User's Manual

SMART Plus Tool
Facility Template

Simplified Methane Assessment and Reporting Tool (SMART Plus) – Facility Template

Global Methane Initiative

Leading methane action since 2004

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LIST OF ACRONYMS

Acronyms	Definition
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRT	Common Reporting Tables
GHG	Greenhouse Gas
GMI	Global Methane Initiative
IPCC	Intergovernmental Panel on Climate Change
LDAR	Leak Detection and Repair
MS	Microsoft
N_2O	Nitrous Oxide
NMVOC	Non-Methane Volatile Organic Compounds
NO_x	Nitrogen Oxides
SMART	Simplified Methane Assessment and Reporting Tool
SO_2	Sulfur Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
U.S. EPA	United States Environmental Protection Agency

LIST OF FIGURES

BACKGROUND

Methane emissions from oil and natural gas facilities contribute significantly to climate change. In accordance with enhanced transparency and reporting requirements under the Paris Agreement, countries must submit a national inventory of greenhouse gas (GHG) emissions, including methane, to the United Nations Framework Convention on Climate Change (UNFCCC) every one to two years, starting in 2024. Developing countries face challenges compiling GHG inventories and often apply default emission factors to national-level activity data to estimate annual emissions. This approach is considered "Tier 1" by the Intergovernmental Panel on Climate Change (IPCC), and often does not yield the most accurate emissions inventory results, as emissions can vary greatly not only by country, but also facility by facility. Refined emissions inventories, which could better inform climate policy and action for meaningful reductions of emissions, can be developed in many ways, including:

- Following an IPCC Tier 2 approach, which represents an improvement from Tier 1 by incorporating country-specific emission factors in place of default factors
- Following an IPCC Tier 3 or "bottom up" approach, which represents an improvement from Tiers 1 and 2 by compiling emissions estimates at the facility level and aggregating these into the national level estimate
- Applying the 2019 Refinement to the 2006 IPCC Guidelines to one or more IPCC source categories

The Simplified Methane Assessment and Reporting Tool, or *SMART Plus* tool ("the Tool"), developed by U.S. EPA and partially funded by the U.S. Department of State's Transparency Accelerator program to enhance national-level GHG inventories from developing countries, is designed to enable stakeholders to refine and/or improve GHG emissions estimates from oil and natural gas facilities. "*Plus*" indicates that the Tool conducts similar assessments for emissions of other gases in addition to methane, such as carbon dioxide. There are three components to the *SMART Plus* tool:

- The *SMART Plus* Facility template, which is aligned with IPCC Tier 3 methodology
- The *SMART Plus* Database application
- The *SMART Plus* IPCC Tier 1/Tier 2 Reporting template, which is aligned with IPCC Tier 1 and Tier 2 methodology

This manual is intended to guide the user through a process for filling out the IPCC Tier 3-aligned *SMART Plus* Facility templates only. Separate manuals provide guidance to the user for:

- Importing and aggregating multiple Facility templates into the *SMART Plus* Database application, and
- Filling out the separate IPCC Tier 1/Tier 2-aligned *SMART Plus* IPCC Tier 1/Tier 2 Reporting template

WHAT IS THE *SMART Plus* FACILITY TEMPLATE?

The *SMART Plus* Facility ("Facility") template is one component of the *SMART Plus* Tool. The Facility template is a spreadsheet-based tool that accepts several types of user input and activity data for one specific facility defined by the user. The template then combines this activity data with pre-populated component counts and emission factors to determine a total emissions estimate for that user-defined facility (see Figure 1 below). Users have the option to input emissions data from direct measurements, which will override emission factor-based calculations and provide a more accurate emissions estimate.

The Facility template estimates emissions of methane (CH_4) and total carbon dioxide equivalent (CO_2e), as well as six other gases:

- Carbon dioxide (CO_2)
- Nitrous oxide (N_2O)
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Non-methane volatile organic compounds (NMVOCs)
- Sulfur dioxide (SO_2)

The Facility template calculates emissions by combining user-defined input data with built-in equipment component counts and default emission factors, which are summarized in Figure 1 below.

User Input Data	Function in the Facility template
Facility definition	Details basic information about the facility being assessed for emissions
Facility activity levels	As appropriate, multiplied by built-in: - **Equipment component counts**, sourced from the API Compendium, Canadian Association of Petroleum Producers (CAPP), and Clearstone Engineering (CEL) - **Fugitive emission factors**, sourced from the API Compendium and U.S. EPA GHGRP Subpart W - **Combustion emission factors,** sourced from U.S. EPA AP-42 and GHGRP Subpart C
Processes used at the facility	
Fuel use at the facility	
Flashing losses at the facility	
Measured emissions contributions	Will override emissions calculations for a given emissions source

Figure 1*:* User input parameters for the *SMART Plus* Facility template

Users of the Facility template must fill out a separate template for each individual facility at which they plan to estimate emissions. Multiple Facility templates can be aggregated into asset-, company-, or national-level estimates using another component of the *SMART Plus* tool, called the *SMART Plus* Database application ("the Database"). The Database is hosted in Microsoft Access, and more details are described in the separate Database-specific user manual.

Additional information on the equations and emission factors used in the Facility template, as well as the built-in facility definitions available to users, are found in the separate *SMART Plus* Technical Documentation.

WHO CAN USE THIS TOOL?

This Tool is intended to be used by national government stakeholders in developing countries who are responsible for compiling their national greenhouse gas (GHG) inventory for oil and gas systems in accordance with annual or bi-annual UNFCCC reporting requirements under the Paris Agreement and who aim to refine their oil and gas sector GHG inventory estimates by developing an IPCC Tier 2, or country-specific, emission factor. The Tool can also be used by company-level stakeholders in developing countries who wish to understand their company-wide or facility-level emissions profile.

OVERVIEW OF THE *SMART Plus* FACILITY TEMPLATE

Step 1: Open the *SMART Plus* Facility template.
Note: A different *SMART Plus* Facility template will need to be completed for <u>each</u> facility you wish to assess.

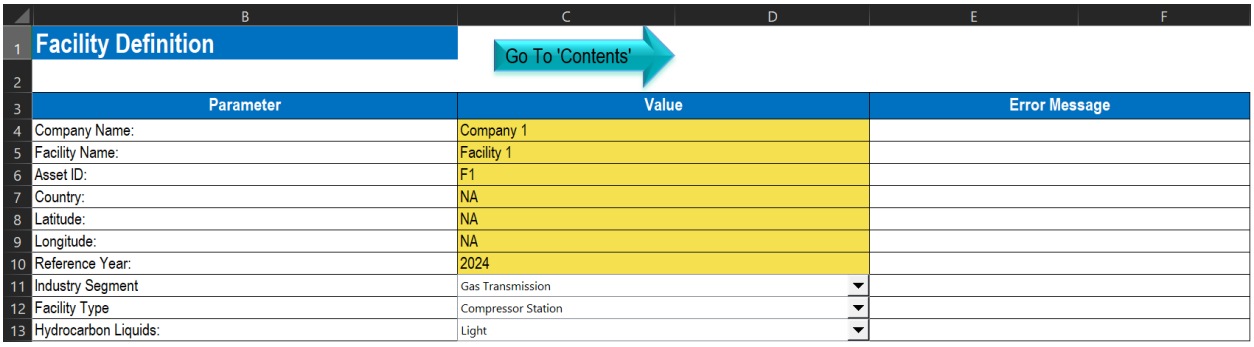
- It is recommended to save each unique Facility template in the same folder on your computer.

Step 2: Open the Language and User Guidance worksheet.

- Select your language from the dropdown menu in cell C2.
- An overview for general items such as navigation and guidance for facility selection and setup can also be found in this worksheet.

Step 3: Open the Setup – Facility Assessment worksheet to complete the following cells with your country's information (all cells for user input are indicated in yellow):

- To fill out FACILITY DEFINITION section (see Figure 2 below):
  - Input general company and facility information, as well as the reference year for the data you are using and other information, into Rows 4 through 10
  - In rows 11 through 13, select your facility's industry segment, facility type, and hydrocarbon liquids type from the corresponding dropdown menus.



	B	C	D	E	F
1	**Facility Definition**	Go To 'Contents'			
2					
3	**Parameter**	**Value**		**Error Message**	
4	Company Name:	Company 1			
5	Facility Name:	Facility 1			
6	Asset ID:	F1			
7	Country:	NA			
8	Latitude:	NA			
9	Longitude:	NA			
10	Reference Year:	2024			
11	Industry Segment	Gas Transmission			
12	Facility Type	Compressor Station			
13	Hydrocarbon Liquids:	Light			

Figure 2: View of "Facility Definition" section of the Setup-Facility Assessment worksheet.

In Figure 2 above, the user defines Facility 1 from Company 1 as a compressor station within the gas transmission segment.

- Then, fill out the FACILITY ACTIVITY LEVELS section as applicable (see Figure 3 below):
    - For rows 17 through 23, as applicable, input the corresponding value (Column D), then select the units of measure (Column E) as well as the source of that value (Column F).
    - For rows 25 through 30, as applicable, input the corresponding value (Column D) and select the units of measure (Column E) as well as the source of the value (Column F).

	B	C	D	E	F
15	**Facility Activity Levels**				
16	**Parameter**		**Value**	**Units of Measure**	**Source of Value**
17	Natural Gas Receipts:		12.2	E6 m3/d	Measured
18	Oil or Condensate Receipts:		22.3	E3m3/y	Measured
19	Produced Water Receipts:				
20	Flared Hydrocarbon Gas:				
21	Flared Acid Gas:				
22	Vented Hydrocarbon Gas:				
23	Vented Acid Gas:				
24		**Type**			
25	Electric Power Purchases:	Hydro Electric		MWh/y	
26		Coal-Fired Power Plant		MWh/y	
27		Natural Gas (Gas Turbine)		MWh/y	
28		Natural Gas (Combined Cycle)		MWh/y	
29	Heat Purchased: Steam:				
30	Heat Purchased: Hot Water:				

Figure 3: View of "Facility Activity Levels" section of the Setup-Facility Assessment worksheet

In Figure 3 above, data has been entered for natural gas receipts and oil or condensate receipts at this compressor station facility. The remaining parameters are left blank, as the user may have found these do not apply for this facility.

- Then, fill out the MEASURED EMISSIONS CONTRIBUTION section (see Figure 4 on the next page):
    - **Note: Measured values used as input in this section will override emissions calculations in this template for the respective parameter.** For example, user input in Column C, Row 35 (Measured Value for Emissions From Detected Leaks) will replace built-in, emission-factor based emissions calculations for equipment leaks. The user is encouraged to conduct targeted emissions measurement campaigns as often as practicable to produce more accurate emissions estimates for the purposes of refining greenhouse gas (GHG) inventories.
    - For rows 46 through 53, as applicable, input the measured value into Column C, then select the appropriate units of measure in Column D.
    - Select the appropriate emitted substance – methane or natural gas – from the dropdown in Column E.
    - Corresponding comments can be added as desired (for example, to note the results from a leak detection and repair, or LDAR, survey) in Column F.

	B	C	D	E
33	**Measured Emission Contributions (Values entered here override corresponding emission factor calculations)**			
34	**Parameter**	**Measured Value**	**Units of Measure**	**Emitted Substance**
35	Emissions From Detected Leaks			
36	Emissions From Compressor Seals	5.000	m3/h	Natural Gas
37	Emissions From Pits & Ponds			
38	Emissions From Associated Well Sites			
39	Emissions From Other Associated Offsite Installations			
40	Venting by Glycol Dehydrators			
41	Venting by Gas Sweetening Units			
42	Venting by Pneumatic Controllers			
43	Venting by Pneumatic Chemical Injection Pumps			
44	Venting by Other Sources			
45	Non-Flashing Losses from Storage Tanks			
46	Casinghead Venting			

Figure 4: View of "Measured Emission Contributions" section of the Setup-Facility Assessment worksheet.

In Figure 4 above, the user has entered results from a direct emissions measurement assessment of compressor seals at this facility. Other parameters in this section may not apply to this facility, so they are left blank.

- Then, fill out the PROCESSES USED AT THE FACILITY section (see Figures 5 and 6 on the next page):
  Note: The number of units (Column B) and corresponding rows to be filled out (Column C) in this section can vary greatly by facility. If your facility has several instances of a particular process type, you do not need to use multiple rows to indicate this. Instead, select that process from the dropdown menu in the "Process Type" column and then input the quantity of this process into column E. For example, if your facility has 10 conventional oil wells, select "Well: Conventional Oil" from the dropdown menu and then input a value of "10" in column E for that row.
  - For rows 51 through 70:
    - In each row, select a process from the "Process Type" column dropdown menu that applies to your facility. Then, input the quantity of this process type in Column E. Repeat for each unique process type used at this facility. **You do no need to complete every row if your facility only has a few process types.**
      - Note: The selections made in rows 11 through 13 of the FACILITY DEFINITION section will determine the available process type options to choose from in the dropdown menu.
    - Then, for process types that incorporate pneumatic devices, select the type of supply gas (natural gas or compressed air) from the dropdown menu in Column F and the type of controller (low-, high-, intermittent-, or no-bleed) from the dropdown menu in Column G.
    - Then, if applicable, input the percentage of operating time (Column H) and pressurized standby time (Column I).
      - If a particular process type does not incorporate pneumatic devices, select "not applicable" from these dropdowns.
    - If an error is identified by the program, it will be displayed in column K.

	B	C	D	E
48	**Processes Used at the Facility**			
49	**Unit No.**	**Process Type**		**Quantity**
50				
51	1	Aerial Cooler: Hydrocarbon Liquid Service		4
52	2	Power Generator: Natural Gas Fuelled (Driver: Gas Turbine)		7
53	3	Compressor: Reciprocating: (Stages: 2) (Driver: Electric Motor)		4
54	4	Separator: Vertical (Phases: 3)		1
55	5	Power Generator: Natural Gas Fuelled (Driver: Gas Turbine)		4
56	6	Compressor: Centrifugal: (Stages: 2) (Seals: Wet) (Driver: Gas Turbine)		7
57	7	Aerial Cooler: Hydrocarbon Liquid Service		4
58	8			
59	9			
60	10			
61	11			
62	12			
63	13			
64	14			
65	15			
66	16			
67	17			
68	18			
69	19			
70	20			

Figure 5: View of "Processes Used at the Facility" section of the Setup-Facility Assessment worksheet.

In Figure 5 above, the user has chosen the particular process types shown above that correspond to this facility, including aerial coolers, power generators, compressors, and a separator. Note that the total of 11 power generators at this facility are split into Row 52 (7 generators) and Row 55 (4 generators); this is an illustrative example of how the *SMART Plus – Facility* template can account for multiple rows of similar entries in this section.

	E	F	G	H	I	J
48						
49	**Quantity**	**Pneumatic Devices**		**Operating Time (Percentage)**		
50		**Supply Gas**	**Type of Controllers**	**Operating**	**Standby & Pressurized**	**Depressurized**
51	4	Natural Gas	Low-Bleed	55.00%	45.00%	0.00%
52	7	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
53	4	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
54	1	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
55	4	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
56	7	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
57	4	Natural Gas	Low-Bleed	50.00%	50.00%	0.00%
58						
59						
60						
61						
62						
63						
64						
65						
66						
67						
68						
69						
70						

Figure 6: Continued view of "Facility Activity Levels" section of the Setup-Facility Assessment worksheet.

Figure 6 corresponds to Figure 5 above. Note that since each selected process unit was determined by the user to be controlled by pneumatic devices, the user completed Columns F through I accordingly.

- Then, fill out the GAS COMPOSITIONS section (see Figures 7 and 8 below)
  - For rows 74 through 82:
    - As applicable for your facility, input the percent mol content of the available pollutants (CH_4, CO_2, N_2, H_2S) in Columns E through H. Then, select the source of these values (calculated, measured, or engineering judgement) from the dropdown in Column I.
    - If an error is identified by the program, it will be displayed in Column K.

	B	C	D	E
72	**Gas Compositions**			
73	**Stream**	**Molecular Weight of Gas Mixture**		**CH4 Content (mol%)**
74	Process Gas	18.63		87.00%
75	Fuel Gas	18.87		85.00%
76	Flared Hydrocarbon Gas:	18.81		86.00%
77	Vented Hydrocarbon Gas	18.63		87.00%
78	Flared Acid Gas:	35.29		10.00%
79	Vented Acid Gas	35.29		10.00%
80	Pneumatic Supply Gas (Natural Gas)	16.92		95.00%
81	Casinghead Vent Gas	20.30		80.00%
82	Product Vapours	23.02		63.00%

Figure 7: View of "Gas Compositions" section of the Setup-Facility Assessment worksheet

	F	G	H	I
72				
73	**CO2 Content (mol%)**	**N2 Content (mol%)**	**H2S Content (mol%)**	**Source of Values**
74	2.00%	1.00%	0.00%	Measured
75	0.50%	1.00%	0.01%	Measured
76	2.00%	1.00%	1.00%	Measured
77	2.00%	1.00%	0.00%	Measured
78	25.00%	1.00%	5.00%	Measured
79	25.00%	1.00%	5.00%	Engineering Judgement
80	0.00%	1.00%	0.00%	Engineering Judgement
81	5.00%	0.00%	0.00%	Engineering Judgement
82	0.00%	1.00%	0.00%	Engineering Judgement

Figure 8: Continued view of "Gas Compositions" section of the Setup-Facility Assessment worksheet

Figures 7 and 8 above show default values that are built into the template; users are encouraged to update these values with appropriate data that is relevant to their facility.

Step 4: Open the Setup –Fuel Use worksheet to estimate emissions from fuel combustion (all cells for user input are indicated in yellow).

- In this worksheet, you can choose to estimate combustion emissions at either the facility level or at the equipment/source level.
  - If you wish to estimate combustion emissions at the facility level, fill out the "FACILITY-LEVEL FUEL" USE SETUP section.

- If you wish you use equipment-level estimates to generate a facility-level combustion emissions estimate, scroll to the "FUEL ALLOCATION BY SOURCE TYPE" SETUP section and fill out the three subsections as applicable to your facility: Heaters & Boilers, Compressor Engines, and Generator Engines.

- **Note: Only fill out <u>one</u> of these two sections. If you accidentally fill out both, the facility level estimate will override the source level estimate, which could result in a less accurate combustion emissions profile.**
- To fill out the "FACILITY-LEVEL FUEL" USE SETUP section (see Figure 9 below):
  - If your facility consumes solid fuels, for rows 6-13, as applicable, enter your measured or reported amount of combusted fuel in Column D.
  - If your facility consumes liquid fuels, for rows 14-23, as applicable, enter your measured or reported amount of combusted fuel in Column D.
  - If your facility consumes gaseous fuels, for rows 24-30, as applicable, enter your measured or reported amount of combusted fuel in Column D.
  - Then, select your units of measure from the dropdown menu in Column G.
  - If there is an error message, it will appear in Column H.

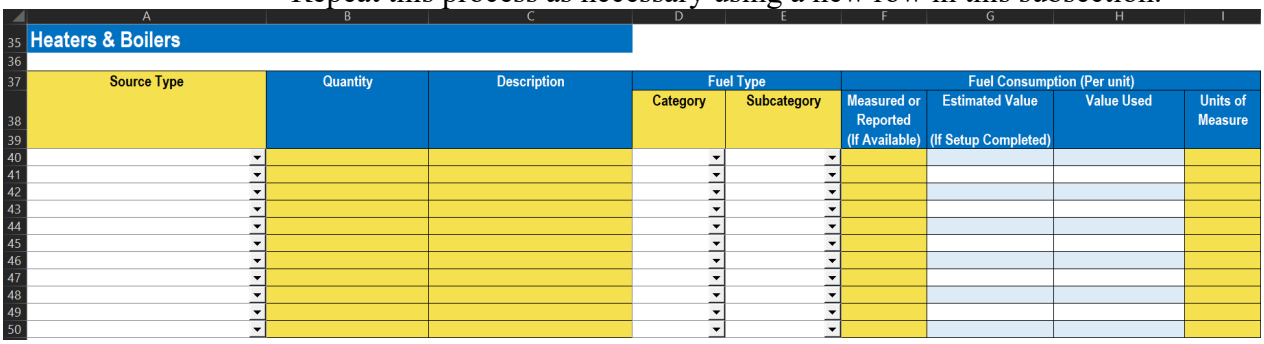
	A	B	C	D	E	F	G
1	"FACILITY-LEVEL FUEL USE" SETUP						
2							
3	Fuel Type		Combustion Source Type	Fuel Consumption			
4	Category	Subcategory		Measured or Reported	Corrected Estimates	Value Used	Units of Measure
5							
6	Solid Fuels	Anthracite	All		0.00	0.00	kg/h
7		Bituminous			0.00	0.00	
8		Lignite			0.00	0.00	
9		Cleaned Coal			0.00	0.00	
10		Other Washed Coal			0.00	0.00	
11		Briquette Coal			0.00	0.00	
12		Coke			0.00	0.00	
13		Petroleum Coke			0.00	0.00	
14	Liquid Fuels	Crude Oil	All		0.00	0.00	m3/d
15		Fuel Oil			0.00	0.00	
16		Gasoline			0.00	0.00	
17		Diesel			0.00	0.00	
18		Aviation Kerosene			0.00	0.00	
19		Common Kerosene			0.00	0.00	
20		Naphtha			0.00	0.00	
21		Liquefied Petroleum Gas			0.00	0.00	
22		Liquefied Natural Gas			0.00	0.00	
23		Propane (liquid)			0.00	0.00	
24	Gaseous Fuels		Total Facility		0.00	610.00	E3 m3/d
25			- Turbine	610.00	0.00	610.00	
26			- Gas Engine (2-Stroke Lean-Burn)		0.00	0.00	
27			- Gas Engine (4-Stroke Lean-Burn)		0.00	0.00	
28			- Gas Engine (4-Stroke Rich-Burn)		0.00	0.00	
29			- Heaters & Boilers		0.00	0.00	
30			- Heaters & Boilers (Low-NOx)		0.00	0.00	

Figure 9: View of the "Facility-Level Fuel Use" section of the Setup – Fuel Use worksheet.

In Figure 9 above, the user has entered the amount of fuel combusted by the 11 power generators referred to in the Setup – Facility Details worksheet. Since the other parameters in this section may not apply to this facility, they are left blank.

- To fill out the "FUEL ALLOCATION BY SOURCE TYPE" SETUP section (see Figure 10 on the next page):
  - There are three subsections: Heaters & Boilers, Compressor Engines, and Generator Engines. Only fill out the subsection(s) that are applicable to equipment found at your facility.
  - For a given row of the Heaters & Boilers subsection:

- Select the source type from the dropdown in Column A.
- Input the quantity of that source type in Column B.
- Space is provided in Column C to describe the source type (for example, location, serial number, etc) for your own records.
- Select the category and subcategory of the fuel type consumed by this equipment in Columns D and E, respectively.
- Input the measured or reported fuel consumption for this equipment, if available, in Column F and select the appropriate units of measure from the dropdown in Column I.
- Repeat this process as necessary using a new row in this subsection.

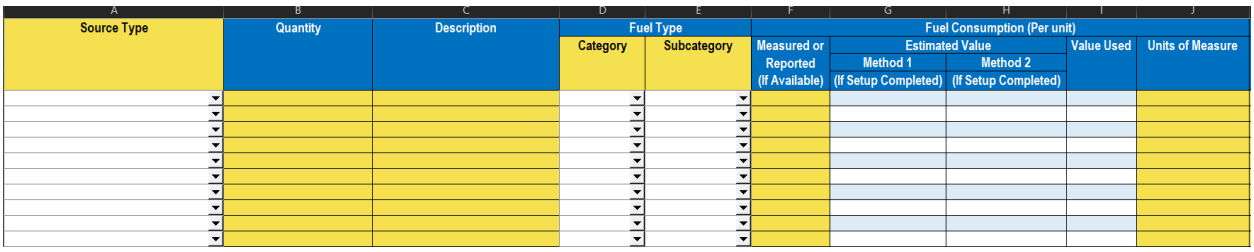


Heaters & Boilers								
Source Type	Quantity	Description	Fuel Type		Fuel Consumption (Per unit)			
			Category	Subcategory	Measured or Reported (If Available)	Estimated Value (If Setup Completed)	Value Used	Units of Measure

Figure 10: View of the "Heaters & Boilers" subsection of the Setup-Fuel Use worksheet.

Note that this section is not filled out for the sample facility used in this example.

- For a given row of the Compressor Engines and/or the Generator Engines subsections (see Figure 11 below):
  - Select the source type from the dropdown in Column A.
  - Input the quantity of that source type in Column B.
  - Space is provided in Column C to describe the source type (for example, location, serial number, etc) for your own records.
  - Select the category and subcategory of the fuel type consumed by this equipment in Columns D and E, respectively.
  - Input the measured or reported fuel consumption for this equipment, if available, in Column F and select the appropriate units of measure from the dropdown in Column J.
  - Repeat this process as necessary using a new row in this subsection(s).



Source Type	Quantity	Description	Fuel Type		Fuel Consumption (Per unit)				
			Category	Subcategory	Measured or Reported (If Available)	Estimated Value		Value Used	Units of Measure
						Method 1 (If Setup Completed)	Method 2 (If Setup Completed)		

Figure 11: View of the "Compressor Engines" subsection of the Setup-Fuel Use worksheet

This subsection is similar to the "Generator Engines" subsection of the same worksheet, and is not filled out for the sample facility used in this example.

Step 5: Open the Setup –Flashing Losses worksheet to estimate emissions from storage losses (all cells for user input are indicated in yellow).

- If your facility includes storage equipment such as tanks, you must fill out the "FACILITY-LEVEL FLASH-GAS EMISSIONS" SETUP section.
- If your facility has oil storage systems, you will also fill out the "OIL STORAGE" SETUP subsection.
- If your facility has produced water storage, you will also fill out the "PRODUCED WATER STORAGE SYSTEM" SETUP subsection.
- If your facility does not have any of the above equipment, you may skip this step and proceed to Step X.

- To fill out the "FACILITY-LEVEL FLASH-GAS EMISSIONS" SETUP section (see Figure 12 below):
    - Input your crude oil and/or produced water receipts, if applicable, in Column C.
    - Select your corresponding units of measure from the dropdown in Column D.
    - In Column E, input your facility's measured or reported flashing losses, if applicable.
    - Select your Column E units of measure from the dropdown in Column H.

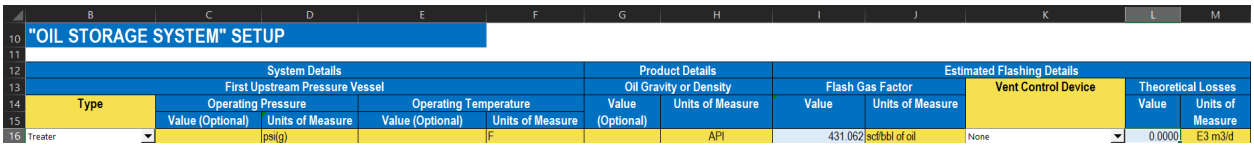
	B	C	D	E	F	G	H
1	"FACILITY-LEVEL FLASH-GAS EMISSIONS" SETUP						
2							
3	Storage System			Flashing Losses			
4	Product	Receipts	Units of Measure	Measured or Reported	Estimated	Value Used	Units of Measure
5	Crude Oil	0	m3/d		0.00	0.00	scf/h
6	Produced Water	0	m3/d		0.00	0.00	
7	Total			0.0	0.00	0.00	

Figure 12: View of "Facility-Level Flash-Gas Emissions" section of the Setup-Flashing Losses worksheet

This section is not filled out for the sample facility used in this example.

- To fill out the "OIL STORAGE SYSTEM" SETUP subsection (see Figure 13 below):
    - Input cells labeled "(Optional)" are not required; leaving these cells blank will not affect the calculation of your emissions profile.
    - First, in Column B, select the type of upstream pressure vessel from the dropdown menu that is first encountered by the gas stream at your facility.
    - Then, input optional values as applicable in Columns C, D, E, F, G, and H.
    - Then, select your flash gas factor units of measure from the dropdown menu in Column J.
    - Then, if your facility has a vent control device connected to storage, such as a flare or vapor recovery compressor, select that device from the dropdown menu in Column K. If the storage process is not connected to a vent control device, select "None."

- Based on this input above, you can view your theoretical storage losses in Column L. You can change the respective units of measure in Column M, as applicable.

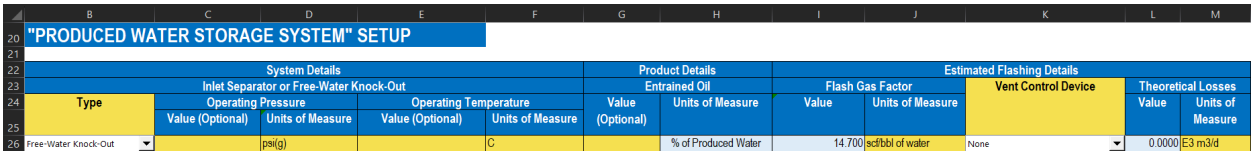


"OIL STORAGE SYSTEM" SETUP

System Details					Product Details		Estimated Flashing Details				
First Upstream Pressure Vessel					Oil Gravity or Density		Flash Gas Factor		Vent Control Device	Theoretical Losses	
Type	Operating Pressure		Operating Temperature		Value (Optional)	Units of Measure	Value	Units of Measure		Value	Units of Measure
	Value (Optional)	Units of Measure	Value (Optional)	Units of Measure							
Treater		psi(g)		F		API	431.062	scf/bbl of oil	None	0.0000	E3 m3/d

Figure 13: View of "Oil Storage System Setup" section of the Setup-Flashing Losses worksheet

- To fill out the "PRODUCED WATER STORAGE SYSTEM" SETUP subsection (see Figure 14 below):
  - Input cells labeled "(Optional)" are not required; leaving these cells blank will not affect the calculation of your emissions profile.
  - First, in Column B, select "Inlet Separator" or "Free-Water Knock-Out" from the dropdown menu.
  - Then, input optional values as applicable in Columns C, D, E, F, and G.
  - Then, select your flash gas factor units of measure from the dropdown menu in Column J.
  - Then, if your facility has a vent control device connected to storage, such as a flare or vapor recovery compressor, select that device from the dropdown menu in Column K. If the storage process is not connected to a vent control device, select "None."
  - Based on this input above, view your theoretical storage losses in Column L. You can change the respective units of measure in Column M, as applicable.



"PRODUCED WATER STORAGE SYSTEM" SETUP

System Details					Product Details		Estimated Flashing Details				
Inlet Separator or Free-Water Knock-Out					Entrained Oil		Flash Gas Factor		Vent Control Device	Theoretical Losses	
Type	Operating Pressure		Operating Temperature		Value (Optional)	Units of Measure	Value	Units of Measure		Value	Units of Measure
	Value (Optional)	Units of Measure	Value (Optional)	Units of Measure							
Free-Water Knock-Out		psi(g)		C		% of Produced Water	14.700	scf/bbl of water	None	0.0000	E3 m3/d

Figure 14: View of "Produced Water Storage System Setup" section of the Setup-Flashing Losses worksheet.

This section is not filled out for the sample facility used in this example.

Step 6: Open the Results (Tabular) – Facility worksheet to review your facility's GHG emissions inventory assessment.

- Columns A and B indicate different emissions source categories and which of these categories are accounted for in this assessment (see Figures 15 and 16 below).

	A	B	C	D	E	F	G	H	I	J
13	**Emission Results (Facility Level) – Summary by Source Category and Polluta**									
14	**Primary Source Category**	**Accounting**	**CH4**	**CO2**	**N2O**	**CO2E**	**NOx**	**CO**	**NMVOC**	**SO2**
15			**(tonnes)**	**(tonnes)**	**(tonnes)**	**(tonnes)**	**(tonnes)**	**(tonnes)**	**(tonnes)**	**(tonnes)**
16	Fuel Combustion:									
17	- Solid Fuels	Included	0.0	0	0.0	0	0	0	0.0	0.0
18	- Liquid Fuels	Included	0.0	0	0.0	0	0	0	0.0	0.0
19	- Gaseous Fuels									
20	- Turbine Engines	Included	34.8	425,618	12.1	429,811	1,296	332	9.7	60.3
21	- Reciprocating Engines	Included	0.0	0	0.0	0	0	0	0.0	0.0
22	- Heaters and Boilers	Included	0.0	0	0.0	0	0	0	0.0	0.0
23	Acid Gas Removal	Included	0.0	0	0.0	0	0	0	0.0	0.0
24	Flaring & Venting (Hydrocarbon Gas)	Included	0.0	0	0.0	0	0	0	0.0	0.0
25	Fugitive Equipment Leaks	Includes Contributions from Leakers and Non-Leakers	2,952.9	186		82,868			742.1	
26	Compressor Seals	Included	21,743.1	1,371		610,177			5,464.4	
27	Wells:									
28	- Casing Vents	Included	0.0	0		0			0.0	
29	- Workovers	Not Included	---							
30	Pneumatic Devices:									
	- Pneumatic Controllers	Included	48.1	0		1,346			4.4	

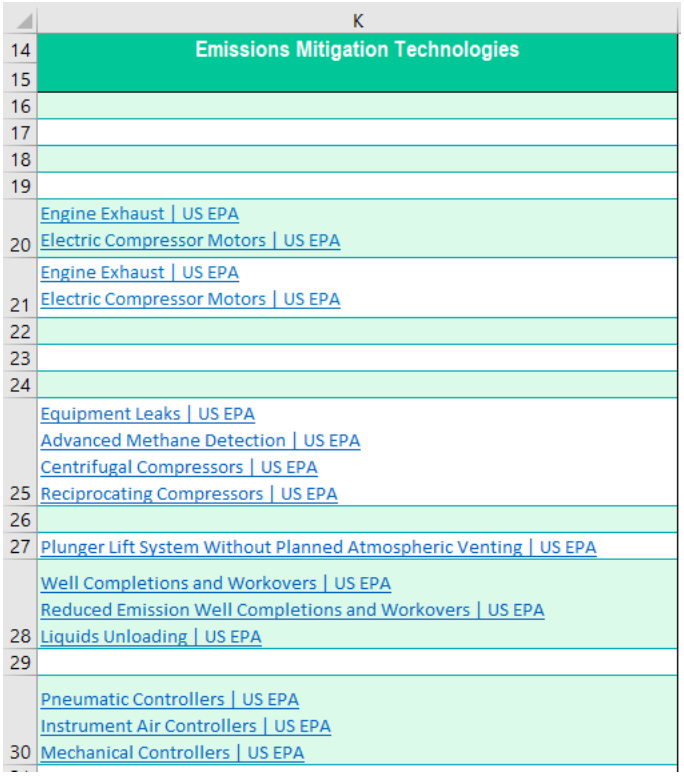
Figure 15: Emissions assessment results based on user input data for this example facility

- Columns C through J display emissions estimates for various GHGs determined by user input in the Setup – Facility Assessment worksheet.

	A	B	C	D	E	F	G	H	I	J
32	- Chemical Injection Pumps	Included	0.0	0		0			0.0	
33	- Compressor Starts	Included	0.0	0		0			0.0	
34	Process Venting:									
35	- Dehydrators	Included	0.0	0		0			0.0	
36	- Sweetening Units	Included	0.0	0		0			0.0	
37	- Storage Losses	Included	0.0	0		0			0.0	
38	Inspection & Maintenance Activities:									
39	- Equipment Depressurization & Purging Events	Included	0.5	0		13			0.1	
40	Mishaps:	Included	0.0	0		0			0.0	
41	Recycled and Utilized Emissions:	Not Included								
42	Indirect Emissions from Power & Heat Purchases:	Included	0.0	0	0.0	0	0	0	0.0	0.0
43	Other Contributions (Measured):	Included	0.0	0		0			0.0	
44	**Total**		**24,779.3**	**427,175**	**12.1**	**1,124,215**	**1,296**	**332**	**6,220.8**	**60.3**
45		Applied Global Warming Potentials (GWPs)	28	1	265					

Figure 16: Continuing display of emissions assessment results based on user input for this example facility

- Column K includes hyperlinks to information on mitigation technologies based on emissions source category (see Figure 17 below). These links refer to U.S. EPA's Methane Mitigation Technologies Platform, where you can learn more about these technologies.



	K
14	Emissions Mitigation Technologies
15	
16	
17	
18	
19	
20	Engine Exhaust | US EPA Electric Compressor Motors | US EPA
21	Engine Exhaust | US EPA Electric Compressor Motors | US EPA
22	
23	
24	
25	Equipment Leaks | US EPA Advanced Methane Detection | US EPA Centrifugal Compressors | US EPA Reciprocating Compressors | US EPA
26	
27	Plunger Lift System Without Planned Atmospheric Venting | US EPA
28	Well Completions and Workovers | US EPA Reduced Emission Well Completions and Workovers | US EPA Liquids Unloading | US EPA
29	
30	Pneumatic Controllers | US EPA Instrument Air Controllers | US EPA Mechanical Controllers | US EPA

Figure 17: Hyperlinks to additional information on source-specific emissions mitigation technologies (U.S. EPA).

- A visual representation of your emissions assessment can be viewed on the Results (Graphical) – Facility worksheet (see Figures 18 and 19 on the next page).
    - Select one of the GHGs in row 13 to display a breakdown of emissions by source category for that particular gas. To view an emissions breakdown by source for a different gas, select another gas in row 13.
    - Columns R and S also provide hyperlinks to information on source-specific mitigation technologies from U.S. EPA.

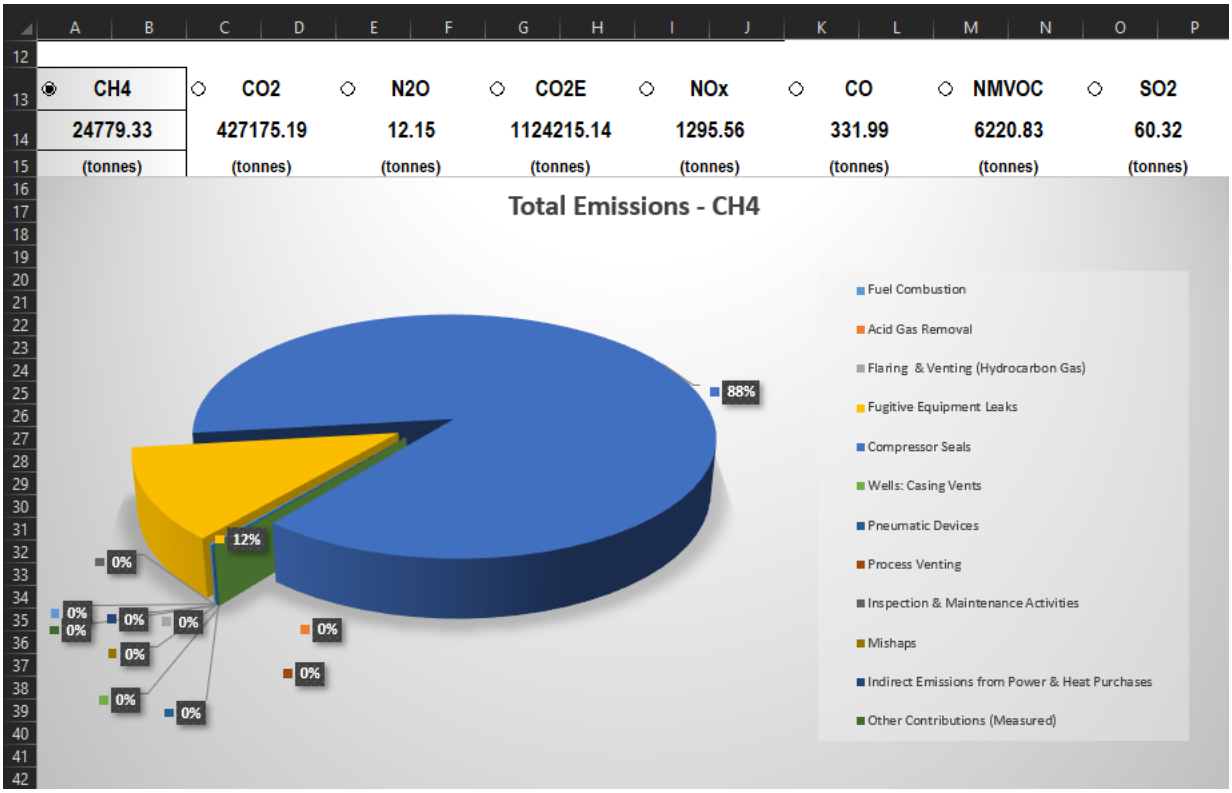


Figure 18: Graphical representation of this example emissions assessment by source category, for selected GHG from row 13. This example shows the emissions for breakdown for CH_4.

	R	S	T
11	Fuel Combustion:	Engine Exhaust | US EPA	
12		Electric Compressor Motors | US EPA	
13	Acid Gas Removal		
14	Flaring & Venting (Hydrocarbon Gas)		
15	Fugitive Equipment Leaks	Equipment Leaks | US EPA	
16		Advanced Methane Detection | US EPA	
17		Centrifugal Compressors | US EPA	
18		Reciprocating Compressors | US EPA	
19	Wells: Casing Vents	Plunger Lift System Without Planned Atmospheric Venting | US EPA	
20	Pneumatic Devices:	Pneumatic Controllers | US EPA	
21		Instrument Air Controllers | US EPA	
22		Mechanical Controllers | US EPA	
23		Compressor Starts | US EPA	
24		Air Starters | US EPA	
25	Process Venting:	Glycol Dehydrators | US EPA	
26		Electric Glycol Circulation Pumps | US EPA	
27		Methanol Injection | US EPA	
28		Optimize Glycol Circulation | US EPA	
29		Flash Tank Separators | US EPA	
30		Desiccant Dehydrators | US EPA	
31		Reroute Glycol Skimmer Gas | US EPA	
32		Storage Tanks | US EPA	
33		Vapor Recovery Units | US EPA	
34		Pressurized Storage Tank | US EPA	
35	Inspection & Maintenance Activities:	Compressor Station Blowdowns | US EPA	
36		Route Blowdown Gas to Low Pressure System | US EPA	
37		Pipeline Hot Taps | US EPA	

Figure 19: Color-coded, source-specific hyperlinks to information on mitigation technologies (U.S. EPA)