



# *SMART Plus* Database Application: User's Manual

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*Version 1.0*

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## 1. Starting the *SMART Plus* Database Application “Facility DB”

To start the *SMART Plus* Database application, download and then double click the SMART Plus – Facility DB.accdb file. The application’s Main form will be displayed on the screen.

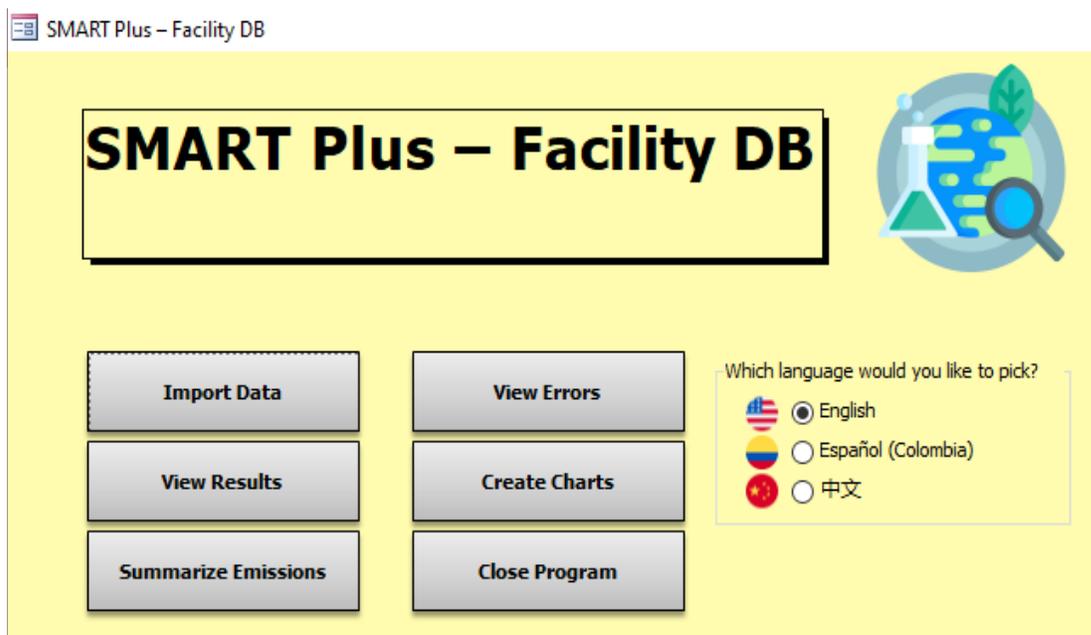
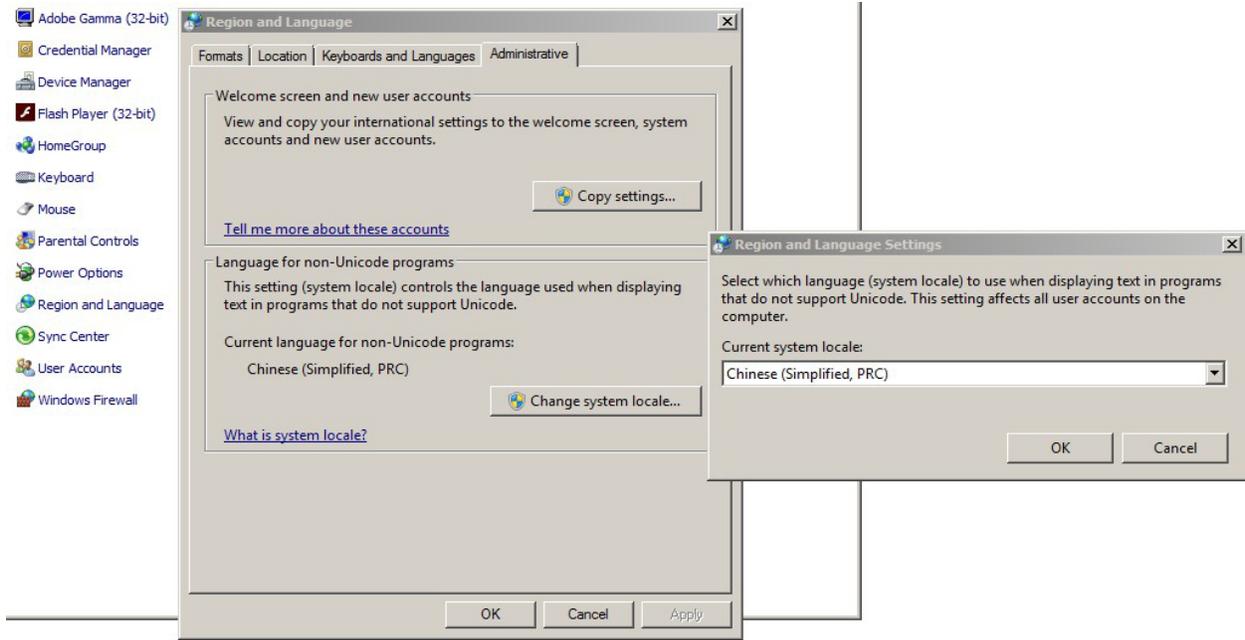


Figure 1. SMART Plus – Facility DB Main form

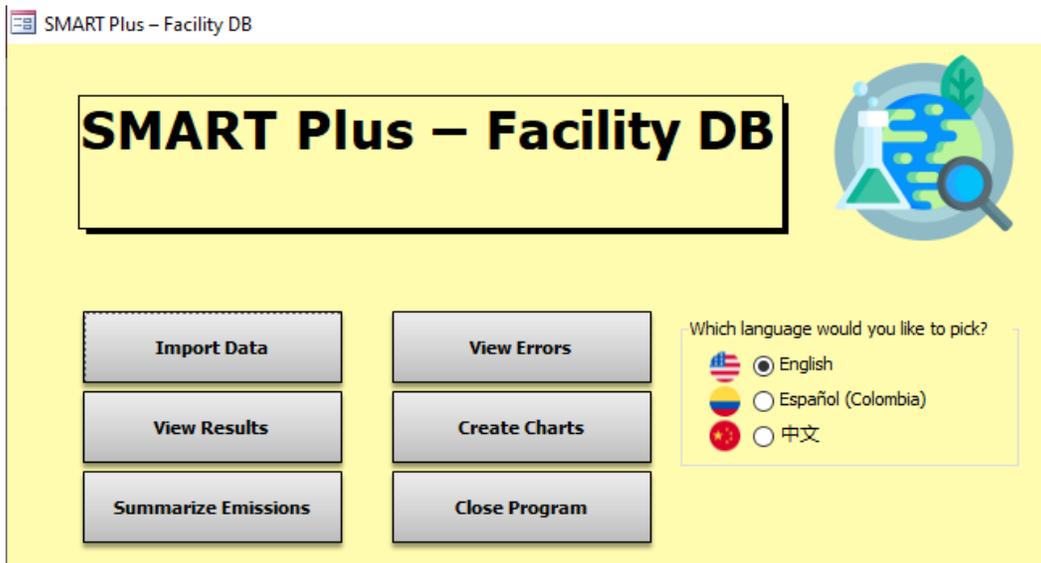
Please note: The *SMART Plus* Database can be viewed in English, Spanish, or Chinese. If you wish to view Chinese characters in the tables you will need to change **Language for non-Unicode programs** to **Chinese (Simplified, PRC)** by opening *Control Panel* -> *Region and Language* -> *Administrative Tab* -> *Change system locale* -> *Chinese (Simplified, PRC)* -> *OK*. Select **Yes** when asked to restart your computer so the new setting can take effect after a successful restart. See Figure 1a below.



**Figure 1a. Region and Language settings**

## 2. Selecting a Language

You can select one of three languages (English, Spanish, or Chinese) and the language on the application will change accordingly:



**Figure 2. Language selection menu on the right-hand side; English selected**



Figure 3. Language selection menu on the right-hand side; Spanish selected



Figure 4. Language selection menu on the right-hand side; Chinese selected

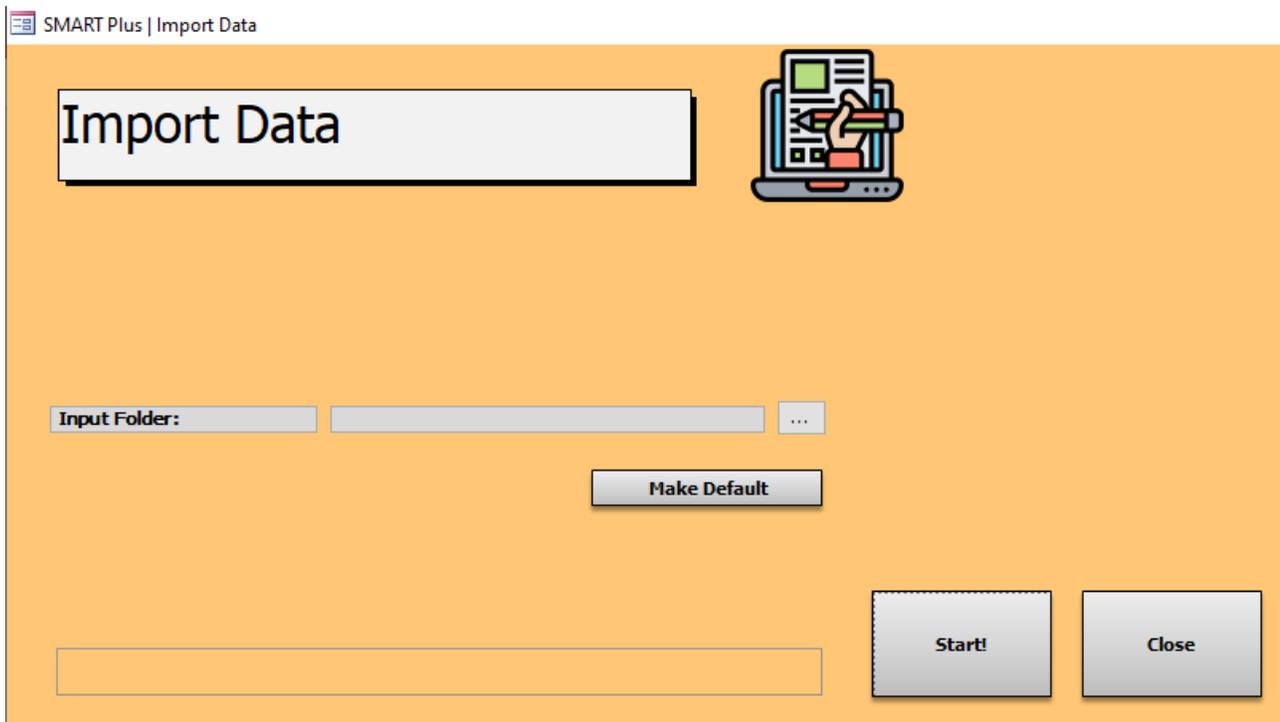
### 3. Selecting a Task

You can select from the following options from the Main form in the Database:

- Import Data from *SMART Plus* Facility template files (**Import Data** button)
- View calculated emissions results from imported *SMART Plus* Facility templates (**View Results** button)
- View errors encountered during import process (**View Errors** button)
- Summarize emissions by Year / Company / Facility / Industry Segment/ Facility Type / Source Category (**Summary** button)
- Create various charts (**Create Charts** button)
- Create IPCC Tier 2 emission factors (**IPCC** button)
- Close the form (**Close Program** button)

#### 3.1 Import Data

To import *SMART Plus* Facility templates, click the **Import Data** button; then, the Import Data form will appear.



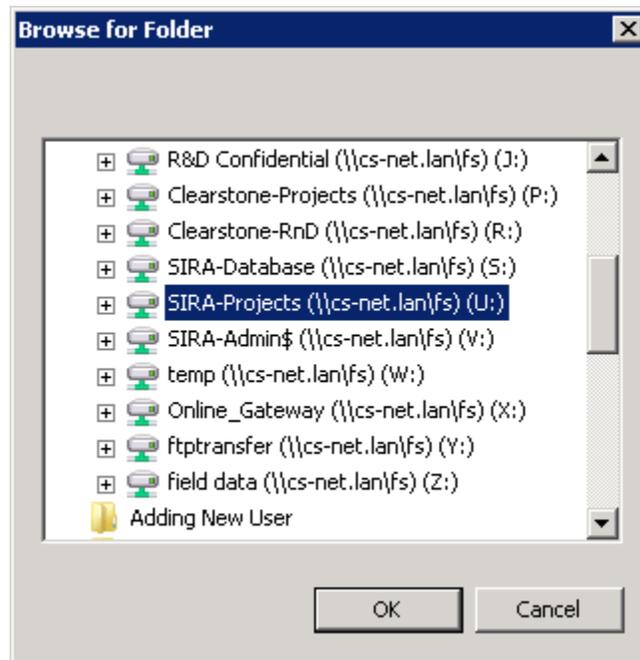
**Figure 5. *SMART Plus* Database Import form**

If you have not already done so, save all *SMART Plus* Facility templates to the same folder on your computer

Before starting the import operation, ensure that the folder containing the *SMART Plus* Facility templates is properly selected and displayed in the Input Folder text box. To browse for this

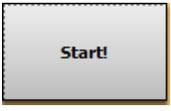
folder, click on the Browse button .

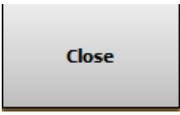
When the 'Browse for Folder' dialog box appears, navigate to the folder containing *SMART Plus* Facility templates and click OK to select it.



**Figure 6. Browse for Folder dialog box that will appear when browsing for the correct import folder. Navigate to the file location where you have saved the *SMART Plus* Facility templates you wish to import.**

To make the selected folder the default, click on the Make Default button  and select **Yes**, when prompted to make entered location the default.

To start importing files, click on the Start button .

To close the form and return to Main form, click on the Close button .

As files are imported, three separate, sequential actions occur which do not require further input from the user:

#### Scan Format Operation

First, the *SMART Plus* Database will scan through all the *SMART Plus* Facility templates and check if all necessary tabs are present in each of the files and if there are any corrupted files (i.e., files containing incorrect formatting).

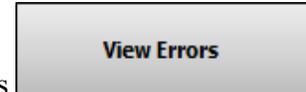
#### Test Operation

Then, the application will test if all the required fields in the *SMART Plus* Facility templates are properly filled and, if not, display an error message to that effect.

### Import Operation

Finally, after successfully completing the test operation, the application will proceed with importing all required data from the *SMART Plus* Facility templates into the Database. Once this import phase is completed, a message will appear indicating that the emission results may now be viewed by returning to the MAIN form and selecting View Results button.

### 3.2 View Errors



To view errors encountered during import phase click on the View Errors button. Errors form will appear on the screen as shown in Figure 7 below.

Errors			
Comm	Error	Added	
1	Could not find any of required tab names		
2	Missing data	Yes	
3	Incorrect file format		
4	Incorrect data format		
5	Double record (skipped row)		
0			

**Figure 7. Example Errors form**

If errors are found during import process, column “Added” will be filled with ‘Yes’ as shown above for error with description ‘Missing Data’. To view all the errors, click on the ‘+’ sign next to the comment. A new window will pop down showing the Files and Sheets containing errors as well as the Error Description as shown in the Figure 8.

Errors			
Comm	Error	Added	
1	Could not find any of required tab names		
2	Missing data	Yes	
	Unit	File	Sheet
	English	FLEET_import_test.xlsx	Setup - Facility Assessment
	English	FLEET_import_test.xlsx	Setup - Facility Assessment
	English	FLEET_import_test.xlsx	Setup - Facility Assessment
	English	FLEET_import_test.xlsx	Setup - Facility Assessment
			Error Description
			Missing Activity Application C34
			Missing Activity Type D25
			Missing Processes Quantity E59
			MissingGas Composition CH4 ContentE84
3	Incorrect file format		
4	Incorrect data format		
5	Double record (skipped row)		
0			

**Figure 8. Example error description**

### 3.3 View Results

After successfully importing the *SMART Plus* Facility templates, you can view results by clicking on the **View Results** button on the **MAIN** form. The View Results form will then be displayed on the screen.

The screenshot shows the 'View Results' form with a blue header and a circular refresh icon. Below the header are four filter boxes: 'Select Company:' (ABC Oil & Gas), 'Select Year:' (2021, 2022), 'Select Facility:' (Compressor Station No. 1, Compressor Station No. 2), and 'Select Source Category:' (a list of categories including Pneumatic Devices, Process Venting, Recycled and Utilized Emissions, Wells / Casing Wells, and Wells / Workovers). A 'Reset' button is located to the right of the filter boxes. Below the filters is a table with the following columns: Year, Company Name, Facility Name, Source Category, Industry Segment, Facility Type, and Accounting. The table contains 20 rows of data for the year 2021, all from 'ABC Oil & Gas' and 'Compressor Station No. 1'. The 'Source Category' and 'Accounting' columns vary across rows. Below the table is a 'Switch view:' section with 'Detailed' (selected) and 'Brief' options, and a 'Close' button.

Year	Company Name	Facility Name	Source Category	Industry Segment	Facility Type	Accounting
2021	ABC Oil & Gas	Compressor Station No. 1	Acid Gas Removal	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Flaring & Venting (Hydrocarbon Gas)	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Fuel Combustion / Liquid Fuels	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Fuel Combustion / Solid Fuels	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Fugitive Equipment Leaks	Gas Transmission	Sales Meter Station	Included Contr
2021	ABC Oil & Gas	Compressor Station No. 1	Gaseous Fuels / Heaters and Boilers	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Gaseous Fuels / Reciprocating Engines	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Gaseous Fuels / Turbine Engines	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Indirect Emissions from Power & Heat Purchases	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Inspection & Maintenance Activities / Equipment Depre	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Mishaps	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Pneumatic Devices / Chemical Injection Pumps	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Pneumatic Devices / Compressor Starts	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Pneumatic Devices / Pneumatic Controllers	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Process Venting / Dehydrators	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Process Venting / Sweetening Units	Gas Transmission	Sales Meter Station	Included
2021	ABC Oil & Gas	Compressor Station No. 1	Process Venting / Tanks	Gas Transmission	Sales Meter Station	Included

Figure 9. View Results form

You can filter results by specific company, year, facility, or source category by clicking on the appropriate entry in the list boxes.

This close-up shows the filter selection boxes. 'Select Company:' has 'ABC Oil & Gas' selected. 'Select Year:' has '2021' selected. 'Select Facility:' has 'Compressor Station No. 1' selected. 'Select Source Category:' has 'Acid Gas Removal' selected. A 'Reset' button is visible at the bottom right.

Figure 10. Selection part of the View Results form

Note that the ‘Detailed’ section of the form will be updated according to the option(s) you select in the list boxes. In the example below, the selections made are “ABC Oil & Gas” for Company, 2022 for Year, Compressor Station No. 1 for Facility and Acid Gas Removal for Source Category so the ‘Detailed’ section shows calculated CH<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub>O, CO<sub>2e</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub> and NMVOC emissions for that selection as well as Industry Segment, Facility Type, Accounting information (as shown on Figure 11 below).

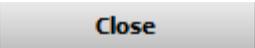
The screenshot shows a software interface with four selection boxes at the top: 'Select Company:' (ABC Oil & Gas), 'Select Year:' (2022), 'Select Facility:' (Compressor Station No. 1), and 'Select Source Category:' (Acid Gas Removal). Below these is a 'Reset' button. The main area is a table with the following data:

Facility Name	Source Category:	Industry Segment	Facility Type	Accounting	CH4	CO2
Compressor Station No. 1	Acid Gas Removal	Gas Storage	Storage Well	Included	0.990509274973442	20568.126120

At the bottom, there is a 'Switch view:' section with two radio buttons: 'Detailed' (selected) and 'Brief'. A 'Close' button is also present.

**Figure 11. Detailed section for “Compressor Station No. 1” example**

To reset all the selection boxes, click on the **Reset** button .

To close the form and return to the MAIN form click the **Close** button .

To switch the view of the ‘Worksheet section’ from **Detailed** to **Brief**, use the option box shown below.

The image shows a close-up of the 'Switch view:' section. It contains two radio buttons: 'Detailed' (which is selected) and 'Brief'.

**Figure 12. Option box Switch view**



**Summarize Emissions**

Select a criterion for summarization and click **Summarize Emissions** button

A table showing the summarized emissions will appear as shown in Figure 15.



Year	CH4 Total	CO2 Total	N2O Total	CO2E Total	NOx Total	CO Total	NMVOG Total	SO2 Total
2022	33727.2578536652	2355587.69655316	0.910407104337448	3300192.17433844	58714.6297162602	6763.78566193713	28737.9205232251	64672.4424139219
2023	36927.0553044005	2821339.36661951	1.56603644228434	3855711.91532993	70219.2974031836	7762.32495818616	32557.4985613942	154321.063914011

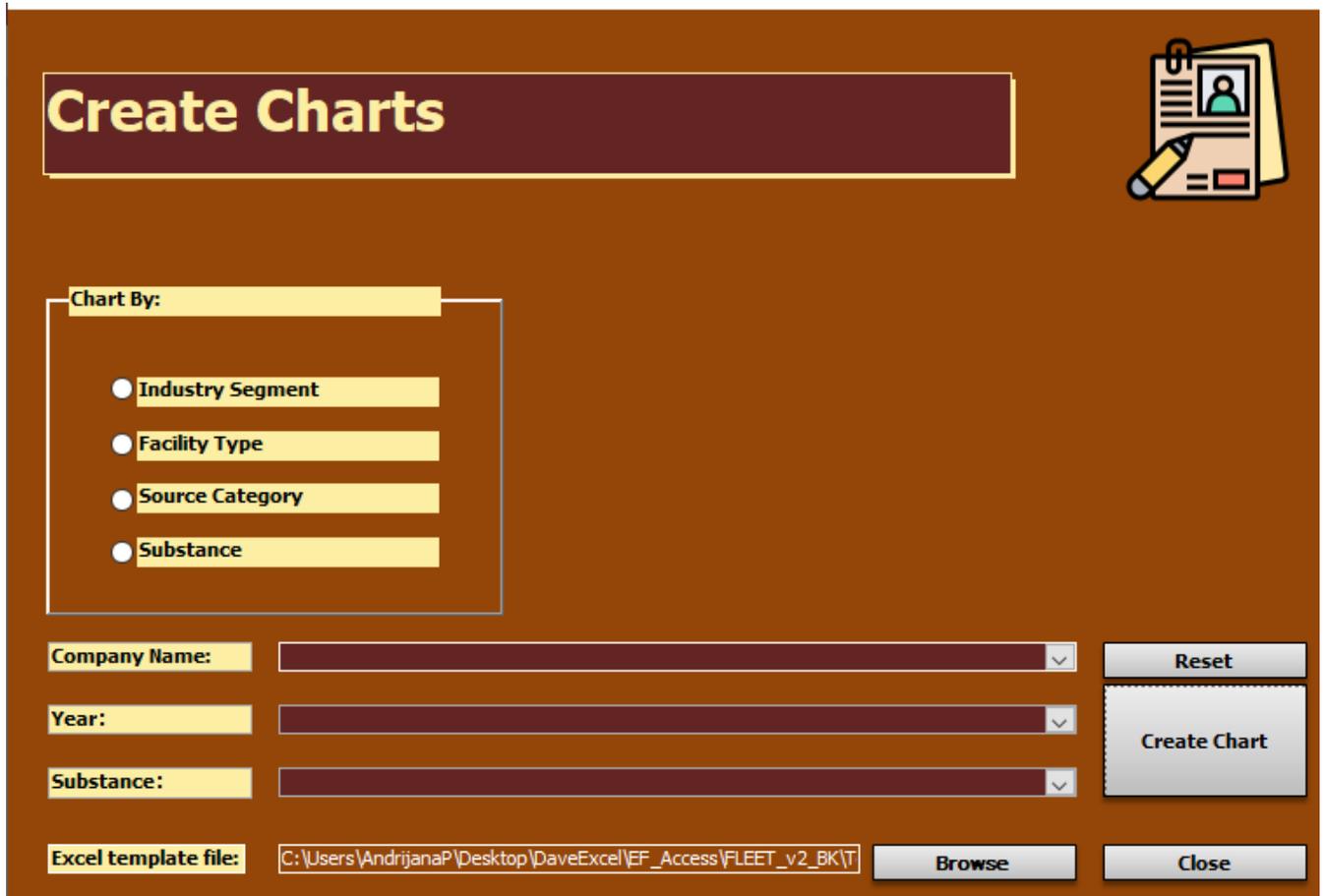
**Figure 15. Summarized emissions by year (2022 and 2023 in this example)**

### 3.5 Chart Creation

**Create Charts**

To create a chart, click on the **Create Charts** button on the Main form.

The Chart form will then be displayed on the screen as shown below.



**Create Charts**

**Chart By:**

- Industry Segment
- Facility Type
- Source Category
- Substance

**Company Name:** [Dropdown]

**Year:** [Dropdown]

**Substance:** [Dropdown]

**Excel template file:** C:\Users\AndrijanaP\Desktop\DaveExcel\EF\_Access\FLEET\_v2\_BK\T [Browse]

**Reset** **Create Chart** **Close**

**Figure 16. Create Charts form**

You can create charts by Industry Segment, Facility Type, Source Category and Substances. To create charts, the *Excel template file* text box must point to the exact location of the *Emissions Summary* Excel sheet.

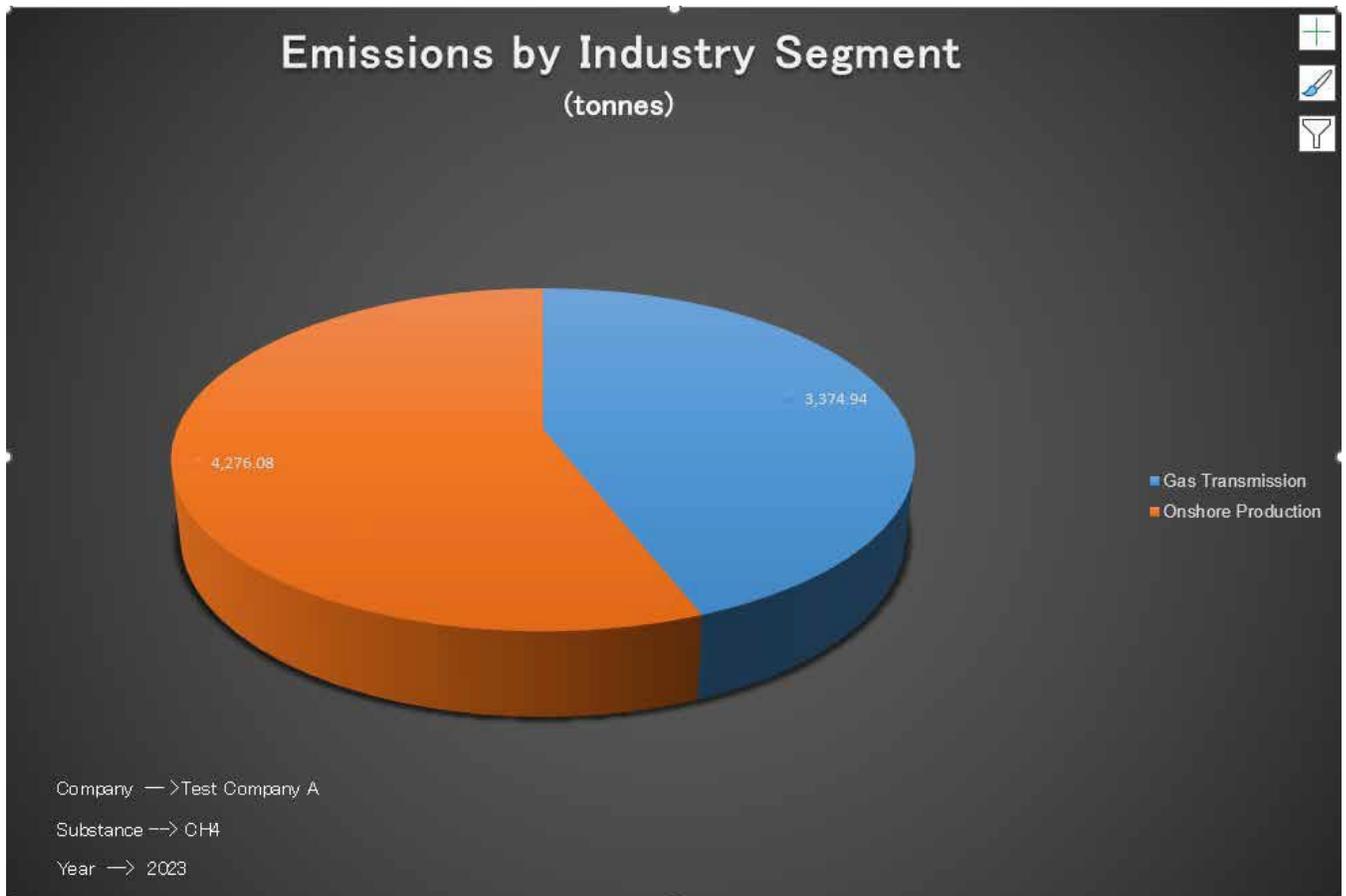
It is recommended to select the same folder where your called *SMART Plus* Facility templates are saved. Click the Browse button and navigate to the file if its location changes over time.

To create a chart first select the graph you want to be created in the *Chart By* option menu. Then, select company, year and substance from the respective boxes.

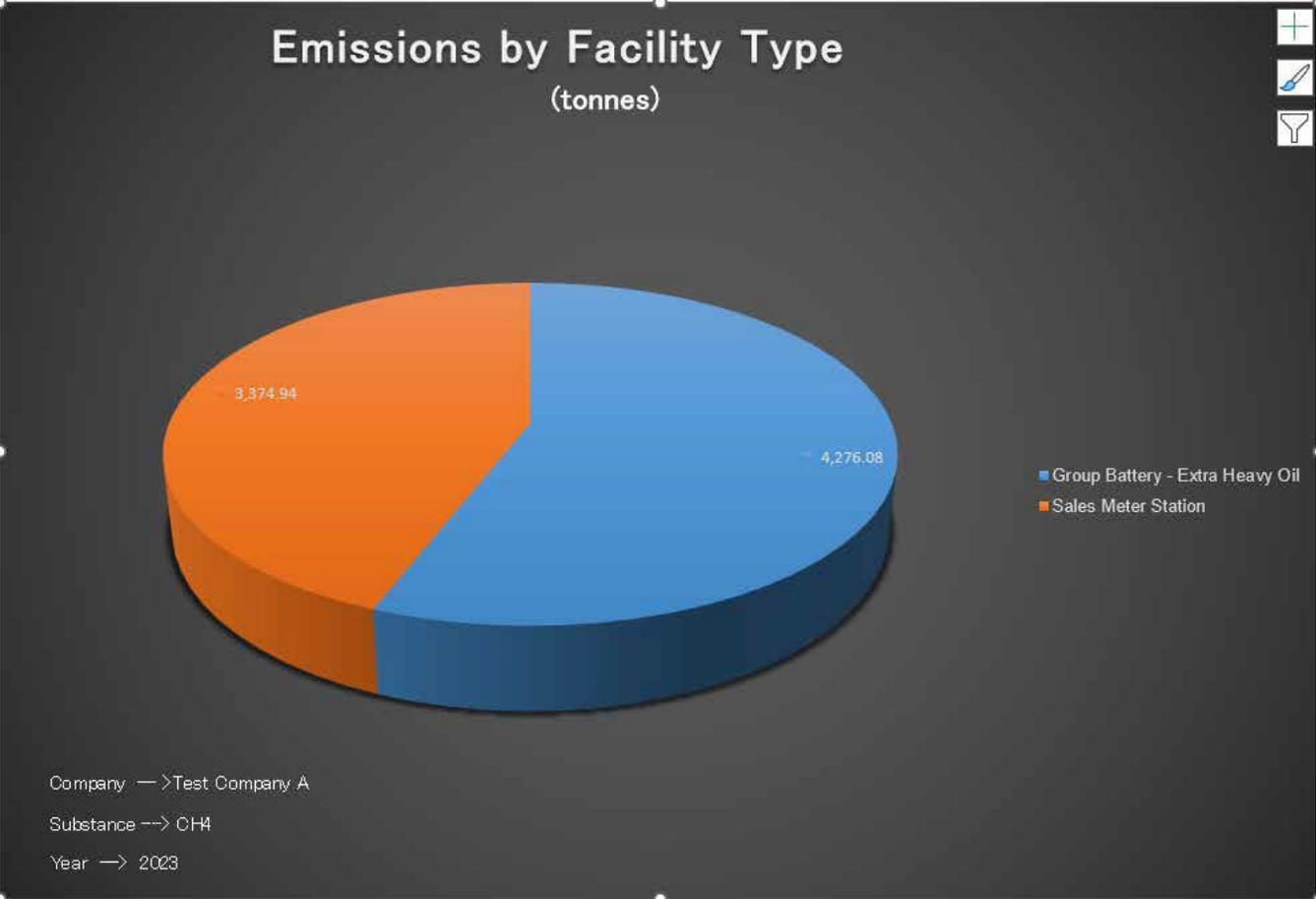
Please note that the content of combo boxes is updated according to the previously selected combo box settings (i.e. when you select Company, only the Years that apply to the Company will be displayed in the Year combo box).



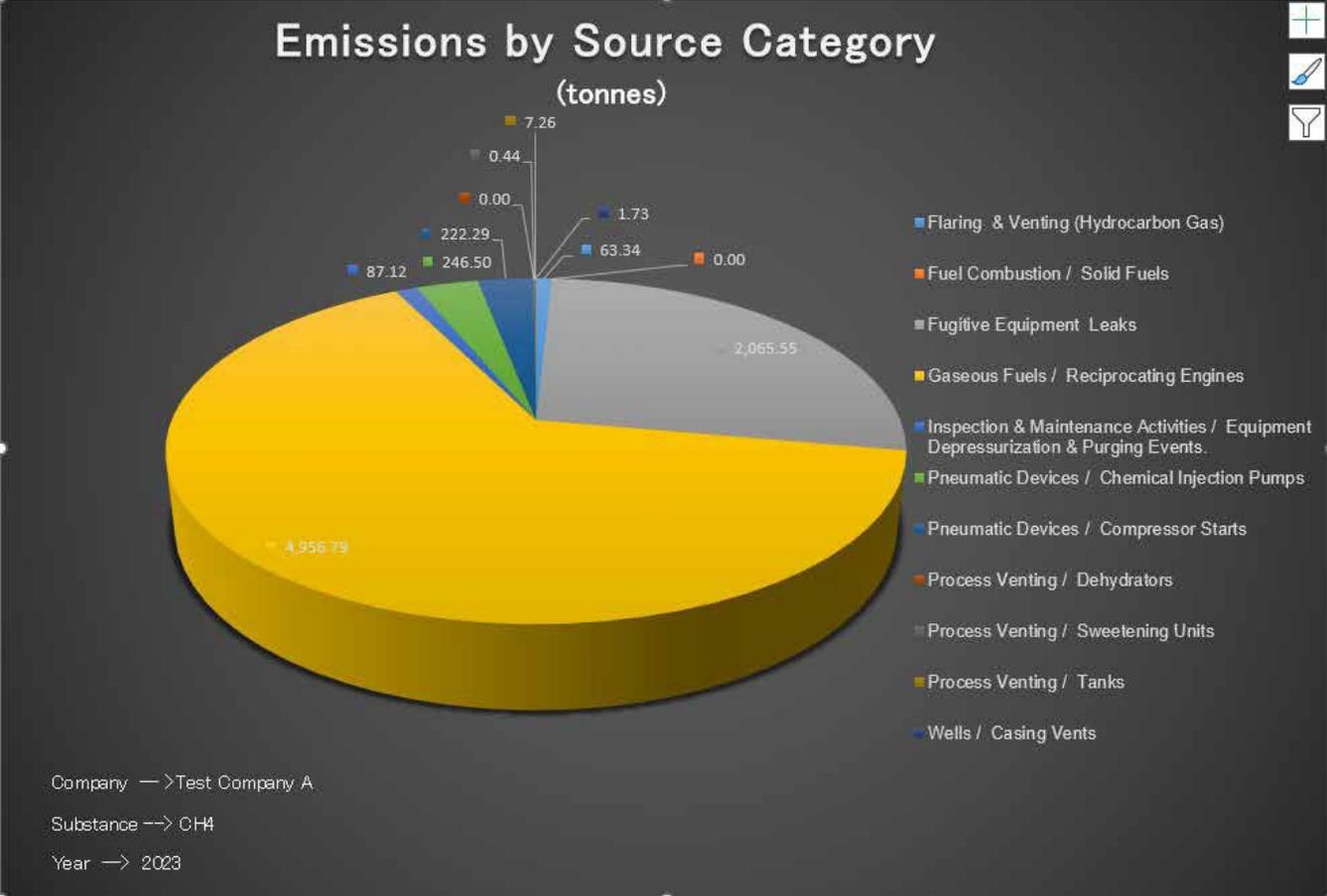
To create a chart, click on the CREATE CHART button on the **MAIN** form. Once the application finishes creating the chart it will display it on the screen as shown in the Figures 17, 18, 19 and 20.



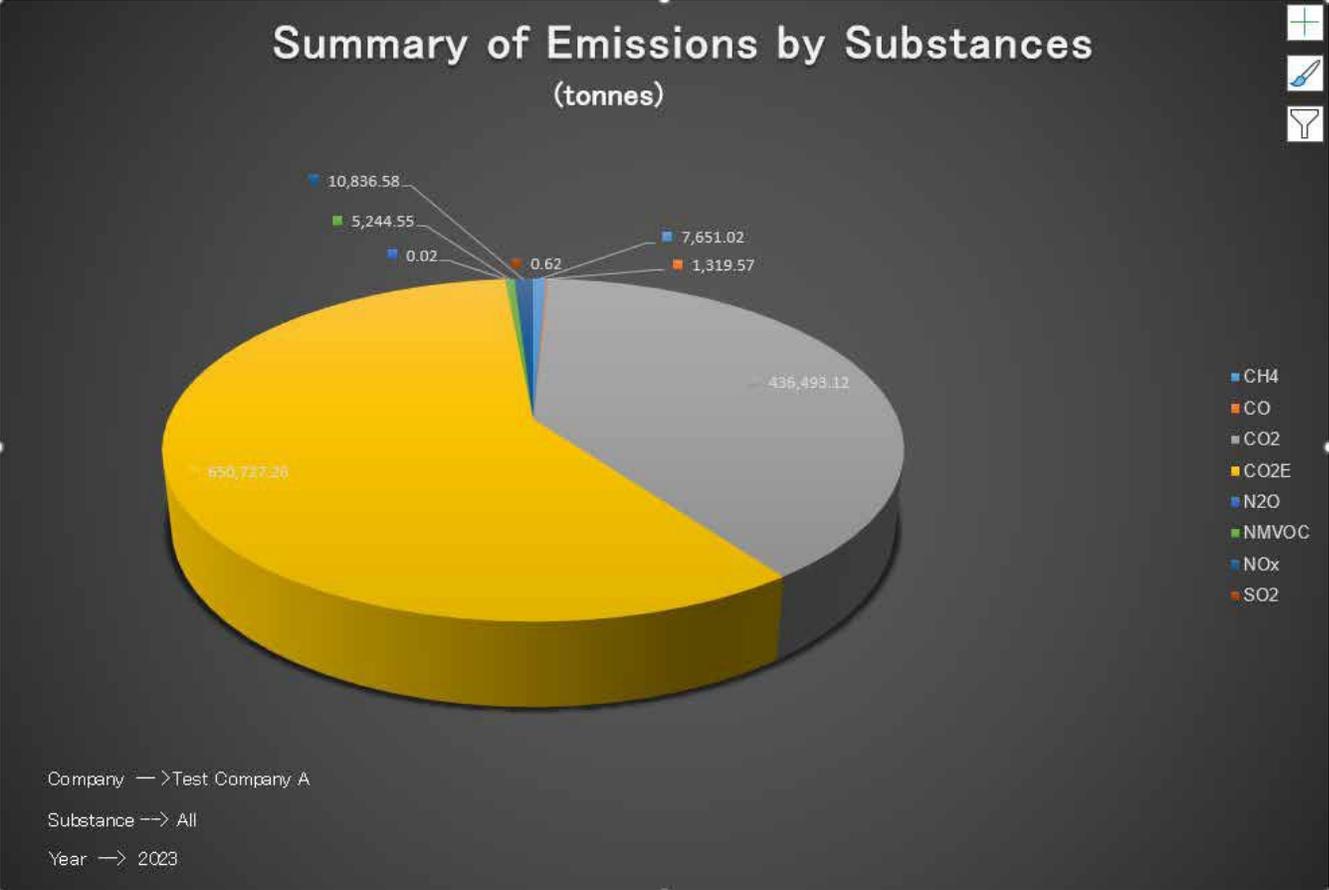
**Figure 17. Example Chart: Emissions by Industry Segment**



**Figure 18. Example Chart: Emissions by Facility Type**



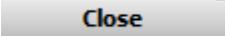
**Figure 19. Example Chart: Emissions by Source Category**



**Figure 20. Example Chart: Emissions by Substances**

You can save the created charts by using the Excel Save As option to any location on your computer’s drive.

To finish working with Charts and return to the Main form click on the **Close** button



### 3.6 Calculate Tier 2 emission factors

To calculate Tier 2 emission factors for each IPCC category, click the **IPCC** button on the **Main** form. This will open the IPCC form, as shown below.

The screenshot shows the IPCC form interface. At the top, there is a header with the text "IPCC". Below the header, there is a "Year 2" dropdown menu with "2024" selected and "2023" as an option. To the right of the year dropdown is a search bar labeled "IPCC Filter" and a button labeled "Export Tier 2".

Below the search bar, there are two buttons: "PREVIOUS" and "NEXT".

The main part of the form is a table with the following columns: Year, IPCC\_Category, IPCC\_Subcategory, Facility Type, Facility Count, TotalActivityValue, ActivityUnits, Method 1\*, and Method 2\*. The table contains 15 rows of data for the year 2024.

Year	IPCC_Category	IPCC_Subcategory	Facility Type	Facility Count	TotalActivityValue	ActivityUnits	Method 1*	Method 2*
2024	Gas Processing	Processing All	LNG Plant (liquefaction)	2	50.3	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Processing	Sour gas (acid gas removal)	Sour Gas Plant	22	2548.5	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Production and Gathering	Gathering	Compressor Station - Gas Gathering	0	0	300m <sup>3</sup> /y	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Gas Production and Gathering	Onshore All	Group Battery - Gas	0	0	300m <sup>3</sup> /y	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Gas Transmission and Storage	Transmission All	Compressor Station	0	0	300m <sup>3</sup> /y	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Oil Production and Upgrading	Onshore All	Single-Well Battery - Extra Heavy Oil	0	0	Well Count	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Oil Production and Upgrading	Onshore All	Group Battery - Extra Heavy Oil	5	325.50	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Processing	Processing All	LNG Plant (Liquefaction)	440	5470	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Processing	Sour gas (acid gas removal)	Sour Gas Plant	40	4685	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Production and Gathering	Gathering	Compressor Station - Gas Gathering	22	0	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Gas Production and Gathering	Onshore All	Group Battery - Gas	0	0	300m <sup>3</sup> /y	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Gas Transmission and Storage	Transmission All	Compressor Station	65	0	300m <sup>3</sup> /y	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Oil Production and Upgrading	Onshore All	Single-Well Battery - Extra Heavy Oil	544	8	Well Count	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2024	Oil Production and Upgrading	Onshore All	Group Battery - Heavy Oil	5	4540	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2024	Oil Production and Upgrading	Onshore All	Group Battery - Extra Heavy Oil	356	4543	300m <sup>3</sup> /y	<input type="checkbox"/>	<input checked="" type="checkbox"/>

At the bottom of the table, there is a footer with the text "Record 15 of 15" and a search bar. Below the footer, there is a "Close" button.

Method 1: Average EF determined based on total emissions and activity data for the input sample set of facilities.  
Method 2: Average EF derived based on the EFs determined by facility type (i.e., from the input sample sets of facilities), and weighted based on the national population of each facility type.

Figure 21. The IPCC Form

To calculate Tier 2 emission factors, start by selecting the year(s) whose data you want to include in the calculation. You can calculate emission factors using two different methods, which can be chosen by checking either **Method 1** or **Method 2**.

**Method 1:** This method calculates the average emission factor (EF) based on the total emissions and activity data for the selected set of facilities. It provides a general average for all included facilities.

$$EF = \frac{\sum_{i=1}^{i=N_f} E_i}{\sum_{i=1}^{i=N_f} A_i}$$

Where:

EF = the developed Tier 2 emission factor

E<sub>i</sub> = the emissions of a particular facility “i”

N<sub>f</sub> = the total number of facilities (regardless of type)

A<sub>i</sub> = the activity value for the facility “i” as determined from the Database

**Method 2:** This method calculates the average EF by determining the EF for each facility type within the selected sample set and then weights these based on the national population of each facility type. This approach accounts for the specific characteristics of different facility types.

**Method 2 Requirements:** If you select Method 2, you’ll need to enter values for **Facility Count** and **Total Activity Value** (these fields will be highlighted in yellow).

$$EF = \frac{\sum_{i=1}^{i=n} E_i * N_i}{A}$$

Where,

EF = the developed Tier 2 emissions factor for a given jurisdiction and industry segment

E<sub>i</sub> = average emissions per facility of each type “i” in the given industry segment based on the available data input to the database

N<sub>i</sub> = total population of facilities of type i in the given jurisdiction and industry segment

n = the number of different types of facilities in the given industry segment

A = total activity value for the given jurisdiction and industry segment based on national statistics

Once your selections are made, click the **Next** button . The application will display calculated emission factors for the categories and subcategories for available data in the database.

IPCC_Category	IPCC_Subcategory	EF_UNITS	CH4_EF	CO2_EF	N2O_EF	NOx_EF	CO_EF	NMVOC_EF	SO2_EF
Gas Processing	Processing All	tonnes/100ms3	336,360,59	3,599,29	0,00	0,00	0,00	34,396,41	0,00
Gas Processing	Sourgas (acid gas removal)	tonnes/100ms3	22,23	321,17	0,00	0,00	0,00	228,23	0,00
Gas Production and Gathering	Gathering	tonnes/100ms3	1,18	4,88	0,00	0,00	0,00	8,87	0,00
Gas Production and Gathering	Onshore All	tonnes/100ms3	1,78	0,29	0,00	0,00	0,00	6,74	0,00
Gas Transmission and Storage	Transmission All	tonnes/100ms3	0,04	0,00	0,00	0,00	0,00	0,01	0,00
Oil Production and Upgrading	Onshore All	tonnes/100ms3	31,28	0,04	0,00	0,00	0,00	9,41	0,00
Oil Production and Upgrading	Onshore All	tonnes/y/well	20,88	1,25	0,00	0,00	0,00	8,00	0,00

**Figure 22. Tier 2 emission factors**

**Note:** If you're not satisfied with the results, you can go back to the previous page by clicking the **Previous** button and make any necessary adjustments.

After successfully completing the calculations, you can export the developed emission factors to the **SMART Plus Tier 1/Tier 2 Reporting Template** tool as Tier 2 emission factors.



**Figure 23. Exporting Emission Factors to SMART Plus – IPCC Tool**

**To browse for the file:** Click the **Browse** button. When the **Browse for File** dialog box appears, navigate to the **SMART Plus – IPCC** file and select it.

**To start the export:** Click the **Export Tier 2** button.

To close the form and return to the **Main** form, click the **Close** button.