

State Inventory Tool

User Guide for States Using the Greenhouse Gas Synthesis Tool

JUNE 2026

Acknowledgements

The SIT was originally developed in conjunction with EPA's state and local programs to automate the steps states would need to take in developing their own emission estimates in a manner that was consistent with prevailing national and state guidelines. The result was a set of eleven modules that help users estimate greenhouse gas emissions and removals at the state level. CGS is supporting updates to the tool to facilitate continuity in state inventory development and improvement work at the state level.

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This section of the User Guide provides instructions on using the Synthesis Tool module of the State Inventory Tool (SIT).

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1.1 SYNTHESIS TOOL OVERVIEW

The Synthesis Tool was designed as a companion to the State Inventory Tool (SIT), which estimates state-level emissions for 1990-2025. Users who have completed the historical emission estimation process using the SIT modules can import the historical emissions into the Synthesis Tool to compile a time series inventory from all sector modules from 1990 through 2025, including aggregating data to present a summary of annual emissions.

1.1.1 Data Requirements

Before using this module, the user should conduct greenhouse gas inventories for all applicable sources using the individual sector modules. The individual sector modules include the following:

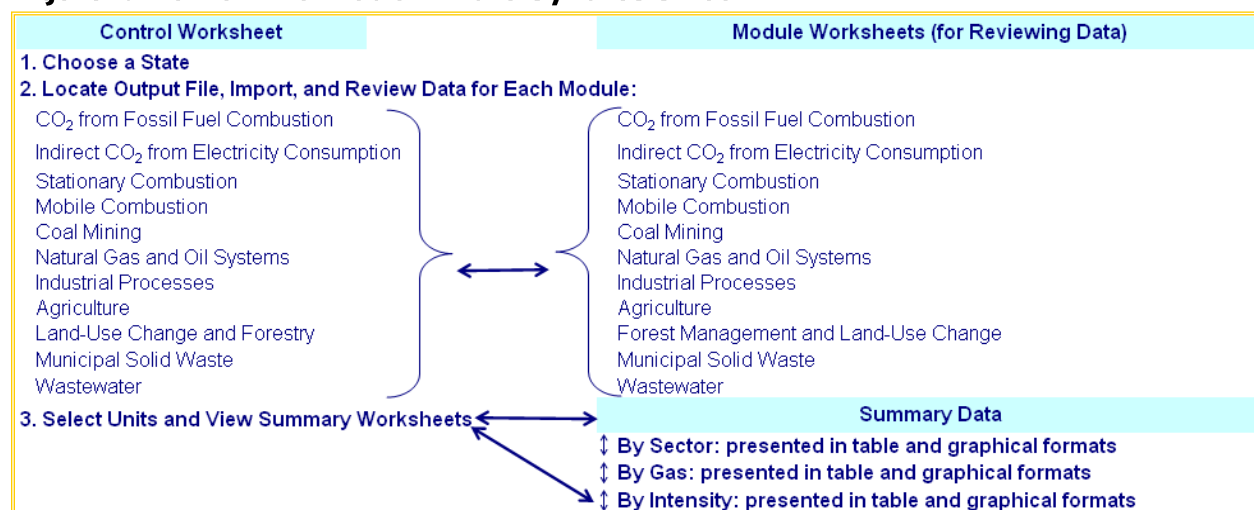
- CO₂ from Fossil Fuel Combustion,
- Electricity Consumption,
- Stationary Combustion, Mobile Combustion,
- Coal Mining,
- Natural Gas and Oil Systems,
- Industrial Processes,
- Agriculture, Land Use,
- Land-Use Change and Forestry,
- Solid Waste, and
- Wastewater.

If other tools are used to compile estimates for a particular sector, users may need to amend the summary outside of the Synthesis Tool to ensure compilation of a complete inventory.

After completing each sector inventory, the user should export the data using the “Export Data” button provided in the final step of each sector module. The modules will then create an output file using a default file name. Please do not change the file names or alter the output files in any way. Once the output files have been generated, the Synthesis module can then be used.

1.1.2 Tool Layout

Because there are multiple steps to complete within the Synthesis Tool, it is important to understand the Tool's overall design. The layout of the Synthesis Tool is presented in Figure 1.

Figure 1. Flow of Information in the Synthesis Tool

1.2 SYNTHESIS TOOL COMPILATION STEPS

This section provides a guide to using the Synthesis Tool to import emission estimates from completed modules of the SIT. The following three steps describe how to import and view the estimates provided by the eleven SIT modules: (1) select a state on the control worksheet; (2) locate output file, import, and review data for each module; (3) select units and view summary information.

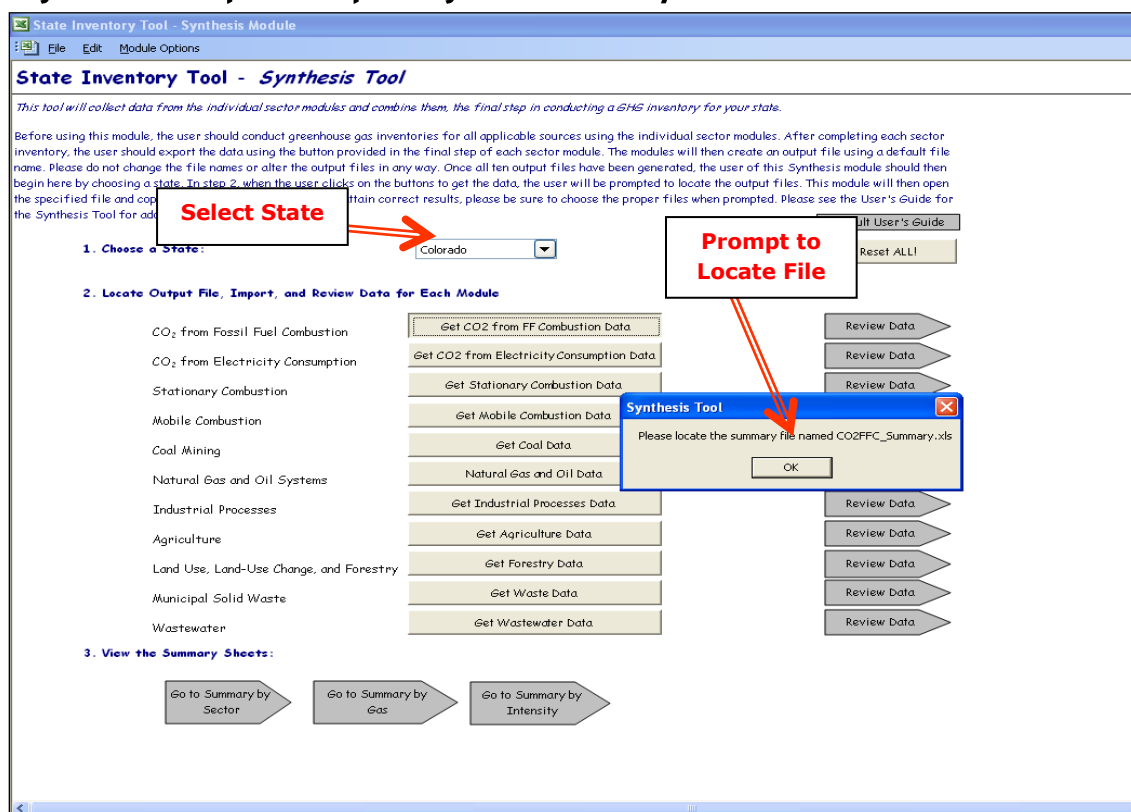
Step (1) Select a State on the Control Worksheet

To begin, select the state you are interested in evaluating. By selecting a state, the rest of the tool will automatically reset to reflect the appropriate state default data and assumptions for use in subsequent steps of the tool.

Step (2) Locate Output File, Import, and Review Data for Each Module

This step involves importing the output files containing emission estimates from the individual modules. While the CO₂ from Fossil Fuel Combustion (CO₂FFC) module will be used as an example of how to import and review data, the importing process is identical across for all eleven SIT modules.

On the control worksheet, select the “Get CO₂ from Fossil Fuel Combustion Data” button. Once this button is selected, you will be prompted to locate the summary file exported from the CO₂FFC module (called “CO2FFC_Summary”) as shown in Figure 2.

Figure 2. Example of Importing Data in the Synthesis Tool

If the file is imported successfully, the current date and time will appear in the column titled "Summary File Imported on". This timestamp is useful to have if you are completing an inventory on an annual basis and would like to know the last time data was imported into the Synthesis Tool.

To review the data that was imported for a given module, click on the gray navigational arrow to the right of the module you would like to review. The summary data worksheet by sector for the CO₂ from Fossil Fuel Combustion is shown in Figure 3. Modules with "Additional Emissions Sources" tabs will automatically integrate these emissions into the synthesis summary. In each sector summary worksheet, users have the option to enter total emissions data by gas (in MMTCO₂E) from 'Additional Emissions Source(s)' if you have emission sources that are not already covered by the sector module or its additional emissions sources tab. Any additional emissions are pulled into the Summary by Sector and Summary by Gas worksheets. To return to the control worksheet, click on the gray navigational arrow.

Figure 3. Example of CO₂FFC Summary Worksheet

Summary of CO₂ Emissions from Fossil Fuel Combustion in Florida (MMTCO₂E)

This tab summarizes emissions from fossil fuel combustion in million metric tons carbon dioxide equivalent (MMTCO₂E) using emissions results extracted from the Synthesis module. Emissions from an additional emissions source can be entered (in MMTCO₂E) in the 'Additional Emissions Source' row if your state has emission sources that are not already included in the sector module. Any additional emissions are pulled into the Summary by Sector and Summary by Gas worksheets.

Return to Control Sheet

Return to Control Arrow

Enter optional Additional Emissions Source

Emissions (MMTCO ₂ Eq.)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Residential	154	158	175	167	157	149	166	137	145	142	152
Coal	0.00	0.00	0.01	0.01	0.01	0.00	0.00	-	0.00	0.00	0.00
Petroleum	0.79	0.83	0.90	0.86	0.74	0.67	0.69	0.63	0.66	0.65	0.63
Natural Gas	0.74	0.75	0.84	0.81	0.83	0.82	0.96	0.73	0.79	0.76	0.89
Other	-	-	-	-	-	-	-	-	-	-	-
Commercial	6.26	5.98	5.97	4.78	4.36	4.34	4.17	3.64	3.56	3.64	4.81
Coal	0.01	0.00	0.03	0.03	0.04	0.00	0.00	-	0.01	0.01	0.02
Petroleum	4.17	3.70	3.51	2.36	1.93	2.05	1.70	1.59	1.45	1.62	1.98
Natural Gas	2.08	2.28	2.43	2.39	2.38	2.28	2.47	2.05	2.10	2.01	2.81
Other	-	-	-	-	-	-	-	-	-	-	-
Industrial	11.96	11.29	12.90	14.15	14.95	16.19	16.04	15.11	15.29	15.39	14.47
Coal	2.81	2.65	3.11	3.03	3.02	3.10	2.97	3.14	2.97	2.76	2.98
Petroleum	4.28	3.67	4.67	5.31	4.90	5.95	5.39	4.99	5.56	5.26	5.38
Natural Gas	4.87	4.97	5.13	5.81	7.03	7.13	7.68	6.98	6.75	7.37	6.12
Other	-	-	-	-	-	-	-	-	-	-	-
Transportation	81.49	77.16	79.91	78.73	84.26	86.48	87.41	90.60	92.03	94.78	100.95
Coal	-	-	-	-	-	-	-	-	-	-	-
Petroleum	81.33	76.95	79.65	78.47	83.94	86.05	87.06	90.27	91.80	94.39	100.51
Natural Gas	0.16	0.20	0.26	0.26	0.32	0.43	0.35	0.33	0.23	0.40	0.44
Other	-	-	-	-	-	-	-	-	-	-	-
Electric Utilities	85.19	91.24	89.17	93.35	95.08	97.14	101.88	105.85	116.34	112.66	114.95
Coal	55.94	57.65	57.08	57.66	58.50	60.63	66.25	66.65	66.28	63.19	67.03
Petroleum	19.11	22.79	21.21	25.62	25.21	16.71	17.59	20.51	32.10	29.33	27.95
Natural Gas	10.14	10.80	10.88	10.07	11.37	19.81	18.04	18.69	17.97	20.14	19.97
Other	-	-	-	-	-	-	-	-	-	-	-
International Bunker Fuels	-	-	-	-	-	-	0.02	0.03	0.02	0.04	0.02
Petroleum	-	-	-	-	-	-	0.02	0.03	0.02	0.04	0.02
TOTAL	186.43	187.98	189.37	192.64	196.74	199.45	211.19	216.59	228.70	227.90	236.72
Coal	58.77	57.38	57.12	57.70	57.74	57.74	57.73	57.90	57.27	55.96	70.03
Petroleum	109.67	107.98	109.37	112.64	116.74	117.45	112.46	118.02	131.60	131.27	136.46
Natural Gas	17.99	19.00	19.53	19.35	21.94	30.48	29.50	28.78	27.83	30.67	30.22
Other	-	-	-	-	-	-	-	-	-	-	-
Additional Emissions Source	-	-	-	-	-	-	-	-	-	-	-

Step (3) View Summary Information

Once the data from all of the modules has been imported, you can view estimates in MMTCO₂E on the final summary worksheet. A summary of the estimates is provided within the Synthesis module as follows:

- By sector,
- By gas, or
- By intensity (per capita and by gross state product)

An example of the sector summary worksheet is shown in Figure 4. In addition, the results are displayed in graphical format at the bottom of the summary worksheets. Mobile module CO₂ emissions and emissions from electricity consumption are not included in the final summary worksheet as they are included in the top-down emissions reported under CO₂ from Fossil Fuel Combustion.

Figure 4. Example of Summary Worksheet by Sector

State Inventory Tool - Synthesis Module

File Edit Module Options

Summary of GHG Emissions by Sector in Colorado (MMTCO₂E)

Return to Control Sheet Go to Summary by Gas Go to Summary by Intensity

Emissions (MMTCO ₂ E)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Energy	590.91	588.27	595.53	610.60	612.73	614.75	661.87	682.00	683.87	671.50	695.36
CO ₂ from Fossil Fuel Combustion	589.46	586.83	594.04	609.14	611.29	613.32	660.34	680.43	682.39	670.03	693.81
Stationary Combustion	1.45	1.44	1.49	1.46	1.44	1.43	1.53	1.56	1.48	1.47	1.55
Mobile Combustion	-	-	-	-	-	-	-	-	-	-	-
Coal Mining	-	-	-	-	-	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-	-	-	-	-	-
Industrial Processes	3.75	8.66	9.10	9.73	10.78	12.21	13.16	17.71	18.10	17.90	19.06
Agriculture	42.51	43.10	44.77	45.94	48.03	47.49	47.12	45.27	45.56	45.07	44.13
Enteric Fermentation	18.17	18.37	19.17	19.88	20.80	20.93	20.62	19.48	19.64	19.31	18.96
Manure Management	3.66	3.66	3.59	3.70	3.87	3.75	3.67	3.69	3.84	3.76	3.97
Rice Cultivation	1.56	1.52	1.55	1.32	1.57	1.41	1.32	1.15	1.25	1.15	1.09
Agricultural Soil Management	19.10	19.53	20.44	21.02	21.76	21.39	21.49	20.92	20.80	20.83	20.09
Burning of Agricultural Crop Waste	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
LULUCF	-	-	-	-	-	-	-	-	-	-	-
Waste	1.26	1.28	1.31	1.33	1.36	1.39	1.41	1.44	1.47	1.49	1.55
Municipal Solid Waste	-	-	-	-	-	-	-	-	-	-	-
Wastewater	1.26	1.28	1.31	1.33	1.36	1.39	1.41	1.44	1.47	1.49	1.55
Indirect CO₂ from Electricity Consumption*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	204.43
Gross Emissions	643.43	641.32	650.70	667.60	672.90	675.85	723.57	746.41	748.99	735.97	760.10
Sinks	-	-	-	-	-	-	-	-	-	-	-
Net Emissions	643.43	641.32	650.70	667.60	672.90	675.85	723.57	746.41	748.99	735.97	760.10

* Emissions from Electricity Consumption are not included in totals in order to avoid double counting with Fossil Fuel Combustion estimates.

1.3 CONCLUSION

Once the results of all eleven modules are imported into the Synthesis Tool, you will have a complete inventory for your state. These results serve as the basis for preparing an inventory report, if mandated and/or prepared by your organization to complement inventory estimates. In addition, you may use these historical estimates as the basis for emission projections in EPA's Projection Tool (CGS has not updated this tool). For instructions on using the Projection Tool, please consult the Projection Tool and its User's Guide posted on EPA's website.¹

¹ See <https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool>. Note the Projection Tool was last updated in January 2025 as noted on the EPA website. Default data in the Projection Tool for 2022 could be inconsistent with CGS's update of the State Inventory Tool (SIT) default data updated through 2023.