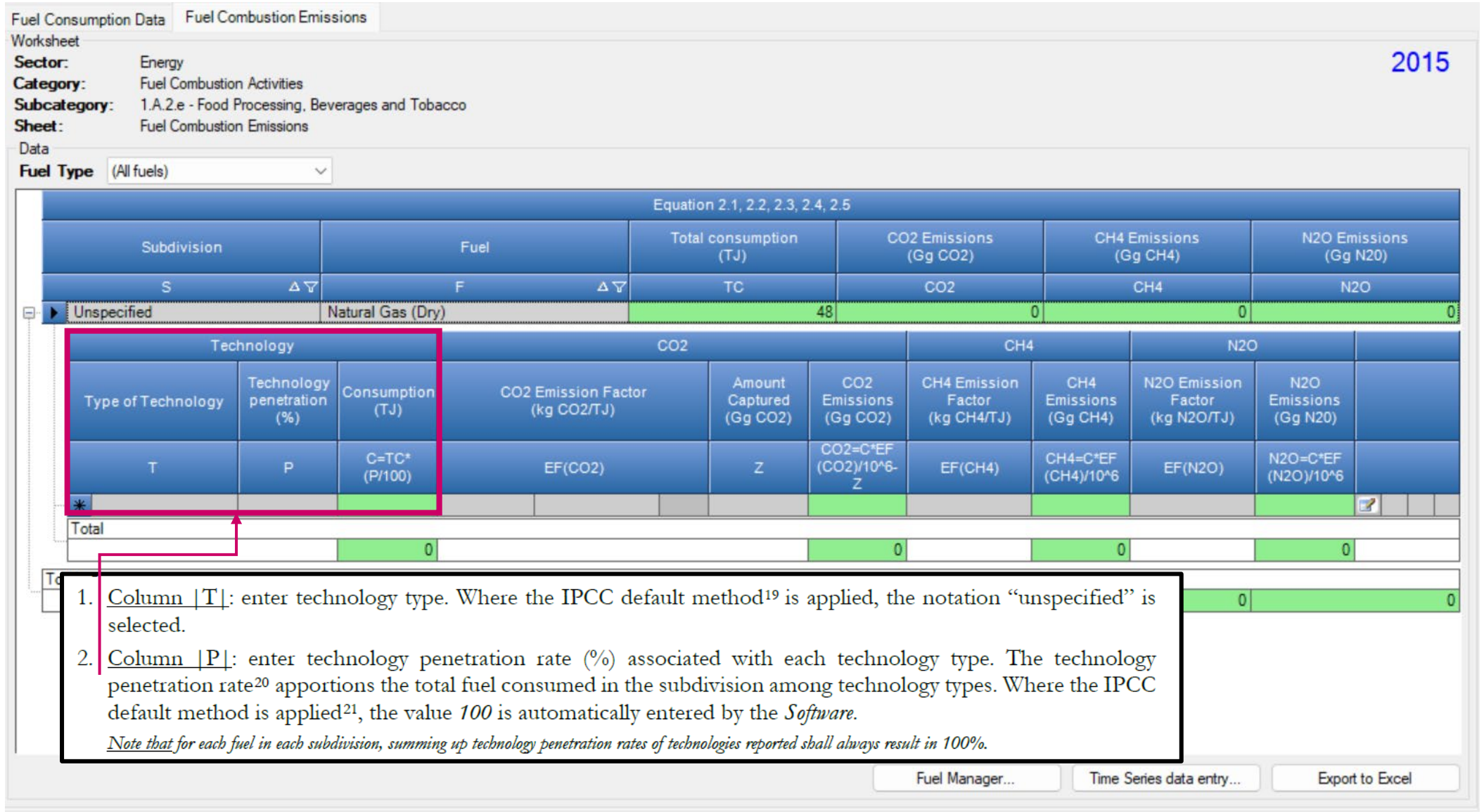
1. Column |F|: select each fuel used from the drop-down menu (one row for each fuel).

   Note that fuels shown in the dropdown menu are those listed in the Fuel Manager.

   Note that user shall select "Fuel Type" in the "Fuel Type" bar at the top, to enter data for each fuel one by one.
2. Column |U|: enter unit of fuel consumption data (e.g. Gg, TJ, m^3). To enter a user-specific unit (e.g. m^3) select *Gg (Manual CF)* from the dropdown menu and overwrite *Gg* with the user-specific unit.
3. Column |C|: enter 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 converted to TJ, the NCV/GCV is sourced from the Fuel Manager and compiled by the Software as the 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^3) the user shall enter the relevant conversion factor here.

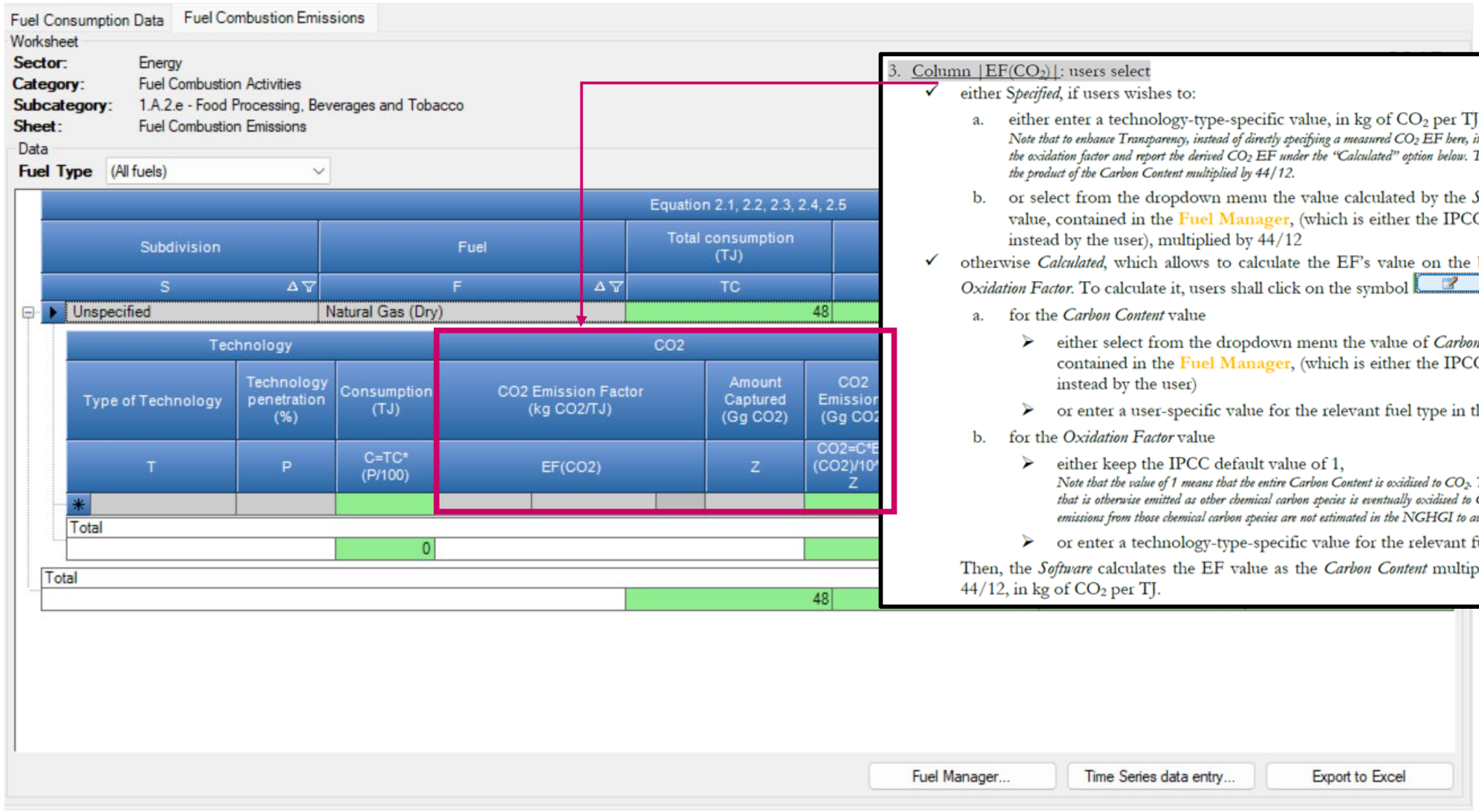
Sectoral Guidebook: EF input



1. Column |T|: enter technology type. Where the IPCC default method[19] is applied, the notation "unspecified" is selected.
2. Column |P|: enter technology penetration rate (%) associated with each technology type. The technology penetration rate[20] apportions the total fuel consumed in the subdivision among technology types. Where the IPCC default method is applied[21], the value *100* is automatically entered by the *Software*.

Note that for each fuel in each subdivision, summing up technology penetration rates of technologies reported shall always result in 100%.

Sectoral Guidebook: EF input

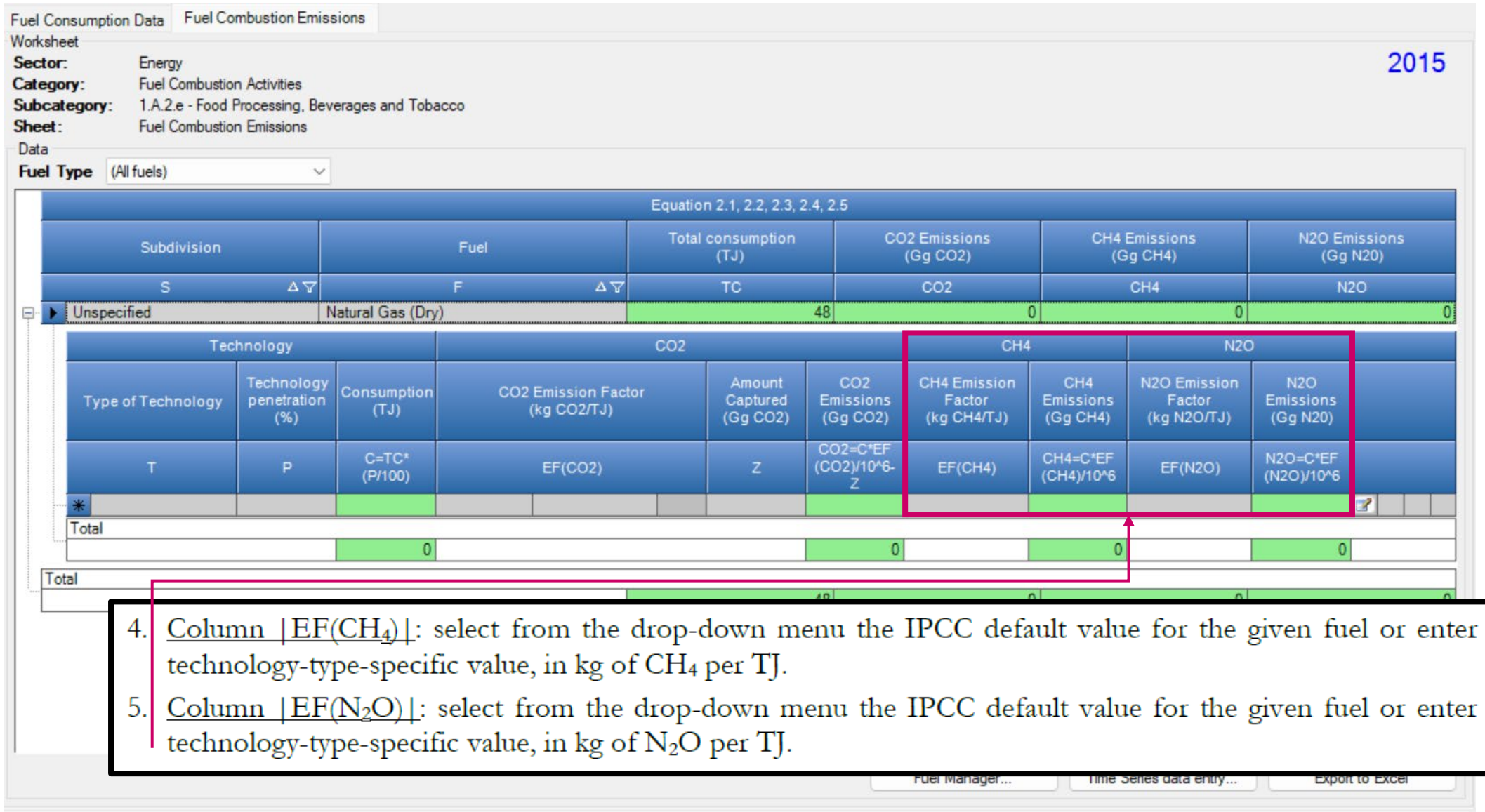


3. Column |EF(CO_2)|: users select

- ✓ either *Specified*, if users wishes to:
  - a. either enter a technology-type-specific value, in kg of CO_2 per TJ
    Note that to enhance Transparency, instead of directly specifying a measured CO_2 EF here, it is suggested to derive from the measured CO_2 EF the oxidation factor and report the derived CO_2 EF under the "Calculated" option below. This is done by dividing the measured CO_2 EF by the product of the Carbon Content multiplied by 44/12.
  - b. or select from the dropdown menu the value calculated by the *Software* based on the *Carbon Content* value, contained in the Fuel Manager, (which is either the IPCC default value of the value entered instead by the user), multiplied by 44/12
- ✓ otherwise *Calculated*, which allows to calculate the EF's value on the basis of the *Carbon Content* and an *Oxidation Factor*. To calculate it, users shall click on the symbol to open a pop-up window where:
  - a. for the *Carbon Content* value
    - ➢ either select from the dropdown menu the value of *Carbon Content* for the relevant fuel that is contained in the Fuel Manager, (which is either the IPCC default value of the value entered instead by the user)
    - ➢ or enter a user-specific value for the relevant fuel type in the relevant year.
  - b. for the *Oxidation Factor* value
    - ➢ either keep the IPCC default value of 1,
      Note that the value of 1 means that the entire Carbon Content is oxidised to CO_2. This means assuming that the entire carbon content that is otherwise emitted as other chemical carbon species is eventually oxidised to CO_2 in the atmosphere. Accordingly indirect CO_2 emissions from those chemical carbon species are not estimated in the NGHGI to avoid to double count those emissions.
    - ➢ or enter a technology-type-specific value for the relevant fuel.

Then, the *Software* calculates the EF value as the *Carbon Content* multiplied by the *Oxidation Factor* and by 44/12, in kg of CO_2 per TJ.

Sectoral Guidebook: EF input



4. Column |EF(CH_4)|: select from the drop-down menu the IPCC default value for the given fuel or enter the technology-type-specific value, in kg of CH_4 per TJ.
5. Column |EF(N_2O)|: select from the drop-down menu the IPCC default value for the given fuel or enter the technology-type-specific value, in kg of N_2O per TJ.

Example: Current Status

2006 IPCC Guidelines *(Vol.2 Chp.2 Stationary Combustion)*

- Breweries belong to *1.A.2.e – Food Processing, Beverages and Tobacco Industries.*
- Main requirement for Tier 1 and Tier 2 Approaches:
  - Data on the *amount of fuel combusted* in the source category
  - A *Default* or a *Country-Specific emission factor*

Sectoral Guidebook *(Energy)*

- Workflow
- Main worksheets:
  - *Fuel Manager: Carbon Content and NCV*
  - *Fuel Consumption Data: AD input*
  - *Fuel Combustion Emissions: EF input*

Worksheets: Fuel Consumption Data

Equation 2.1, 2.2, 2.3, 2.4, 2.5					
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
Unspecified	Fuel 1	TJ	300,000	1	300,000
Unspecified	Fuel 2	Gg (Auto CF)	5,000	40	200,000
Unspecified	Fuel 3	Gg (Manual CF)	5,000	20	100,000
Unspecified	Fuel 4	* Custom Unit *	10,000,000	0.005	50,000
Total					
					650,000

FUEL CONSUMPTION DATA & CALORIFIC VALUES

- Compile fuel consumption information to estimate **Total Energy Consumption** (TJ).

- Users can enter data in **Energy** (TJ) or **Mass** (Gg) by default. ***Other units*** (*e.g., m³, BTUs, liters*) can also be used, but require a *user-defined* conversion factor (TJ/unit).

Consumption Unit	Consumption *unit type*	Conversion Factor	Conversion Factor Unit (NCV)	*Source of Conversion Factor*
TJ	Energy	-	TJ/TJ	CF = 1
Gg (Auto CF)	Mass	*Default CF*	TJ/Gg	Fuel Manager *(Default/User defined)*
Gg (Manual CF)	Mass	Manual	TJ/Gg	*User-defined*
**** Custom Unit ****	*Other* *(e.g. volume)*	Manual	TJ/*Custom Unit*	*User-defined*

Activity Data INPUT

Amount of Fuel combusted									
Category	**Sub-category**	**Product**	**Subdivision**	**Fuel**	**Fuel Type**	**Parameter**	**unit**	**2015**	**Source**
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	LPG	Liquid Fuels	Fuel Consumption	Gg	0.1	National Statistics - Energy Balance
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	Natural Gas	Gaseous Fuels	Fuel Consumption	10^3 m^3	1500	National Statistics - Energy Balance
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Diesel Oil	Liquid Fuels	Fuel Consumption	Gg	0.6	National Statistics - Energy Balance
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Fuel Oil	Liquid Fuels	Fuel Consumption	Gg	0.1	National Statistics - Energy Balance
Net Calorific Value									
Category	**Sub-category**	**Product**	**Subdivision**	**Fuel**	**Fuel Type**	**Parameter**	**unit**	**2015**	**Source**
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	LPG	Liquid Fuels	Net Calorific Value	TJ/Gg	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	Natural Gas	Gaseous Fuels	Net Calorific Value	TJ/10^3 m^3	0.038	Data from Natural Gas Suppliers
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Diesel Oil	Liquid Fuels	Net Calorific Value	TJ/Gg	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Fuel Oil	Liquid Fuels	Net Calorific Value	TJ/Gg	NA	Not available

Equation 2.1, 2.2, 2.3, 2.4, 2.5						
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	
Modern Breweries	Liquefied Petroleum Gases	Gg (Auto CF)	0.1	47.3	4.73	
Modern Breweries	Natural Gas (Dry)	10^3 m^3	1,500	0.038	57	
Old Breweries	Gas/Diesel Oil	Gg (Auto CF)	0.1	43	4.3	
Old Breweries	Residual Fuel Oil	Gg (Auto CF)	0.6	40.4	24.24	
Total						
					90.27	

IPCC Inventory Software

1.A.2.e – Food Processing, Beverages and Tobacco

Fuel Consumption Data

Worksheets: Fuel Combustion Emissions

Technology			CO2				
Type of Technology	Technology penetration (%)	Consumption (TJ)	CO2 Emission Factor (kg CO2/TJ)			Amount Captured (Gg CO2)	CO2 Emissions (Gg CO2)
T	P	C=TC*(P/100)	EF(CO2)			Z	CO2=C*EF (CO2)/10^6-Z
Tech 1	50	150,000	Specified	54,000		0	8,100
Tech 2	40	120,000	Specified	53,750		0	6,450
Tech 3	10	30,000	Calculated	55,000		0	1,650
*							
Total							
		300,000					16,200

CO_2 EMISSION ESTIMATE

- Estimate CO_2 emissions using default and/or user-specified *carbon content* and *oxidation factor* or *CO_2 emission factors.*
- Supports disaggregated estimates by ***technology***, enabling different emission factors for the same fuel consumption.

Estimate Parameters Approach	*CO_2 Emission Factor Option*	*Carbon Content*	*Oxidation Factor*	*CO2 Emission Factor*
Manual input of $C_{Content}$ and $Oxi._{Factor}$	**Calculated**	User-defined	User-defined	**Calculated**
Manual input of CO_2 EF value	**Specified**	-	-	User-defined
Automatic CO_2 EF selection	**Specified**	-	-	IPCC Default

Emission Factor INPUT

CO2 Emission Factor

Category	Sub-category	Product	Subdivision	Fuel	Fuel Type	Parameter	unit	2015	Source
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	LPG	Liquid Fuels	CO2 EF	$kgCO_2/TJ$	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	Natural Gas	Gaseous Fuels	CO2 EF	$kgCO_2/TJ$	55300	Data from Natural Gas Suppliers
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Diesel Oil	Liquid Fuels	CO2 EF	$kgCO_2/TJ$	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Fuel Oil	Liquid Fuels	CO2 EF	$kgCO_2/TJ$	NA	Not available

Modern Breweries | Natural Gas (Dry) | 57

Technology			CO2			
Type of Technology	Technology penetration (%)	Consumption (TJ)	CO2 Emission Factor (kg CO2/TJ)		Amount Captured (Gg CO2)	CO2 Emissions (Gg CO2)
T	P	C=TC*(P/100)	EF(CO2)		Z	CO2=C*EF (CO2)/10^6-Z
Unspecified	100	57	Specified	55,300		3.1521

Emission Factor INPUT

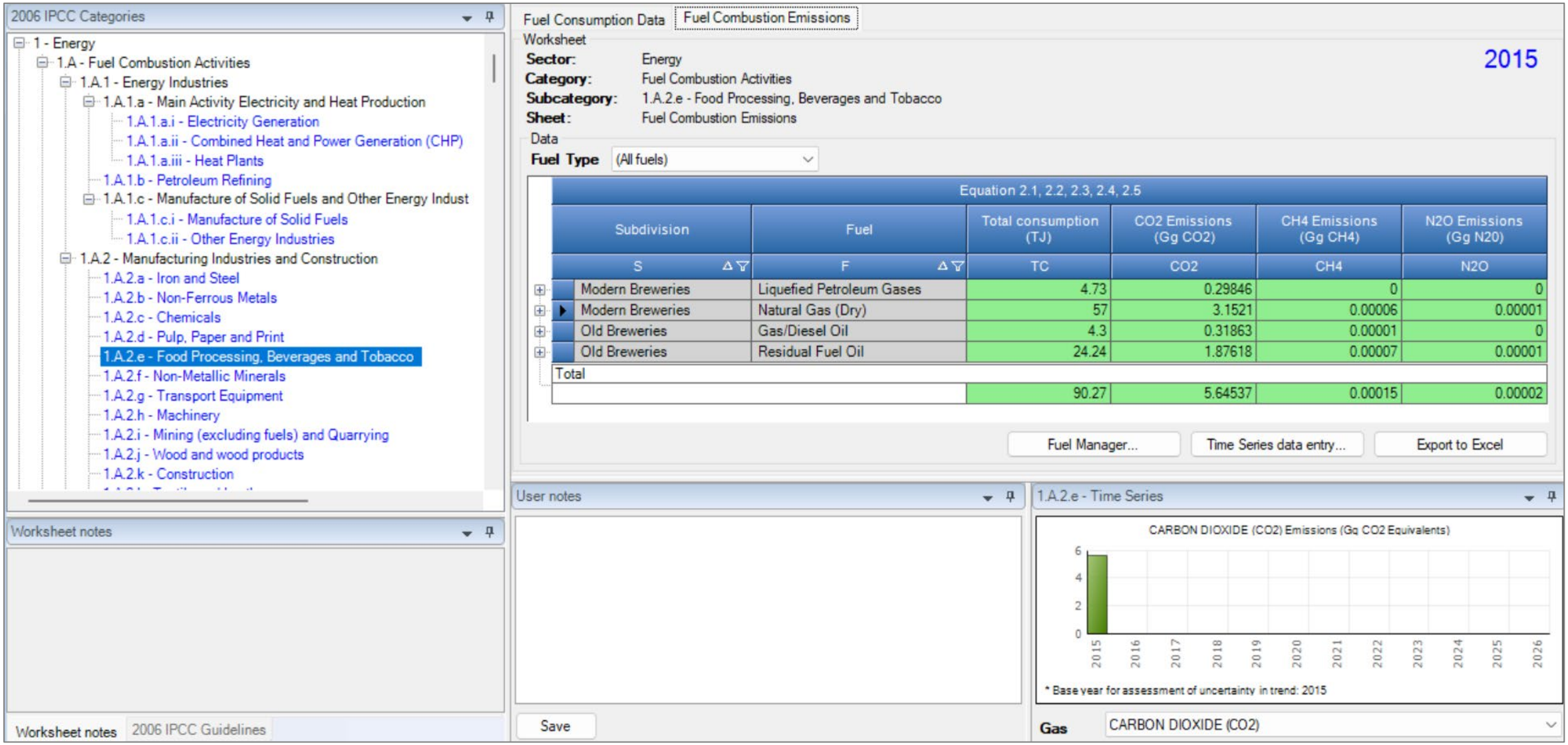
CH4 Emission Factor									
Category	**Sub-category**	**Product**	**Subdivision**	**Fuel**	**Fuel Type**	**Parameter**	**unit**	**2015**	**Source**
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	LPG	Liquid Fuels	CH4 EF	$kgCH_4/TJ$	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	Natural Gas	Gaseous Fuels	CH4 EF	$kgCH_4/TJ$	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Diesel Oil	Liquid Fuels	CH4 EF	$kgCH_4/TJ$	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Fuel Oil	Liquid Fuels	CH4 EF	$kgCH_4/TJ$	NA	Not available
N2O Emission Factor									
Category	**Sub-category**	**Product**	**Subdivision**	**Fuel**	**Fuel Type**	**Parameter**	**unit**	**2015**	**Source**
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	LPG	Liquid Fuels	N2O EF	kgN_2O/TJ	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Modern Breweries	Natural Gas	Gaseous Fuels	N2O EF	kgN_2O/TJ	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Diesel Oil	Liquid Fuels	N2O EF	kgN_2O/TJ	NA	Not available
1.A.2.e - Food Processing, Beverages and Tobacco	Beverages Sector	Beer	Old Breweries	Fuel Oil	Liquid Fuels	N2O EF	kgN_2O/TJ	NA	Not available

Modern Breweries	Natural Gas (Dry)	57	3.1521	

Technology			CO2				CH4		
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)	N
T	P	C=TC*(P/100)	EF(CO2)		Z	CO2=C*EF(CO2)/10^	EF(CH4)	CH4=C*EF(CH4)/10^6	
Unspecified	100	57	Specified	55,300		3.1521	1	0.00006	
							Default Value	Lower limit	Upper limit
Total							1	0.3	3

kg/TJ

Results in Worksheets



CRT – Background Tables

Sector: Energy | Year: 2015 | Refresh values | Update mode | Current year (2015)

Table1 | Table1.A(a)s1 | Table1.A(a)s2 | Table1.A(a)s3 | Table1.A(a)s4 | Table1.A(b) | Table1.A(c) | Table1.A(d) | Table1.B.1 | Table1.B.2 | Table1.C | Table1.D

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY

Fuel combustion activities - sectoral approach (Sheet 2 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS		
	Consumption	NCV/GCV (5)	CO2 (1)	CH4	N2O	CO2 (2,3)	CH4	N2O
	(TJ)		(t/TJ)	(kg/TJ)	(kg/TJ)	(kt)	(kt)	(kt)
1.A.2.e. Food processing, beverages and tobacco	90.27	NCV				5.645369	0.00014735	0.0000233
Liquid fuels	33.27	NCV	74.94045687	2.71565975	0.52891494	2.493269	0.00009035	0.0000176
Solid fuels	NE	NCV	NE	NE	NE	NE	NE	NE
Gaseous fuels (6)	57	NCV	55.3	1	0.1	3.1521	0.000057	0.0000057
Other fossil fuels (7)	NE	NCV	NE	NE	NE	NE	NE	NE
Peat (8)	NE	NCV	NE	NE	NE	NE	NE	NE
Biomass (3)	NE	NCV	NE	NE	NE	NE	NE	NE

Support Materials

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO
UN environment programme

Support – Where to turn for help

IPCC Guidelines | *the foundation of it all*
Your technical reference for methods, tiers, and decision trees.

User Manual | *the essential guide to the Software*
A full walkthrough of how to operate the IPCC Inventory Software. *[new friendly ppt format]*

Sectoral Guidebooks | *step-by-step help for each sector*
Category-specific manuals that include IPCC equations, worksheet logic, and detailed examples.

Inventory Team | *collaborate with colleagues*
Coordinate across your team — others may already have the data or experience you need.

IPCC Software's User Community | *You're part of a growing network*
Ask questions, learn from others, and share your experience.

Sectoral Guidebooks

Sectoral Guidebooks give you everything in one place — technical background, category-specific guidance, and a step-by-step path to get the job done.

Follow them, and you'll be able to estimate emissions for any category in your sector — confidently and correctly.

All the relevant information

SOURCE & SINKS

IPCC Guidance for the source/sink category

GHGs

Relevant GHG's for the source/sink category

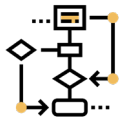
IPCC EQUATIONS

a list of relevant equations from the IPCC Guidelines

SOFTWARE WORKSHEETS

a short description of the relevant Software worksheets

Detailed Procedure



CATEGORY FLOWCHART

a schematical diagram of workflow

ACTIVITY DATA INPUT

guidance on input of AD in category's worksheets

EMISSION FACTOR INPUT

guidance on input of EFs in category's worksheets

RESULTS

any issues related to the results of estimation

Join the IPCC Software User Community

What it is

A **collaborative online spac** connect, ask questions, share solution

What you'll find there

- Peer Support – Ask questio
- Community Discussions –
- Guides & FAQs – Easily acc
- News & Updates – Stay info
- Feedback Channel – Help s

How to join

- Access is via Microsoft Tea
- Complete the registration form: [QR code]

Still need help? Reach out directly.

If you encounter technical issues with the **Software** or trouble accessing the **User Community**, you can always reach us by

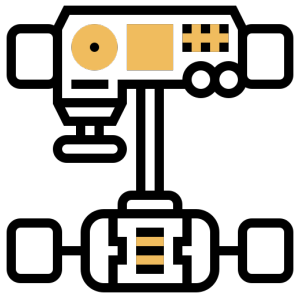
Email: ipcc-software@iges.or.jp

We'll do our best to support you.

Wrap-up

Designed to Support at Every Step

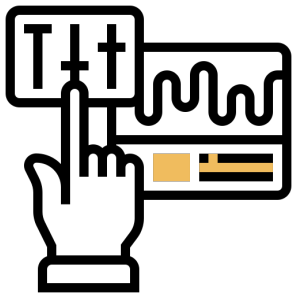
Think of it as your Inventory assembly line using the IPCC Inventory Software:



You start Strong

Worksheets, IPCC defaults, and structure already in place — you're never starting from zero.

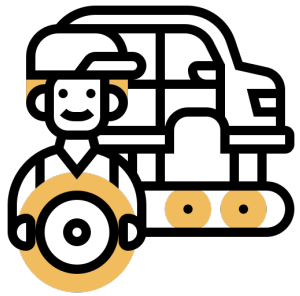
You're already rolling with a powerful engine.



Tailor to your Country

Data Managers help you integrate your national data, factors, and assumptions.

Fine-tune it to match your terrain



Error-Proof your Work

Built-in checks and logic avoid calculation errors and ensure methods are applied consistently.

Your alignment is spot on — no wobbles here.

Submit with Confidence

Outputs align with the 2006 IPCC Guidelines and UNFCCC MPGs — ready for ETF upload.

Tested, inspected, and cleared for the road.

The **IPCC Inventory Software** won't do all the work for you — but it will make **producing** a **high-quality**, **guideline-consistent GHG inventory** far **easier**.

Key Takeway

The Software doesn’t replace the Guidelines it makes them operational.

- **The IPCC Guidelines** explain how to estimate emissions.
- **The IPCC Inventory Software** helps you organize, apply, and report those estimates.
- The more you *connect both*, the easier it becomes to **update**, **review**, **and improve** your inventory.

From learning to fishing…

- You now ***understand*** what the Software *does*, how it's *structured*, and *where to find help*.
- **Start simple**: pick one category, follow the guidance and explore step by step.
- Each cycle *builds your confidence* and improves your inventory.
- There are plenty **support materials**: manuals, guidebooks, auxiliary resources and the user community – all there to help.

THANK YOU

FOR YOUR ATTENTION

STAY IN TOUCH

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STAY CONNECTED

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