# README DOCUMENTATION FOR “ALLStateGHGData” xlsx file

## Background Information for the EPA GHG Inventory All States (1990-2020 GHG data) Workbook

This file consolidates state level greenhouse gas (GHG) data published in EPA’s GHG Data Explorer consistent with the national GHG Inventory as published in April 2022 and described in the *Methodology Report: Inventory of U.S. Greenhouse Gas Emissions and Sinks by State: 1990-2020* Methodology Report (EPA-430-R-22-005): <https://www.epa.gov/ghgemissions/methodology-report-inventory-us-greenhouse-gas-emissions-and-sinks-state-1990-2020>.

Generally, emissions from sources of GHGs are shown with positive numbers; removals from sinks are denoted by negative numbers (with some exceptions as per the economic sector tab descriptions below). The units in this consolidated file are million metric tons of CO2 equivalents or CO2e using 100-year GWPs from IPCC’s Fourth Assessment report consistent with the national Inventory published in April 2022: <https://www.epa.gov/ghgemissions/us-greenhouse-gas-inventory-report-archive>.

The workbook contains three tabs: Data by UNFCCC-IPCC Sectors, Data by Econ Sect, and Annotations. Each tab is discussed in more detail in the tables below. For specific questions please email EPA at [GHGInventory@epa.gov](mailto:GHGInventory@epa.gov).

## Data by UNFCCC-IPCC Sectors Tab

Column definitions for the Data by UNFCCC-IPCC Sectors tab and guidance for interpreting and use of each column in your analyses are provided below in Table 2.1. A description of specific Sectors, Subsectors, and Categories provided within these data are included in Table 2.2 below.

**Table 2.1 Data by UNFCCC-IPCC Sectors Tab - Column Description and Use**

|  |  |
| --- | --- |
| Column Name | Column Description and Use |
| SECTOR | Consistent with the national Inventory, state level estimates are arrayed using IPCC methodological guidance and presented using the 5 UNFCCC reporting sectors, (i.e., energy, industrial processes, agriculture, land-use change and forestry, and waste). Further information on sectors can be found in the [methodology](https://www.epa.gov/ghgemissions/methodology-report-inventory-us-greenhouse-gas-emissions-and-sinks-state-1990-2020) report noted above and at <https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>. In addition to the 5 traditional UNFCCC reporting sectors this column includes an Energy-Excluded sector. Energy-Excluded emissions are not generally included in state or national emission totals and instead reported as memo items (see more information on memo items below). |
| SUBSECTOR | These provide segmentation within Sectors. Subsectors labeled ‘Memo Items’ (including (International Bunker Fuels and Biomass/BioFuels) are not included in state or national emission totals but are reported for informational purposes. The fugitive subsector includes emissions from leaks, vents, and flaring (e.g., from petroleum and natural gas systems). |
| CATEGORY | These provide further segmentation within subsector. For some categories, emissions from U.S. Territories are reported as their own end-use sector due to a lack of specific consumption data for the individual end-use sectors within U.S. Territories. |
| SUBCATEGORY1 | These 4 subcategories provide additional hierarchical detail breaking down emissions and removals. These columns are only provided where addition detail or subdivision is possible. |
| SUBCATEGORY2 |
| SUBCATEGORY3 |
| SUBCATEGORY4 |
| FUEL | These provide detail of the fuel associated with an emission and are only available in the Fossil Fuel Combustion subsector |
| STATE | Provides the state or territory where the emission or sink takes occurs. These are general two letter state and territory postal codes. Exceptions include:   * Territories - where emissions across all US Territories are aggregated into a single row * FO – Federal Offshore is a designation for Petroleum and Natural Gas System emissions which occur offshore within US waters * National – emissions and sinks which are not yet disaggregated to state-level but are included to ensure consistency with totals in the national GHG Inventory * Withheld – emissions and sinks which could not be disaggregated to states without potentially exposing proprietary information |
| GHG | Greenhouse gas applicable to specific activity, i.e., carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorochemicals (PFCs), sulfur hexafluoride (SF6), and nitrogen trifluoride (NF3). For fluorinate sources, in particular, estimates may be aggregated for usability and are presented as Other HFC, etc. |
| Y1990 – Y2020 | “Y” followed by year indicates individual year in the time series. Annual state-level estimates are quantified for the 30-year time series providing data from 1990-2020. Note, the data may still contain zeros. Zeros can indicate several conditions, i.e., that activity is actually zero, not occurring, or that emissions and sinks from an activity are not estimated for a particular state. Please refer to the Annotations tab for the basis for zero values. |
| RowNumber | RowNumber are provided to link data from the Data by UNFCCC\_IPCC Sector Tab and Data by Econ Sect tab with the Annotations tab. To determine if emissions numbers in Columns Y1990 – Y2020 are associated with an annotation you may use the RowNumber to find the associated annotation row. If a particular RowNumber does not appear in the Annotations Tab then values for that row are not annotated. |

**Table 2.2 Data by UNFCCC-IPCC Sectors Tab - Sector, Subsector, and Category Organization**

|  |  |  |
| --- | --- | --- |
| Sector | Subsector | Category |
| Energy | Fossil Fuel Combustion | Commercial |
| Electricity Generation |
| Industrial |
| Residential |
| Transportation |
| US Territories |
| Fugitive (includes leaks, vents, and flaring) | Coal Mining |
| Abandoned Coal Mines |
| Natural Gas Systems |
| Abandoned Wells |
| Petroleum Systems |
| Incineration of Waste | Incineration |
| Non-Energy Uses of Fossil Fuels | |
| Energy-Excluded | Memo Items | Biofuel-Biodiesel |
| Biofuel-Ethanol |
| Biomass-Wood |
| International Bunker Fuels |
| Industrial Processes | Chemical Industry | Adipic Acid Production |
| Ammonia Production |
| Caprolactam Production |
| Nitric Acid Production |
| Petrochemical Production |
| Phosphoric Acid Production |
| Silicon Carbide Production and Consumption |
| Soda Ash Production |
| Titanium Dioxide Production |
| Urea Consumption for Non-Agricultural Uses |
| Electronics Industry | Micro-Electro-Mechanical Devices |
| Photovoltaics |
| Semiconductor Manufacture |
| Metal Industry | Aluminum Production |
| Ferroalloy Production |
| Iron and Steel Production |
| Lead Production |
| Magnesium Production and Processing |
| Zinc Production |
| Mineral Industry | Carbon Dioxide Consumption |
| Cement Manufacture |
| Glass Production |
| Lime Manufacture |
| Other Process Uses of Carbonates |
| Other product manufacture and use | Electrical Transmission and Distribution |
| N2O Product Use |
| Product uses as substitutes for ODS | Fire Extinguishing |
| Foams |
| MDI Aerosols |
| Non-MDI Aerosols |
| Refrigeration |
| Solvents |
| Production and Use of Fluorinated Gases | HCFC-22 Production |
| Agriculture | Agricultural Soil Management | Direct |
| Indirect |
| CO2 emissions from liming, urea application and other carbon-containing fertilizers | Liming |
| Urea Fertilization |
| Enteric Fermentation | |
| Field Burning of Agricultural Residues | |
| Manure Management | |
| Rice Cultivation | |
| Waste | Anaerobic Digestion at Biogas Facilities | |
| Composting | |
| Landfills | Industrial Landfill |
| MSW Landfill |
| Wastewater Treatment and Discharge | Domestic |
| Industrial |
| Land-use Change and Forestry | Cropland | Cropland Remaining Cropland |
| Land Converted to Crop Land |
| Forest land | Forest Land Remaining Forest Land |
| Land Converted to Forest Land |
| Grassland | Grassland Remaining Grassland |
| Land Converted to Grassland |
| Settlements | Land Converted to Settlements |
| Settlements Remaining Settlements |
| Wetlands | Land Converted to Wetlands |
| Wetlands Remaining Wetlands |

Note: Some subcategories of the national inventory have not yet been disaggregated to the state level due to nature of activity and data challenges. Data Caveats and corrigenda are published and updated online at the following URL: <https://cfpub.epa.gov/ghgdata/inventoryexplorer/docs/StateData_Corrigenda-DataCaveats_110122.pdf>

## Data by Econ Sect Tab

Column definitions for the Data by Econ Sect tab and guidance for interpreting and use of each column in your analyses are provided in Table 3.1 below. A description of specific Economics sector, Economic source, Sectors, Subsectors, and Categories is provided in Table 3.2 below.

**Table 3.1 Data by Econ Sect Tab - Column Description and Use**

|  |  |
| --- | --- |
| Column Name | Column Description and Use |
| ECON\_SECTOR | The Economics Sector designation includes Transportation, Electric Power, Industry, Agriculture, Commercial, Residential, U.S. Territories and net totals from the Land-use, Land-use Change and Forestry. Econ\_Sector and Econ\_Source designations allow data otherwise organized by UNFCCC reporting sectors and IPCC methodological guidance to be arrayed by economic sector. |
| ECON\_SOURCE | Economic source details individual sources within each economic sector. These sources correspond to the UNFCCC-IPCC categories but for this data view these emissions have been allocated to economic sectors. This column in concert with the Econ\_Sector column allow data to be summarize in manner consistent with the Economic Sector reports in the national inventory report (Table 2-10 - U.S. Greenhouse Gas Emissions Allocated to Economic Sectors) |
| SECTOR | Transportation, Electric Power, Industry, Agriculture, Commercial, Residential, U.S. Territories and net totals from the Land-use, Land-use Change and Forestry sector. Energy-Excluded is not included in this view. |
| SUBSECTOR | As described for Data by UNFCCC-IPCC Sectors. Memo Items are not included in this view. The fugitive subsector includes emissions from leaks, vents, and flaring (e.g., from petroleum and natural gas systems). |
| CATEGORY | Same as described for Data by UNFCCC-IPCC Sectors. |
| SUBCATEGORY1 | Same as described for Data by UNFCCC-IPCC Sectors. |
| SUBCATEGORY2 |
| SUBCATEGORY3 |
| SUBCATEGORY4 |
| FUEL | Same as described for Data by UNFCCC-IPCC Sectors. |
| STATE | Same as described for Data by UNFCCC-IPCC Sectors. |
| GHG | For this view, emissions from Substitution of Ozone Depleting Substances are aggregated by economic sector and present as emission total for that sector by state. Emissions for this source are presented with the gas name “CO2e” because these emission are aggregates of multiple gases. Beyond these exceptions GHG is same as described under Data by UNFCCC-IPCC sector. |
| Y1990 – Y2020 | As described for Data by UNFCCC-IPCC Sectors. Emission values for certain sources are presented as negative numbers (Subcategories: Mobile Non-Highway Other, Mobile Non-Highway Construction, and Mobile Agricultural Equipment). These instances are not actual sinks but rather are adjustments to avoid double counting of emissions reported in the agricultural economic sector. When analyzing these sources users should aggregate at the Econ\_Source level rather than displaying these values separately. Beyond these notes the annual data is same as described under Data by UNFCCC-IPCC sector. |
| RowNumber | RowNumber are provided to link data from the Data by UNFCCC\_IPCC Sector Tab and Data by Econ Sect tab with the Annotations tab. To determine if emissions numbers in Columns Y1990 – Y2020 are associated with an annotation you may use the RowNumber to find the associated annotation row. If a particular RowNumber does not appear in the Annotations Tab then values for that row are not annotated |

**Table 3.2 Data by Econ Sect Tab - Sector, Subsector, and Category Organization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ECON\_SECTOR | ECON\_SOURCE | SECTOR | SUBSECTOR | CATEGORY |
| Transportation | CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | Transportation |
| Mobile Combustion | Energy | Fossil Fuel Combustion | Transportation |
| Non-Energy Use of Fuels | Energy | Non-Energy Uses of Fossil Fuels | Transportation |
| Substitution of Ozone Depleting Substances | Industrial Processes | Product uses as substitutes for ODS |  |
| Electric Power Industry | CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | Electricity Generation |
| Electrical Transmission and Distribution | Industrial Processes | Other product manufacture and use | Electrical Transmission and Distribution |
| Incineration of Waste | Energy | Incineration of Waste | Incineration |
| Other Process Uses of Carbonates | Industrial Processes | Mineral Industry | Other Process Uses of Carbonates |
| Stationary Combustion | Energy | Fossil Fuel Combustion | Electricity Generation |
| Industry | Abandoned Oil and Gas Wells | Energy | Fugitive (includes leaks, vents, and flaring) | Abandoned Wells |
| Abandoned Underground Coal Mines | Energy | Fugitive (includes leaks, vents, and flaring) | Coal Mining |
| Adipic Acid Production | Industrial Processes | Chemical Industry | Adipic Acid Production |
| Aluminum Production | Industrial Processes | Metal Industry | Aluminum Production |
| Ammonia Production | Industrial Processes | Chemical Industry | Ammonia Production |
| Caprolactam, Glyoxal, and Glyoxylic Acid Production | Industrial Processes | Chemical Industry | Caprolactam Production |
| Carbide Production and Consumption | Industrial Processes | Chemical Industry | Silicon Carbide Production and Consumption |
| Carbon Dioxide Consumption | Industrial Processes | Mineral Industry | Carbon Dioxide Consumption |
| Cement Production | Industrial Processes | Mineral Industry | Cement Manufacture |
| CO2 from Fossil Fuel Combustion | Agriculture | Fossil Fuel Combustion | Agriculture |
| CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | Industrial |
| Coal Mining | Energy | Fugitive Fugitive (includes leaks, vents, and flaring) | Coal Mining |
| Electronics Industry | Industrial Processes | Electronics Industry | Micro-Electro-Mechanical Devices |
| Photovoltaics |
| Semiconductor Manufacture |
| Ferroalloy Production | Industrial Processes | Metal Industry | Ferroalloy Production |
| Glass Production | Industrial Processes | Mineral Industry | Glass Production |
| HCFC-22 Production | Industrial Processes | Production and Use of Fluorinated Gases | HCFC-22 Production |
| Iron and Steel Production | Industrial Processes | Metal Industry | Iron and Steel Production |
| Landfills - Industrial | Waste | Landfills | Industrial Landfill |
| Lead Production | Industrial Processes | Metal Industry | Lead Production |
| Lime Production | Industrial Processes | Mineral Industry | Lime Manufacture |
| Magnesium Production and Processing | Industrial Processes | Metal Industry | Magnesium Production and Processing |
| Mobile Combustion | Industrial Processes | Fossil Fuel Combustion | Industry |
| N2O from Product Uses | Industrial Processes | Other product manufacture and use |  |
| Natural Gas Systems | Energy | Fugitive (includes leaks, vents, and flaring) | Natural Gas Systems |
| Nitric Acid Production | Industrial Processes | Chemical Industry | Nitric Acid Production |
| Non-Energy Use of Fuels | Energy | Non-Energy Uses of Fossil Fuels | Industrial |
| Other Process Uses of Carbonates | Industrial Processes | Mineral Industry | Other Process Uses of Carbonates |
| Petrochemical Production | Industrial Processes | Chemical Industry | Petrochemical Production |
| Petroleum Systems | Energy | Fugitive (includes leaks, vents, and flaring) | Petroleum Systems |
| Phosphoric Acid Production | Industrial Processes | Chemical Industry | Phosphoric Acid Production |
| Soda Ash Production | Industrial Processes | Chemical Industry | Soda Ash Production |
| Stationary Combustion | Agriculture | Fossil Fuel Combustion | Industrial |
| Stationary Combustion | Energy | Fossil Fuel Combustion | Industrial |
| Substitution of Ozone Depleting Substances | Industrial Processes | Product uses as substitutes for ODS |  |
| Titanium Dioxide Production | Industrial Processes | Chemical Industry | Titanium Dioxide Production |
| Urea Consumption for Non-Agricultural Purposes | Industrial Processes | Chemical Industry | Urea Consumption for Non-Agricultural Uses |
| Wastewater Treatment | Waste | Wastewater Treatment and Discharge | Industrial |
| Zinc Production | Industrial Processes | Metal Industry | Zinc Production |
| Agriculture | CO2 from Fossil Fuel Combustion | Agriculture | Fossil Fuel Combustion | Agriculture |
| Enteric Fermentation | Agriculture | Enteric Fermentation |  |
| Field Burning of Agricultural Residues | Agriculture | Field Burning of Agricultural Residues |  |
| Liming | Agriculture | CO2 emissions from liming, urea application and other carbon-containing fertilizers | Liming |
| Manure Management | Agriculture | Manure Management |  |
| Mobile Combustion | Agriculture | Fossil Fuel Combustion | Agriculture |
| N2O from Agricultural Soil Management | Agriculture | Agricultural Soil Management | Direct |
| Indirect |
| Rice Cultivation | Agriculture | Rice Cultivation |  |
| Stationary Combustion | Agriculture | Fossil Fuel Combustion | Industrial |
| Urea Fertilization | Agriculture | CO2 emissions from liming, urea application and other carbon-containing fertilizers | Urea Fertilization |
| Commercial | Anaerobic Digestion at Biogas Facility | Waste | Anaerobic Digestion at Biogas Facilities |  |
| CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | Commercial |
| Composting | Waste | Composting |  |
| Landfills - Municipal | Waste | Landfills | MSW Landfill |
| Stationary Combustion | Energy | Fossil Fuel Combustion | Commercial |
| Substitution of Ozone Depleting Substances | Industrial Processes | Product uses as substitutes for ODS |  |
| Wastewater Treatment | Waste | Wastewater Treatment and Discharge | Domestic |
| Residential | CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | Residential |
| Stationary Combustion | Energy | Fossil Fuel Combustion | Residential |
| Substitution of Ozone Depleting Substances | Industrial Processes | Product uses as substitutes for ODS |  |
| U.S. Territories | CO2 from Fossil Fuel Combustion | Energy | Fossil Fuel Combustion | US Territories |
| Non-Energy Use of Fuels | Energy | Non-Energy Uses of Fossil Fuels | US Territories |
| Stationary Combustion | Energy | Fossil Fuel Combustion | US Territories |
| LULUCF Sector Net Total |  | Land-Use Change and Forestry | Cropland | Cropland Remaining Cropland |
| Land Converted to Crop Land |
| Forest land | Forest Land Remaining Forest Land |
| Land Converted to Forest Land |
| Grassland | Grassland Remaining Grassland |
| Land Converted to Grassland |
| Settlements | Land Converted to Settlements |
| Settlements Remaining Settlements |
| Wetlands | Land Converted to Wetlands |
| Wetlands Remaining Wetlands |

## Annotations Tab

Column definitions for the Annotations tab and guidance for interpreting and use of each column in your analyses are provided below in Table 4.1.

**Table 4.1 Annotations Tab - Column Description and Use**

|  |  |
| --- | --- |
| Column Name | Column Description and Use |
| SECTOR | As described for Data by UNFCCC-IPCC Sectors. |
| SUBSECTOR | As described for Data by UNFCCC-IPCC Sectors. The fugitive subsector includes emissions from leaks, vents, and flaring (e.g., from petroleum and natural gas systems). |
| CATEGORY | As described for Data by UNFCCC-IPCC Sectors. |
| SUBCATEGORY1 | As described for Data by UNFCCC-IPCC Sectors. |
| SUBCATEGORY2 |
| SUBCATEGORY3 |
| SUBCATEGORY4 |
| FUEL | As described for Data by UNFCCC-IPCC Sectors. |
| STATE | As described for Data by UNFCCC-IPCC Sectors. |
| GHG | As described for Data by UNFCCC-IPCC Sectors. |
| Y1990 – Y2020 | Annual state-level estimates are quantified for the 30-year time series providing data from 1990-2020. The data includes use of notation keys to indicate completeness of the data as outlined below:   * **NO** (not occurring) for activities or processes in a particular source or sink category that do not occur * **NE** (not estimated) for existing emissions by sources and removals by sinks of greenhouse gases which have not been estimated. * **IE** (included elsewhere) for emissions by sources and removals by sinks of greenhouse gases estimated but included elsewhere in the inventory   Note, where numbers on the Data by UNFCCC-IPCC Sectors and Data by Econ Sect tabs contain zeros these zeros can indicate several conditions, i.e., that activity is actually zero, not occurring, or not estimated for a particular state. If an Annotation is record present these zeros are based on the annotation. If no annotation records is present the emission is true zero. |
| RowNumber | RowNumber are provided to link data from the Data by UNFCCC-IPCC Sector Tab and Data by Econ Sect tab with the Annotations tab. To determine if emissions numbers in Columns Y1990 – Y2020 are associated with an annotation you may use the RowNumber to find the associated annotation row. |