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# Community Greenhouse Gas Inventory

Prepared For  
**Albany County**

112 State Street  
Albany, New York

November 2024

**Barton & Loguidice**

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Albany County  
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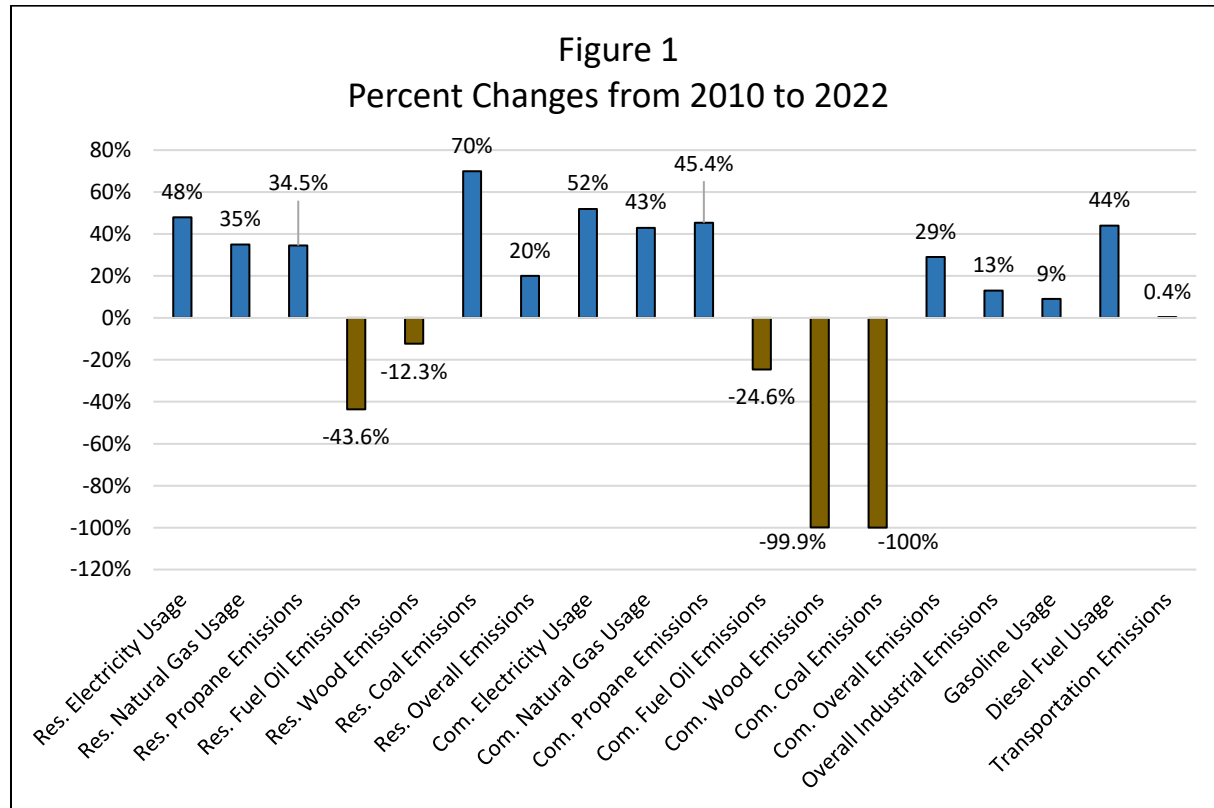
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## EXECUTIVE SUMMARY

This Community Greenhouse Gas Emissions Inventory (GHG EI) provides a comprehensive inventory of 2022 greenhouse gas emissions from operations within each community in Albany County. These emissions includes the combustion of utility and non-utility fuels for heating private residences, electricity usage, fuel usage by commercial sources, fuel usage by industrial sources, transportation, agricultural operations, and waste management operations. This report satisfies the Pledge Element Action 2 of the New York State Climate Smart Communities program, of which Albany County has been a member since 2009, and it serves as an update to the Baseline GHG EI Report completed in 2010.

Albany County's GHG emissions for all communities within the County totaled 7,958,331 metric tons of carbon dioxide equivalents (MTCDE) in 2022. Overall, the communities inventoried saw a 3% increase in emissions from the 2010 report. The largest source of emissions were industrial sources, accounting for 53% of overall emissions. Data was broken into percent usage by emission sector and fuel type. Changes from the Baseline GHG EI Report are as follows:



These increases, seen in most sectors, can be attributed to an increase in energy usage throughout the communities within the County.

**ABBREVIATIONS**

|                   |                                                         |
|-------------------|---------------------------------------------------------|
| ACS               | American Community Survey                               |
| CDTC              | Capital District Transportation Committee               |
| CFC               | Chlorofluorocarbons                                     |
| CH <sub>4</sub>   | Methane                                                 |
| CLCPA             | Climate Leadership and Community Protection Act         |
| CO <sub>2</sub>   | Carbon dioxide                                          |
| CO <sub>2</sub> e | Carbon dioxide equivalents                              |
| CSC               | Climate Smart Communities                               |
| EI                | Emission Inventory                                      |
| EIA               | Energy Information Administration                       |
| EPA               | Environmental Protection Agency (US)                    |
| EV                | Electric vehicle                                        |
| FLIGHT            | Facility Level Information on Greenhouse gases Tool     |
| GHG               | Greenhouse gas                                          |
| GIPA              | Green Island Power Authority                            |
| HDD               | Heating degree day                                      |
| HFC               | Hydrofluorocarbons                                      |
| IPCC              | Intergovernmental Panel on Climate Change               |
| kWh               | Kilowatt-hours                                          |
| LFGTE             | Landfill Gas to Energy                                  |
| mcf               | Thousand cubic feet                                     |
| MMBtu             | Million British thermal units                           |
| Mmt               | Million metric tons                                     |
| MRR               | Mandatory Reporting Rule                                |
| MTCDE             | Metric tons carbon dioxide equivalents                  |
| MWh               | Megawatt-hours                                          |
| N <sub>2</sub> O  | Nitrous oxide                                           |
| NAICS             | North American Industry Classification System           |
| NASS              | National Agricultural Statistics Service                |
| NEI               | National Emissions Inventory                            |
| NYS               | New York State                                          |
| NYSDEC            | New York State Department of Environmental Conservation |
| NYSDOT            | New York State Department of Transportation             |
| NYSEG             | New York State Electric and Gas                         |
| NYSERDA           | New York State Research and Development Authority       |

|      |                               |
|------|-------------------------------|
| ODS  | Ozone-depleting substances    |
| ppm  | Parts per million             |
| SIT  | State Inventory Tool          |
| T&D  | Transmission and distribution |
| VMT  | Vehicle miles travelled       |
| WTE  | Waste to Energy               |
| WWTP | Wastewater treatment plant    |

## 1.0 INTRODUCTION

The Climate Smart Communities (CSC) program is a New York State (NYS) initiative that helps local governments take action to reduce GHG emissions and adapt to a changing climate as outlined in New York's Climate Leadership and Community Protection Act (CLCPA). Albany County took the Climate Smart Communities (CSC) Pledge in 2009, which enables the County to receive technical support from New York State and assistance to help the County progress through the ten CSC Pledge Elements. One of the pledge elements is to set goals, inventory emissions, and move to action.<sup>1</sup> As part of the County's 2011 Climate Smart Communities Regional Coordinators Pilot Program, the County developed a baseline greenhouse gas (GHG) emission inventory (EI) for 2010 community-wide operations associated with all municipalities within the County.

Albany County, with support from Barton & Loguidice, D.P.C., developed a GHG EI for 2022. This 2022 GHG EI is an update to the 2010 Baseline GHG EI Report,<sup>2</sup> and together, they serve as the emission inventory for the County. The GHG EI are updated to measure progress using the Plans started by this CSC Program, and the County can use them to assess existing programs as well as potential new emission reduction targets and strategies to achieve outlined climate action goals.

### 1.1. Climate Leadership and Community Protection Act (CLCPA)

The CLCPA, signed into law in July 2019, established the following statewide targets:

- To reduce total GHG emissions by 40 percent from 1990 levels by 2030,
- To achieve a zero-emissions electricity sector by 2040, and
- To reduce total GHG emissions by 85 percent from 1990 levels by 2050.

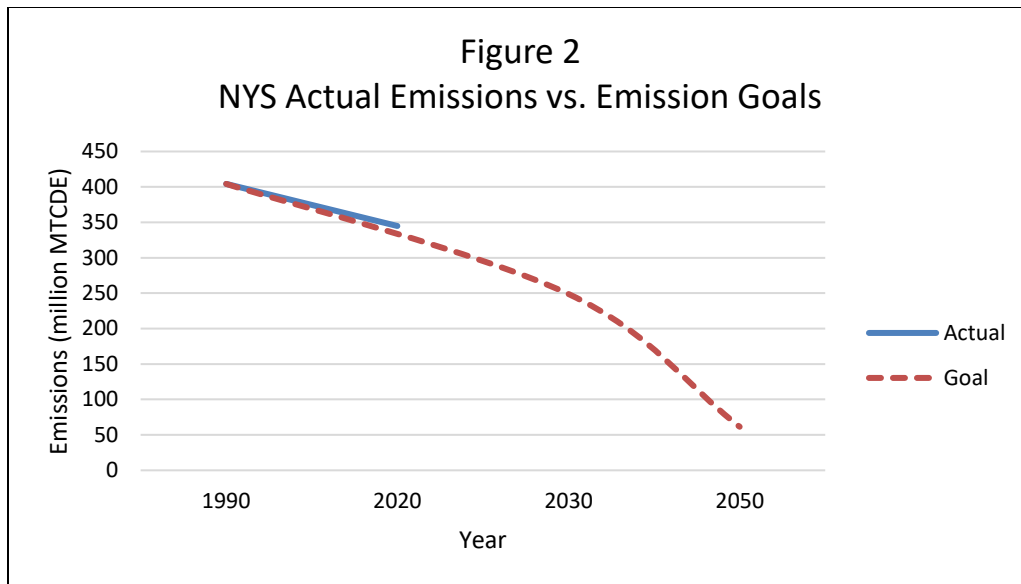
As inventoried by the New York State Department of Environmental Conservation (NYSDEC), statewide baseline emissions were 404.26 million metric tons of CO<sub>2</sub>e (MTCDE) in 1990. The CLCPA established emission goals for the years 2030 and 2050 based on these emissions to help the State combat climate change. Total gross emissions statewide in 2020 were 15% lower than 1990 and 8% lower than in 2019.<sup>3</sup> While emissions have decreased, work remains to meet the CLCPA target objectives. To track this statewide progress on a regional level, greenhouse gas inventories are completed to compare the emission levels in a particular area as time progresses on both the local government and community levels. Figure 2 illustrates these emission goals and New York State's current emissions.

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<sup>1</sup> Albany County, "Climate Smart Communities Profile," March 2013, <https://www.albanycounty.com/home/showpublisheddocument/946/636984653559470000>.

<sup>2</sup> Albany County, "Albany County 2010 GHG Inventory: County and Municipal Inventories," 2010, [Microsoft Word - DRAFT2 Albany County GHG Inventory Report.docx](#)

<sup>3</sup> New York State Department of Environmental Conservation, "2022 Statewide GHG Emissions Report," [2022 Summary Report of the NYS Statewide GHG Emissions Report](#)



In December 2022, the New York’s Climate Action Council released its Final Scoping Plan. This plan outlines a variety of regulatory and legal changes, sector-specific strategies, market mechanisms, and technologies essential to achieving the CLCPA’s goals and requirements.

The Final Scoping Plan identifies actions needed from a variety of different sectors, and economy-wide, for New York to achieve the CLCPA target objectives.

### 1.2. Climate Smart Communities

The Climate Smart Communities (CSC) program began in 2009 and helps to provide guidance, technical support, and recognition to communities as they take action to address climate change. Benefits to participation in this program include:

- Cost savings through decreased energy use,
- Greater energy independence,
- Improved air quality,
- Reduction in flood risk,
- Green space conservation for people and wildlife, and
- Investment in a green economy.

The first step in becoming a Climate Smart Community is to adopt the Climate Smart Communities Pledge and send it to the New York State Department of Environmental Conservation (NYSDEC). This pledge is a public commitment to reduce GHG emissions and adapt to a changing climate.

The program is centered on the following ten priority elements:

- 1) Build a climate-smart community;
- 2) Inventory emissions, set goals, and plan for climate action;
- 3) Decrease energy use;

- 4) Shift to clean, renewable energy;
- 5) Use climate-smart materials management;
- 6) Use climate-smart land use;
- 7) Enhance community resilience to climate change;
- 8) Support a green innovation economy;
- 9) Inform and inspire the public; and
- 10) Engage in an evolving process of climate action.

The program also includes more than 100 actions to assist in achieving program goals. The actions fall into two categories: mandatory and priority. Mandatory actions are required for certification, and priority actions tend to be relatively low-cost assessments and policies that establish a baseline knowledge and plan for future action. An example of a mandatory action for this program would be the completion of this GHG EI, whereas an example of a priority action would be informing and inspiring the public to reduce emissions. Local governments earn points for completing the various actions, and they can attain bronze, silver, and gold certifications as specific milestones are reached.

The 2010 Baseline GHG EI Report and the current 2022 GHG Emissions Inventory was part of the pledge element to “inventory emissions, set goals, and plan for climate action.” The CSC Program provides an inventory guidance document that was referenced in the preparation of this GHG EI update. The Baseline GHG EI Report was also referenced.<sup>4</sup>

### **1.3. Basis for Development**

A GHG emission inventory is one of the first and most important steps in the local climate action process. In general, an emission inventory is used as an account of emissions emitted to or removed from the atmosphere during a specific period. This community operations GHG inventory is an accounting, analysis, and report of the GHG emissions resulting from everyday operations within the County. GHG emissions from the consumption of energy and fuels in homes and businesses, agricultural activities, waste management activities, transportation, refrigeration, and other community-based operations are summarized in this inventory.

GHG inventory reports serve as a tool to:

- Identify the largest sources of GHG emissions, by grouping (e.g. residential, commercial, or industrial) or sector, and
- Track emissions over time to help plan for future emission reduction efforts.

### **1.4. Community Operations Emission Inventory Scope**

Inventories categorize emissions by “scopes” to provide a consistent way of accounting for emissions based on an organization’s or community’s level of control. By using scopes to help categorize emissions sources, the County can easily identify GHGs directly emitted by

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<sup>4</sup> Albany County, “Albany County 2010 GHG Inventory: County and Municipal Inventories,” 2010, [Microsoft Word - DRAFT2 Albany County GHG Inventory Report.docx](#)

community operations, and those produced by large GHG emitters throughout the communities inventoried. The Climate and Smart Communities New York Community and Regional GHG Inventory Guidance (version 1.0, September 2015) (CSC Guidance), further defines three emission scopes.<sup>5</sup>

| Table 1-1<br>Emission Inventory Scope Categories |                                                                                                                             |                                                                                                                                                                                                         |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scope                                            | What They Cover                                                                                                             | Examples                                                                                                                                                                                                |
| Scope 1                                          | <ul style="list-style-type: none"> <li>All direct GHG emissions that occur within a regional community boundary.</li> </ul> | <ul style="list-style-type: none"> <li>Burning fuels to heat homes or businesses.</li> <li>Landfill methane from waste generated and landfilled within the inventoried boundary.</li> </ul>             |
| Scope 2                                          | <ul style="list-style-type: none"> <li>Indirect emissions from the use or purchase of electricity.</li> </ul>               | <ul style="list-style-type: none"> <li>Electricity consumption.</li> </ul>                                                                                                                              |
| Scope 3                                          | <ul style="list-style-type: none"> <li>Indirect emissions an entity may influence or not control.</li> </ul>                | <ul style="list-style-type: none"> <li>Fuel consumed by air travel.</li> <li>Landfill methane from waste generated within the inventoried boundary, but landfilled outside of this boundary.</li> </ul> |

B&L worked with the County to determine the boundaries of the GHG inventory. This Greenhouse Gas Emissions Inventory includes Scope 1, Scope 2, and Scope 3 emission sources from various operations throughout communities within the County.

### 1.5. Greenhouse Gas Emissions

GHGs trap infrared radiation emitted from the Earth's surface and solar radiation emitted by the sun that enters the Earth's atmosphere. By preventing this radiation from escaping, the Earth gets warmer like a greenhouse. Climate changes with the changes in characteristics of the planet, such as temperature.

GHGs include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Certain refrigerants, including chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs), also contribute to climate change. CO<sub>2</sub> is the primary GHG emitted through human activities, accounting for approximately 79% of all GHG emissions.<sup>6</sup> Although CO<sub>2</sub> is naturally present in the atmosphere, emissions from human activities have significantly increased the levels of CO<sub>2</sub> (and other GHGs) in the

<sup>5</sup> Climate Action Associates LLC, "Climate Smart Communities: New York Community and Regional GHG Inventory Guidance," version 1.0, Sept 2015.

<sup>6</sup> United States Environmental Protection Agency, "Overview of Greenhouse Gases," February, 2024.

atmosphere since the industrial revolution through fossil fuel combustion, deforestation, and land-use changes, which is causing climate change.

These different GHGs can have different effects on the Earth's warming, and global warming potentials (GWPs) are used to allow for comparisons of the global warming impacts on different gases. GWP was developed by the Intergovernmental Panel on Climate Change (IPCC) to address the fact that GHGs differ from each other. These differences are based on their availability to absorb energy (referred to as the "radiative efficiency") and how long they stay in the atmosphere (referred to as the gas's "lifetime"). GWP serves to measure how much energy the emissions of 1 metric ton of a gas will absorb over a given period, relative to the emissions of 1 metric ton of CO<sub>2</sub>. CO<sub>2</sub> is used as the standard GHG as it is the most prevalent GHG. The larger the GWP, the more that a given gas warms the Earth compared to CO<sub>2</sub> over that time, typically a 100-year time period. In the IPCC's Fifth Assessment Report, methane was assigned a GWP of 28, and nitrous oxide was assigned a GWP of 265.<sup>7</sup> This means that methane can absorb 28 times more energy than CO<sub>2</sub>, so 28 times more energy can be trapped in Earth's atmosphere by one metric ton of methane than one metric ton of CO<sub>2</sub>.

GHG emissions are typically reported as metric tons of CO<sub>2</sub> equivalents or MTCDE. These are calculated by multiplying the metric tons of each GHG emitted by that GHG's global warming potential and summing the results. Reporting the GHG emissions as MTCDE allows policymakers to compare emissions reduction opportunities across sectors and gases.

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<sup>7</sup> Intergovernmental Panel on Climate Change. "Fifth Assessment Report." IPCC, Nov 2014.

## 2.0 INVENTORY METHODOLOGY, DATA SOURCES, AND CALCULATIONS

This report follows the methodology laid out in the CSC’s “NY Community and Regional GHG Inventory Guidance” (CSC Guidance).<sup>8</sup> This was developed by the CSC Program and outlines the methods and data sources needed to conduct regional GHG Emission Inventories. Once collected, data was input into EPA’s Local GHG Inventory Tool: Community Operations Module (version 2023.1) (“The Tool”). The Tool consists of an Excel template that the user can use to input data and calculate estimated GHG emissions from each emissions source.

Emission inventories that are updates to baseline emissions are kept consistent to allow for appropriate comparisons of community emissions from year to year. This is achieved by establishing the following during the baseline emissions inventory and keeping them the consistent during updates:

- The inventory boundary (for example, all community operations taking place within the County),
- The “scopes” selected,
- Source types within each scope (for example, stationary combustion sources), and
- The method (for example, using the same emissions accounting tool).

In addition to ensuring these are the same, the same GWP would need to be used. Prior baseline emissions may be scaled to the GWPs from the IPCC’s most recent Assessment Report used in the current inventory.

### 2.1. Emissions Sources

Emissions sources were identified through discussions with County staff, and review of the CSC Guidance. These sources include stationary combustion of fossil fuels, electricity consumption, mobile combustion sources from transportation vehicles, agricultural activities, and waste management. Including these within this inventory helps to capture the emissions generated by community activities in a way that is easy to understand.

The County’s Baseline GHG EI Report inventoried 2010 emissions which included all raw data, calculations, tables, and figures. Raw data for this report was collected from a variety of reputable sources, including the US Census, EPA, and NYSDEC databases. Sources of emissions included in this inventory were based on the outlined sources found in the CSC Guidance. To maintain uniformity between the Baseline GHG EI Report and the 2022 GHG EI, the same emission sources were inventoried where possible. Table 1-2 below outlines each emission source as well as where the information was sourced from for both the 2010 and 2022 reports.

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<sup>8</sup> Climate Action Associates LLC, “Climate Smart Communities: New York Community and Regional GHG Inventory Guidance,” version 1.0, Sept 2015.

| Table 1-2<br>Data Sources |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emission Source           | 2010 Baseline GHG EI Report                                                                                                                                                                                                                                                       | 2022 GHG EI Report                                                                                                                                                                                                                                                                                                                                                               |
| Transportation            | <ul style="list-style-type: none"> <li>2010 New York State Department of Environmental Conservation (NYSDEC) Albany County Emissions Inventory</li> <li>2010 Capital District Transportation Committee (CDTC) data</li> <li>2002 NY Locomotive Survey</li> </ul>                  | <ul style="list-style-type: none"> <li>2021 National Emissions Inventory (NEI) Data Retrieval Tool</li> <li>2022 NYS Vehicle and Boat Registrations by fuel type</li> <li>2017 New York State Department of Transportation (NYSDOT) highway mileage</li> <li>2023 NYSDEC non-road emissions data</li> </ul>                                                                      |
| Residential               | <ul style="list-style-type: none"> <li>2010 Energy Information Administration (EIA) energy consumption estimates</li> <li>2010 National Grid, Central Hudson, NYS Electric and Gas (NYSEG), and the Green Island Power Authority (GIPA) energy consumption information</li> </ul> | <ul style="list-style-type: none"> <li>2021 Energy Information Administration (EIA) energy consumption estimates</li> <li>NYS Capital Region Indicators website</li> <li>2021 American Community Survey (ACS) 5-year house heating fuel data</li> <li>2022 New York State Energy Research and Development Authority (NYSERDA) energy tool</li> <li>2021 NEI data tool</li> </ul> |
| Industrial                | <ul style="list-style-type: none"> <li>2010 Environmental Protection Agency (EPA) Facility Level Information on Greenhouse gases Tool (FLIGHT)</li> <li>2010 EIA Schedule 923</li> <li>2010 NYSDEC Title V Program</li> </ul>                                                     | <ul style="list-style-type: none"> <li>2021 NEI data tool</li> <li>2022 NYSDEC Title V Program</li> <li>2022 Mandatory Reporting Rule (MRR) data</li> <li>2015 CSC Guidance</li> <li>2022 NYS Utility Data Registry</li> </ul>                                                                                                                                                   |
| Waste                     | <ul style="list-style-type: none"> <li>2010 EPA State Inventory Tool (SIT)</li> <li>2010 NYSDEC Title V program</li> </ul>                                                                                                                                                        | <ul style="list-style-type: none"> <li>2021 NEI facility source emissions table</li> <li>2022 EPA FLIGHT</li> <li>2022 NYSDEC Annual Part 360 Reports for</li> </ul>                                                                                                                                                                                                             |

| Table 1-2<br>Data Sources                                                                                                                                                                                                                                                                          |                                                                                                                                   |                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Emission Source                                                                                                                                                                                                                                                                                    | 2010 Baseline GHG EI Report                                                                                                       | 2022 GHG EI Report                                                                                                            |
|                                                                                                                                                                                                                                                                                                    |                                                                                                                                   | waste management facilities                                                                                                   |
| Agricultural                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>2010 EPA SIT</li> <li>2010 National Agricultural Statistics Service (NASS) data</li> </ul> | <ul style="list-style-type: none"> <li>2017 National Agricultural Statistics Survey (NASS)</li> <li>2022 US Census</li> </ul> |
| <b>Note:</b><br>When data for all of 2022 was not available by the time of this report's writing, the most recent available complete dataset was used to ensure calculations are as accurate as possible and feasible. This is why some datasets from previous years were used for this inventory. |                                                                                                                                   |                                                                                                                               |

Once data was collected for each of the emission source categories identified, the data and corresponding emissions were assigned to a specific sector for analysis.

## 2.2. Emission Factors

GHG emission factors were obtained from a number of sources highlighted within the Tool. Stationary emissions factors were sourced from the "The Climate Registry 2022 Default Emission Factors and Emission Factors for Greenhouse Gas Inventories" from the EPA.<sup>9</sup> Electricity factors were sourced from eGRID2021 for the New York Upstate Region (released January 30, 2023).<sup>10</sup> GWPs were also sourced from the IPCC's Fifth Assessment Report.<sup>11</sup> Wastewater treatment emission factors were sourced from the "Local Government Operations Protocol" (version 1.1).<sup>12</sup> Wood and coal emission factors were sourced from USEPA 40 CFR Part 98 Subpart C.<sup>13</sup> All source activity and emissions factor data were compiled into a database developed for project-specific data storage and management ("Albany County GHG Community Inventory Calculations").

## 2.3. Emission Categorization

The EPA's Local GHG Inventory Tool: Community Operations Module (version 2023.1) was utilized for data input and emission calculations. Emissions were analyzed by scope, sector, and fuel type. Emission sectors were used to categorize the GHG emissions at a high level within the community.

<sup>9</sup> United States Environmental Protection Agency. "The Climate Registry 2022 Default Emission Factors and Emission Factors for Greenhouse Gas Inventories." USEPA, April 2022.

<sup>10</sup> United States Environmental Protection Agency. "eGRID 2021 NYSUP Sub region." USEPA, Revised January 2023.

<sup>11</sup> Intergovernmental Panel on Climate Change. "Fifth Assessment Report." IPCC, November 2014.

<sup>12</sup> California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability, and The Climate Registry. "Local Government Operations Protocol," version 1.1, 03 May 2010.

<sup>13</sup> United States Environmental Protection Agency. "40 CFR Part 98 Subpart C". USEPA, Revised March, 2024.

Emission sources were categorized under three main “sectors” as further described below. The term “sector” refers to the primary activity across communities that is responsible for the GHG emissions within each individual community.

#### 2.3.1. Agriculture

The agricultural sector encompasses all of the agricultural activities within Albany County. Emissions estimated under this sector are primarily from livestock population and crop acreage. Data from the 2017 National Agricultural Statistics Survey (NASS) include the number of farms, amount of livestock, and acres of cropland within each county in New York State. This was then used to modify the US EPA State Inventory Tool to estimate emissions by using New York State average default factors already in the Inventory Tool for the year 2022, and inputting County total livestock and crop quantities to scale for actual agricultural activities within the County.

#### 2.3.2. Energy Consumption

The Energy Consumption sector encompasses all emissions from residential, commercial, industrial, and transportation sources. Energy sources used include natural gas, electricity, coal, fuel oils (including kerosene), wood, and propane.

##### 2.3.2.1 Residential Building Non-Utility Fuel Use

Community fuel consumption was estimated by using Energy Information Administration (EIA) data on total residential fuel consumption for New York State and the 2020 NYSERDA Energy Profile, along with 2021 American Community Survey (ACS) data on effective housing units and home heating fuel preferences. An effective housing unit (EHU) is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters.<sup>14</sup> These are determined by weighing specific household information such as household counts and housing size across each community. Consumption of each fuel was scaled from State consumption totals to local totals by comparing the number of effective housing units and heating fuel preferences across the entire State and Albany County. Since coal is no longer considered a major source of residential heat, the total quantity of coal consumed was based off of the New York State total fuel oil consumption, and scaled using the effective number of coal burning houses in the County.

##### 2.3.2.2 Commercial Building Fuel use

Commercial fuel consumption by each community was determined by weighing the fuel consumption by commercial entities for each municipality by its total commercial square footage space. This was done by taking the total number of employees within each community and using square footage per worker data

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<sup>14</sup> American Census Bureau. “Population Estimates Program”, USACS, January, 2024.

from the North American Industry Classification System (NAICS) to determine total commercial square footage. This was then compared to the 2021 total New York State commercial energy usage data, and square footage space, to scale down consumption to a community level. Heating fuel preference and climate differences were also taken into account.

#### 2.3.2.3 Industrial Facility Fuel Use

Emissions from large industrial facilities fall into one of the three mandatory programs which require this data to be made public: the EPA's Facility-level GHG Reporting Program through the EPA's Facility Level Information on Green House gases Tool (FLIGHT), the NYSDEC's Title V permit program issued under the Air Permitting and Registration Program, or the Energy Information Administration (EIA)'s Schedule 923 annual electric utility reporting. Data was collected from these sources for 2022. Large industrial emitters, industrial power and natural gas generation facilities, and transmission and distribution (T&D) losses from these generation facilities were included in this inventory. These emissions also account for industrial process emissions such as cement and paper production throughout the County. Industrial emissions from electricity usage were also inventoried for this report. This data was taken from the NYSEDA Utility Registry database for the year 2022, but some of this information was withheld, meaning electricity emissions may be higher than reported.

#### 2.3.2.4 Transportation

Several means of transportation were accounted for in this inventory: on-road, off-road, railway, air, and marine.

On-road transportation data for all of the communities within the County were provided by the Capital District Transportation Committee (CDTC). The total number of vehicles registered within the County by fuel type in 2022 was used along with the total vehicle miles travelled (VMT) per year, as last reported in 2017 by NYSDOT. This data, along with the 2022 average fuel efficiency of the different vehicle types, were used to estimate on-road emissions from gasoline and diesel fuel consumption. Electric vehicle (EV) emissions are accounted for in electricity consumption totals; therefore, EVs were not included in the transportation emissions sector.

Non-road transportation data was provided by the NYSDEC for non-road equipment for the year 2023, as 2022 non-road data was not projected by NYSDEC. This data included all off-road vehicle emissions and included all air and marine travel within the County.

Railway transportation is entirely Class I freight. No communities in Albany County contain electric rails or Class II/III freight which include passenger/commuter and switchyard rails. Diesel fuel consumption by County was obtained from the 2020 NEI data retrieval tool and used to determine total emissions for railway transportation.

#### 2.3.3. Waste Management

The waste management sector encompasses all emissions generated at landfills, waste management sites, and municipal wastewater treatment facilities located within the County. Landfill sources include the City of Albany Rapp Road Waste Management Facility and the Town of Colonie Landfill. Closed landfills were not included in this inventory, as it was determined that emissions from these facilities is minimal given the age of these facilities. All closed landfills within the County have been closed for more than 30 years, and older waste generates significantly less emissions than newer waste.

Scope 3 landfill gas emissions were also included within this sector. These include emissions from waste generated within the emissions inventory boundary, but landfilled outside of the inventoried boundary. These emissions were estimated using the USEPA's Waste Reduction Model (WARM), which combines national and regional GHG waste generation averages with the total tonnage of waste sent out of the area to be landfilled or incinerated.

Wastewater treatment sources include the two (2) Albany County wastewater treatment plants (the North and South Plants), and individual septic tanks. Wastewater emissions were estimated using the EPA State Inventory Tool, which combines per capita emission averages with community population.

The NEI facility source emissions table, EPA FLIGHT, and the wastewater treatment plant annual reports for 2022 were used to estimate emissions. Landfill gas combusted in engines or flares are included in the Biogenic Emissions detailed in Section 2.3.4. All other landfill emissions are included in the Waste Management sector emissions totals.

#### 2.3.4. Biogenic Emissions

Biogenic emissions are defined as CO<sub>2</sub> emissions produced from the burning of biofuels such as wood, ethanol, or landfill gas in the CSC Guidance. These emissions are considered "carbon neutral" and therefore do not cause climate change. Biogenic emissions were calculated as part of this emission inventory for completeness, but are categorized separately and not include in the total Community GHG emissions per CSC guidance. Similar to the 2010 Baseline GHG EI, a portion of emissions from wood combustion, on-road gasoline combustion (to account for ethanol in gasoline), and landfill gas combustion were calculated to be accounted for as biogenic emissions.

The assumptions stated in the CSC Guidance for biogenic calculations used in the report include that 44% of landfill gas combustion emissions for electricity generation were biogenic, and that 6.78% of gasoline emissions for on-road transportation were biogenic to account for the ethanol sourced from plant materials added to the gasoline. All non-road emissions (including emissions from all off-road vehicles, air travel, and marine travel) were considered Scope 1 for this report. Provided data from NYSDEC was not broken out by fuel type, so the exact amount of E10 gasoline, meaning fuel containing a blend of 10% ethanol and 90% gasoline, was not able to be determined. Biogenic emissions from wood were calculated for residential and commercial sectors but not for the industrial sector because industrial data did not provide a breakdown of consumption by individual fuel type.

## **2.4. Changes Since 2010**

### **2.4.1. Data Sources**

For this GHG EI update, certain data sources remained consistent with those from the prior 2010 GHG EI, while others were modified or are new based on the availability of data for each sector evaluated. The 2010 report was part of a largescale effort to gather detailed findings of GHG emissions for the entire Capital District, including Albany and other surrounding Counties. Since this study was the first of its kind, and has not been followed up with an equally detailed study in more recent years, some specific fuel usage data has not been calculated for this report. These include breakdowns of non-utility industrial fuel usage and fuel-specific usage for non-road transportation sources. Reports for these sources showed total emissions in MTCDE only, and did not include these individual fuel breakdowns.

In the 2010 Baseline GHG EI Report, electricity and natural gas consumption data were collected from utility providers for all communities within the Capital Region. For 2022, EIA-reported statewide consumption data for electricity and natural gas based on equivalent housing units provided by ACS was scaled for Albany County. All fuel consumption data for residential and commercial use was obtained and scaled using this method.

### **2.4.2. Emission Factors and GWP Differences**

When calculating GHG emissions, emission factors are used to convert units of individual fuel source usage into MTCDE. These emission factors are incorporated into the Tool and can impact calculated emissions results based on which set of factors are used.

The 2022 GHG EI Report's emission factors are sourced from the most recent version of the GHG EI Tool, discussed above. The 2010 Baseline GHG EI Report used different emission factors than those in the current Tool. Electricity, for example, has new emission factors published annually, due to the changing energy source for electricity

generation. The regional grid coefficient dropped by almost half from 2010 to 2022 as the regional network of electricity providers drew power from a greater percentage of renewable energy sources. These sources, such as Abest Green Power, and CleanChoice Energy, have started supplying major energy providers like National Grid.<sup>15</sup> These sources provide green energy from methods such as wind turbines, which in turn reduces overall emissions related to the use of electricity. Decreasing the amount of emissions per kWh from increasing the amount of cleaner energy in electricity used in New York State significantly decreases total emissions. This is how emissions stayed relatively stable between the 2010 and 2022 reports despite increasing usage over time. It should be noted that emission factors for various energy sources change over time and at different rates.

Additionally, Global Warming Potentials (GWPs) are used to convert tons of CH<sub>4</sub> and N<sub>2</sub>O to MTCDE. The most recent IPCC Report, the Fifth Assessment Report (AR5) was used to calculate emissions in the 2022 report. In this report, methane was assigned a GWP of 28, and nitrous oxide was assigned a GWP of 265. The 2010 emissions calculations used GWPs published in a previous IPCC Report (the Third Assessment Report (AR3)), which was the most recent report available at the time. In the Third Assessment Report CH<sub>4</sub> was assigned a GWP of 21, and N<sub>2</sub>O was assigned a GWP of 310.<sup>16</sup> This results in an increase in CH<sub>4</sub> and N<sub>2</sub>O emissions, when comparing on a tons of CO<sub>2</sub>e-basis.

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<sup>15</sup> National Grid, "Energy Supplier List," 2023. [Energy Supplier List | National Grid \(nationalgridus.com\)](https://www.nationalgridus.com)

<sup>16</sup> Intergovernmental Panel on Climate Change. "Third Assessment Report." IPCC, 2001.

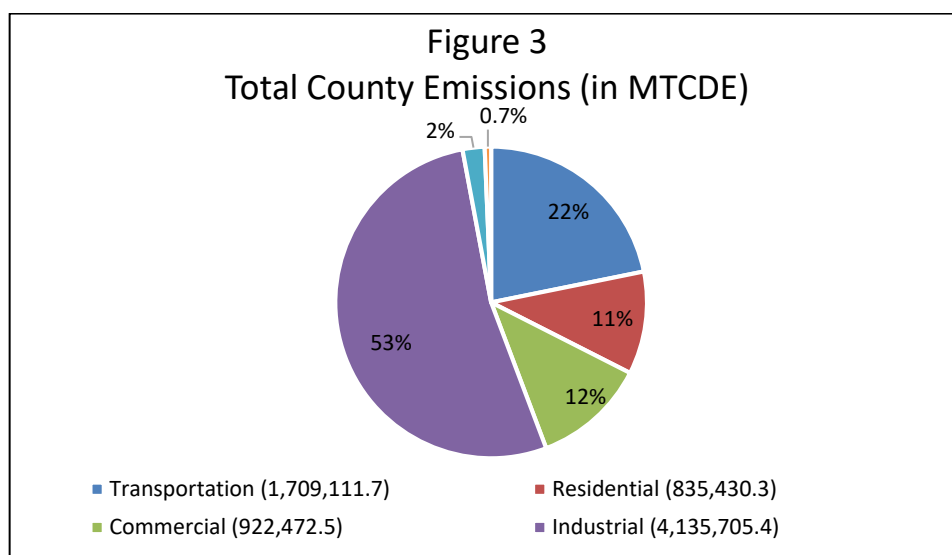
### 3.0 GHG INVENTORY RESULTS

#### 3.1. County-Wide Emissions

In 2022, an estimated 7,958,330 MTCDE are attributed to community GHG sources across all sectors within Albany County. Table 3-1 shows total emissions broken out by Scope. The breakdown of these emission sources overall are shown in Figure 3.

| Table 3-1<br>County-Wide Emissions Summary                   |                    |                    |                    |                     |
|--------------------------------------------------------------|--------------------|--------------------|--------------------|---------------------|
| Sector/Source                                                | Scope 1<br>(MTCDE) | Scope 2<br>(MTCDE) | Scope 3<br>(MTCDE) | Biogenic<br>(MTCDE) |
| <b>Residential Energy Consumption</b>                        |                    |                    |                    |                     |
| Electricity/Steam                                            |                    | 189,769            |                    |                     |
| Natural Gas                                                  | 549,866            |                    |                    |                     |
| Propane                                                      | 25,262             |                    |                    |                     |
| Distillate Fuel Oil (#1,2,4; Kerosene)                       | 67,768             |                    |                    |                     |
| Coal                                                         | 2,077              |                    |                    |                     |
| Wood                                                         | 1,349              |                    |                    | 64,061              |
| <b>Commercial Energy Consumption</b>                         |                    |                    |                    |                     |
| Electricity/Steam                                            |                    | 352,758            |                    |                     |
| Natural Gas                                                  | 511,227            |                    |                    |                     |
| Propane                                                      | 14,423             |                    |                    |                     |
| Distillate Fuel Oil (No. 1,2,4; Kerosene)                    | 44,065             |                    |                    |                     |
| Coal                                                         | 0                  |                    |                    |                     |
| Wood                                                         | 1                  |                    |                    | 44                  |
| <b>Industrial Process and Product Use Energy Consumption</b> |                    |                    |                    |                     |
| Global Companies LLC (Selkirk, 12158)                        | 1,140              |                    |                    |                     |
| Lafarge Building Materials, Inc.                             | 923,792            |                    |                    |                     |
| Norlite Corp                                                 | 50,582             |                    |                    |                     |
| Owens-Corning Insulating Systems                             | 42,981             |                    |                    |                     |
| Sabic Innovative Plastics US LLC                             | 36,006             |                    |                    |                     |
| Industrial Sector Electricity Usage                          |                    | 25,103             |                    |                     |
| Buckeye Albany Terminal                                      | 11,701             |                    |                    |                     |
| Citgo Glenmont Terminal                                      | 29                 |                    |                    |                     |
| <b>Energy Generation and Power Supply</b>                    |                    |                    |                    |                     |
| Bethlehem Energy Center                                      | 2,092,921          |                    |                    |                     |
| NYS OGS Sheridan Steam Plant                                 | 76,114             |                    |                    |                     |
| Albany Landfill GTE Facility                                 | 1,191              |                    |                    | 667                 |
| Innovative/Colonie                                           | 27,098             |                    |                    | 15,175              |
| Selkirk Cogeneration Project                                 | 192,785            |                    |                    |                     |
| Natural Gas T/D Losses                                       | 19,703             |                    |                    |                     |
| <b>Product Use (HFC, ODS)</b>                                |                    |                    |                    |                     |
| Use of SF <sub>6</sub> in the Utility Industry               | 52                 |                    |                    |                     |
| All Refrigerants except SF <sub>6</sub>                      | 124,202            |                    |                    |                     |
| <b>Transportation: On-Road</b>                               |                    |                    |                    |                     |
| Gasoline (E-10)                                              | 1,268,001          |                    |                    | 85,970              |
| Diesel Fuel                                                  | 365,400            |                    |                    |                     |

| Table 3-1<br>County-Wide Emissions Summary                                                                                                                                                                                                                                                                                                  |                    |                    |                    |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|-------------------------------|
| Sector/Source                                                                                                                                                                                                                                                                                                                               | Scope 1<br>(MTCDE) | Scope 2<br>(MTCDE) | Scope 3<br>(MTCDE) | Biogenic<br>(MTCDE)           |
| <b>Transportation: Non-Road</b>                                                                                                                                                                                                                                                                                                             |                    |                    |                    |                               |
| Total Emissions (NYSDEC Non-Road Model)                                                                                                                                                                                                                                                                                                     | 151,023            |                    | 10,658             |                               |
| <b>Waste Management</b>                                                                                                                                                                                                                                                                                                                     |                    |                    |                    |                               |
| Albany Rapp Road Landfill                                                                                                                                                                                                                                                                                                                   | 107,898            |                    |                    | 31,639                        |
| Town of Colonie Landfill                                                                                                                                                                                                                                                                                                                    | 34,481             |                    |                    | 53                            |
| Out of County Waste Emissions                                                                                                                                                                                                                                                                                                               |                    |                    | 13,035             |                               |
| Sewage Treatment                                                                                                                                                                                                                                                                                                                            | 23,645             |                    |                    |                               |
| <b>Agriculture</b>                                                                                                                                                                                                                                                                                                                          |                    |                    |                    |                               |
| Enteric Fermentation/Manure                                                                                                                                                                                                                                                                                                                 | 9,267              |                    |                    |                               |
| Soils/Fertilizer                                                                                                                                                                                                                                                                                                                            | 43,031             |                    |                    |                               |
| <b>Totals by Scope</b>                                                                                                                                                                                                                                                                                                                      | <b>7,367,007</b>   | <b>567,630</b>     | <b>23,693</b>      | <b>193,436</b>                |
| <b>Percent by Scope</b>                                                                                                                                                                                                                                                                                                                     | <b>93%</b>         | <b>6.7%</b>        | <b>0.3%</b>        | <b>2.4%<br/>(Not Counted)</b> |
| <b>Note:</b><br>1. Scope 3 emissions for this report included emissions from air travel and Landfill methane from waste generated within the inventoried boundary, but landfilled outside of the boundary.<br>2. Some industrial sector electricity emissions data was withheld, meaning electricity emissions may be higher than reported. |                    |                    |                    |                               |



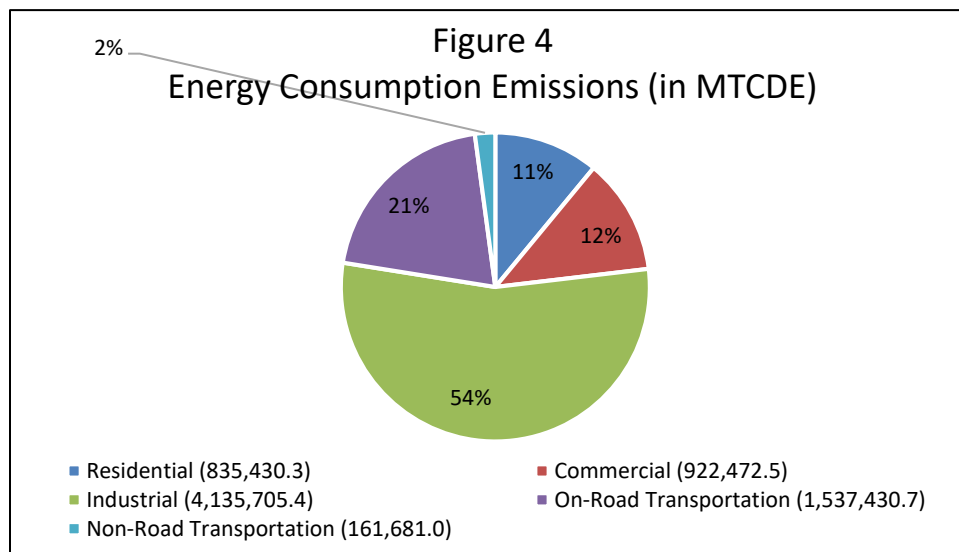
All Community GHG calculation inputs and fuel usage data is included in Appendix A. All community GHG emission outputs and calculated results are included in Appendix B.

### 3.2. Agricultural Sector Emissions

The agricultural sector produced a total of 52,928 MTCDE in 2022. These emissions primarily come from livestock production and crop growth occurring within each community. Agricultural production within the County generally takes place in rural areas and comprises less than 1% of total 2022 emissions.

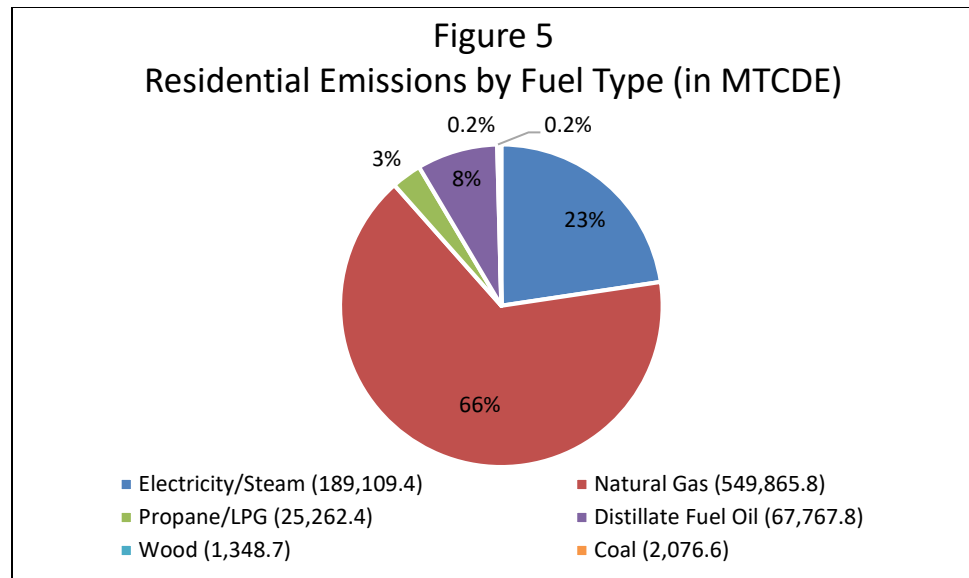
### 3.3. Energy Usage and Process Emissions

The energy usage and process emissions sector produced an estimated 7,566,017 MTCDE in 2022. These emissions come from a wide range of sources, including residential, commercial, and industrial sources. This also includes emissions from both on-road and non-road transportation vehicles. A breakdown of emissions from energy usage is shown in Figure 4.



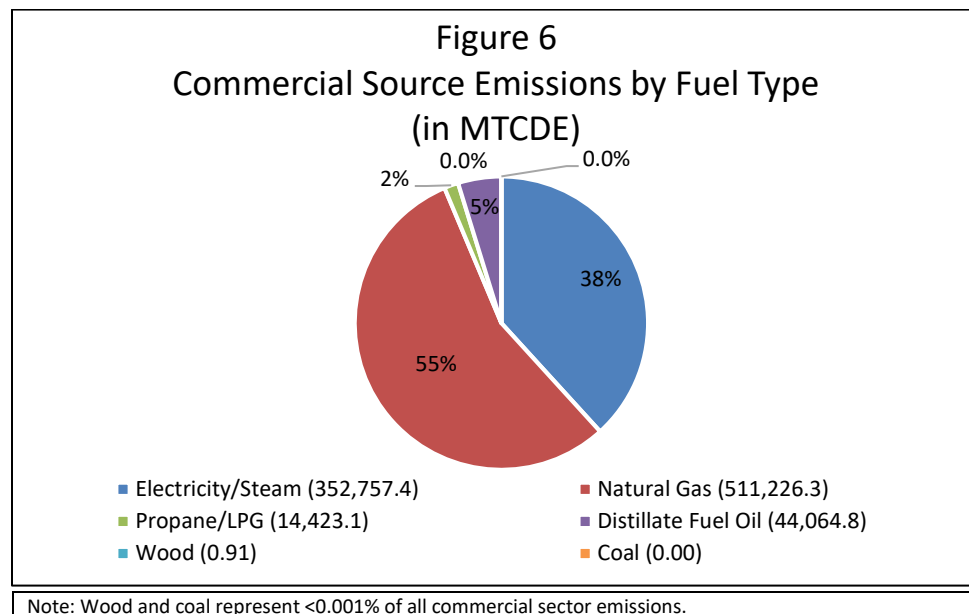
#### 3.3.1. Residential Energy Consumption

Residential energy consumption produced an estimated 835,430 MTCDE, or 11% of the total energy consumption emissions, in 2022. The majority of energy was from natural gas and electricity residential buildings within the County. Lesser emissions are attributable to alternative fossil fuels such as propane and fuel, and wood for building heating. A breakdown of total residential emissions by fuel type is shown in Figure 5.



### 3.3.2. Commercial Energy Consumption

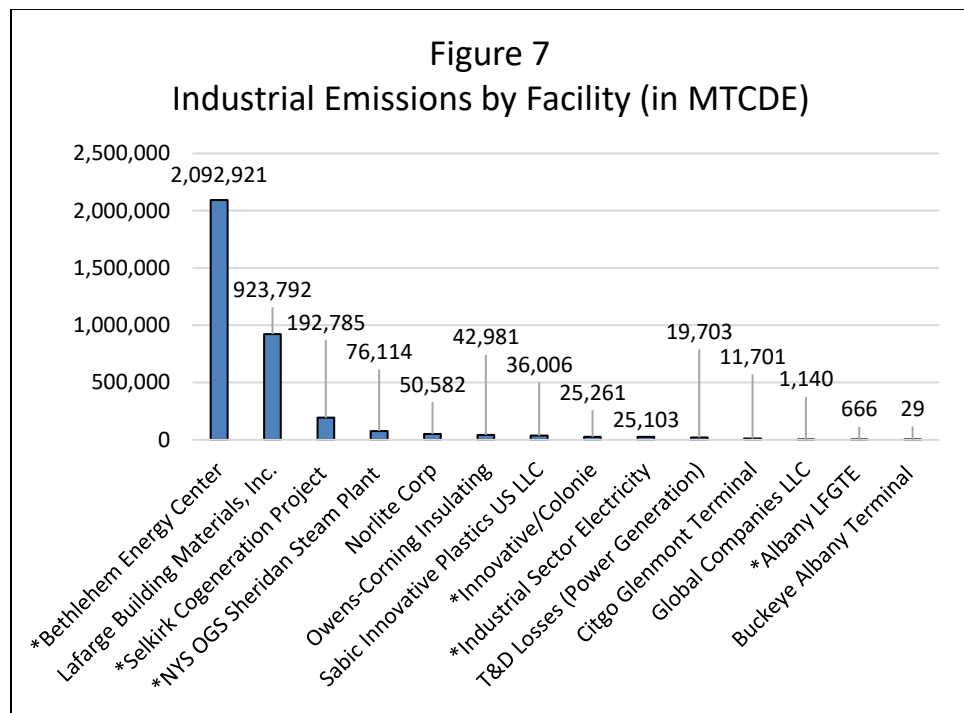
Commercial energy consumption produced an estimated 922,473 MTCDE, or 12% of total energy consumption emissions, in 2022. A breakdown of all commercial fuel usage by fuel type is shown in Figure 6.



### 3.3.3. Industrial Process and Product Use

#### 3.3.3.1 Direct Energy Consumption

Industrial facility energy consumption produced an estimated 4,135,705 MTCDE, or 53% of total energy consumption emissions, in 2022. This includes twelve (12) facilities reporting GHG emissions through the NYSDEC Title V program and encompasses power generation facilities within the County, which contributed 2,362,343 MTCDE to this total as well as T&D losses from power generation and emissions from electricity usage. Figure 7 shows emissions from each major industrial source included within this inventory.



#### Key

\* = Energy generation facilities

#### Notes:

1. To remain consistent with the 2010 report, only scope 1 and scope 2 process emissions were reported.
2. Some industrial sector electricity emissions data was withheld, meaning electricity emissions may be higher than reported.

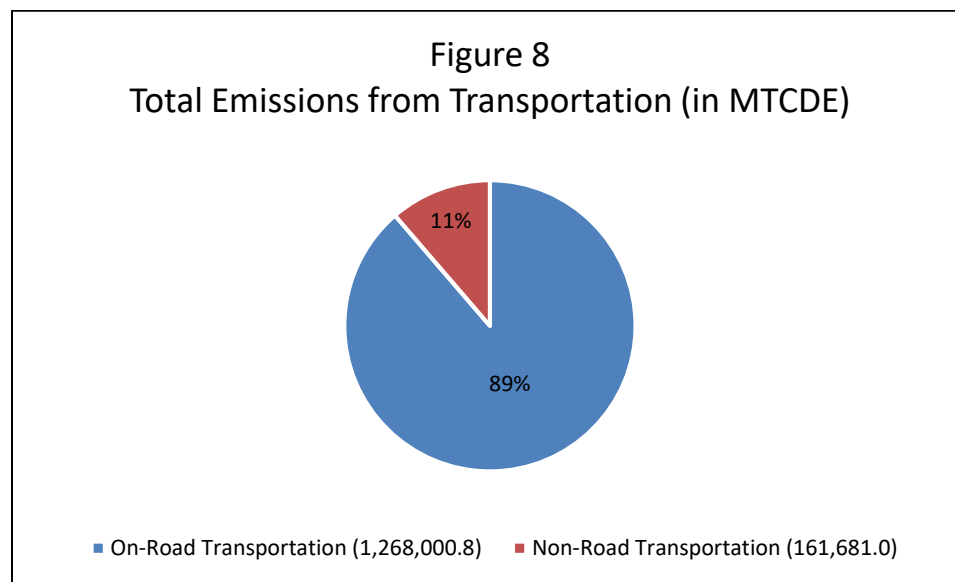
Included with the industrial total are process emissions attributed to cement production at the Lafarge Building Materials, Inc. facility located in Ravena, New York.

### 3.3.3.2 Ozone-Depleting Substances

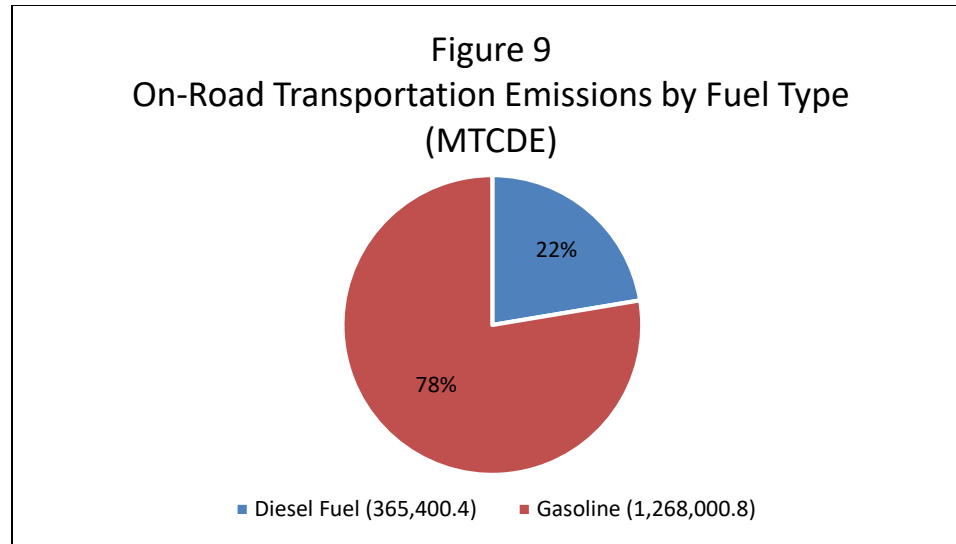
Some refrigerants and other products containing “ozone-depleting substances” have the potential for leakage and can contribute to GHG emissions. These products are categorized as hydrofluorocarbons (HFCs) which are also known as ozone-depleting substances (ODS), and sulfur hexafluoride (SF<sub>6</sub>). Emissions from these substances can be estimated by using a per capita factor determined by the U.S. National GHG Inventory,<sup>17</sup> and using the total community population (for calculating ODS) and total electricity emissions (for calculating SF<sub>6</sub>) to multiply by each substance’s specific emission factor to estimate total emissions. In 2022, communities within the County emitted approximately 124,202 MTCDE from ODS and 52.2 MTCDE from SF<sub>6</sub>.

### 3.3.4. Transportation

Transportation energy consumption produced an estimated 1,709,112 MTCDE, or 22% of total energy consumption emissions, in 2022. Modes of transportation included in this inventory were from on-road travel by registered motor vehicles, as well as non-road travel, which includes all off-road vehicles, rail, air, and marine travel emissions. Of these sources, on-road transportation was the largest contributor overall, mainly due to worker commutes. Figures 8 and 9 show the breakdown of on-road vs. off-road emissions, as well as a breakdown of on-road emissions by fuel type.



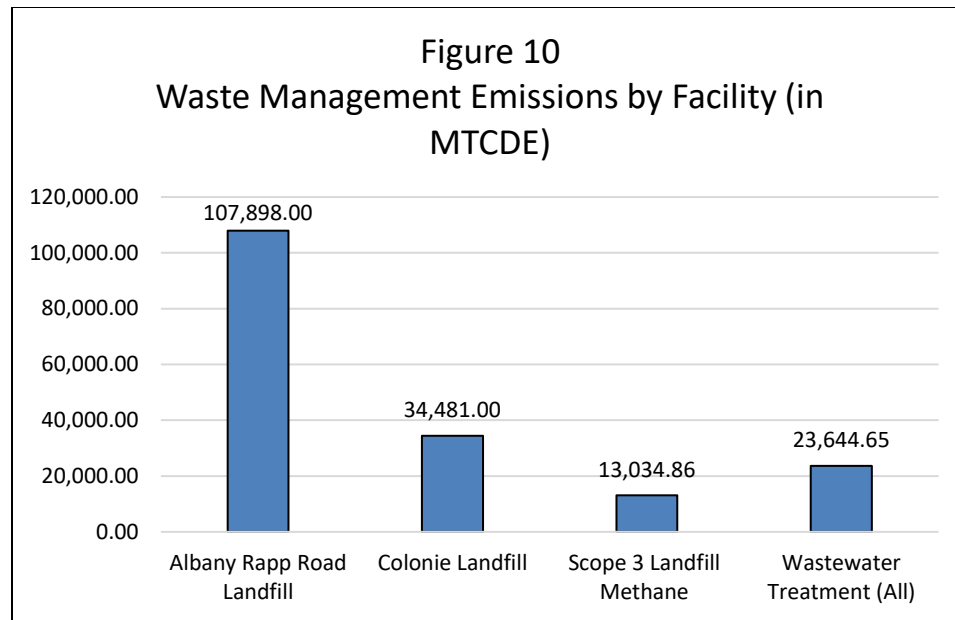
<sup>17</sup> U.S. ODS Emissions from the U.S. National GHG Inventory (U.S. EPA, 2013). U.S. Population from U.S. Census, 2010. ODS per Capita calculated by the Working Group.



### 3.4. Waste Management Emissions

The Waste Management sector produced an estimated 179,059 MTCDE in 2022. Of these emissions, 142,379 MTCDE came from Scope 1 landfill methane generated within the County, and 13,035 MTCDE came from Scope 3 landfill methane from waste generated within the county, but landfilled or incinerated outside of the County. Emissions reported for each landfill through the NYSDEC Title V program include those emitted from the operation and maintenance of each facility by each facility.

Waste management emissions do not include the landfill gas-to-energy (LFGTE) facilities associated with each landfill, which are owned and operated by third parties. Their emissions have been included in the industrial energy subsector as discussed in Section 3.3.3. Total emissions from each waste management facility with the County are shown per facility in Figure 10.



### 3.5. Biogenic Emissions

In total, an estimated 193,436 MTCDE were emitted from biogenic sources. Of these emissions, 85,971 MTCDE came from the combustion in the ethanol percentage in gasoline; 64,104 MTCDE came from residential and commercial wood combustion; 31,692 MTCDE came from landfill gas emissions at both the Albany Rapp Rd and Town of Colonie Landfills; 524 MTCDE came from landfill gas combustion at the Albany Landfill Gas-to-Energy (LFGTE) facility; and 11,175 MTCDE came from landfill gas combustion at the Innovative/Colonie LFGTE facility. Biogenic emissions are for approximately 2% of total emissions; however, they are not included in the total for the County per CSC guidance.

## 4.0 ANALYSIS AND RECOMMENDATIONS

### 4.1. Comparison to 2010

This 2022 GHG EI provides a periodic update to the 2010 Baseline GHG EI Report. By comparing the data between these two inventories, and between future inventories, the County can track progress towards emission reduction goals. Overall, there was a slight increase in emissions since the original report in 2010. This could be from an overall increase in utility fuel consumption across a range of sectors within the County. Table 4-1 highlights the increases in both fuel consumption quantities and overall emissions throughout the County.

| Table 4-1<br>2010 vs. 2022 Fuel Usage and Emissions Differences |              |               |                   |
|-----------------------------------------------------------------|--------------|---------------|-------------------|
| Emission Source                                                 | 2010         | 2022          | % Difference      |
| <b>Residential</b>                                              |              |               |                   |
| Electricity Consumption (MWh)                                   | 791,610.0    | 1,510,675.0   | +48% (increase)   |
| Natural Gas Consumption (Therms)                                | 65,216,196.0 | 100,225,258.4 | +35% (increase)   |
| Residential Emissions from Propane (MTCDE)                      | 16,545.0     | 25,262.4      | +34.5% (increase) |
| Residential Emissions from Fuel Oil (MTCDE)                     | 120,077.0    | 67,767.8      | -43.6% (decrease) |
| Residential Emissions from Wood (MTCDE)                         | 1,538.0      | 1,348.7       | -12.3% (decrease) |
| Residential Emissions from Coal (MTCDE)                         | 625.0        | 2,076.6       | +70% (increase)   |
| Overall Emissions (MTCDE)                                       | 666,695.0    | 835,430.3     | +20% (increase)   |
| <b>Commercial</b>                                               |              |               |                   |
| Electricity Consumption (MWh)                                   | 1,352,006.0  | 2,817,960.4   | +52% (increase)   |
| Natural Gas Consumption (Therms)                                | 53,031,718.0 | 93,182,341.7  | +43% (increase)   |
| Commercial Emissions from Propane (MTCDE)                       | 7,879.0      | 14,423.1      | +45.4% (increase) |
| Commercial Emissions from Fuel Oil (MTCDE)                      | 58,403.0     | 44,064.8      | -24.6% (decrease) |
| Commercial Emissions from Wood (MTCDE)                          | 514.0        | 0.91          | -99.9% (decrease) |
| Commercial Emissions from Coal (MTCDE)                          | 99.0         | 0.0           | -100% (decrease)  |

| <b>Table 4-1<br/>2010 vs. 2022 Fuel Usage and Emissions Differences</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                    |                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|-----------------------|
| <b>Emission Source</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>2010</b>        | <b>2022</b>        | <b>% Difference</b>   |
| Overall Emissions (MTCDE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 658,852.0          | 922,472.5          | +29% (increase)       |
| <b>Industrial</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                    |                       |
| Overall Emissions (MTCDE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3,588,817.0        | 4,135,705.0        | +13% (increase)       |
| <b>Transportation (On- and Off-Road)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                    |                       |
| Gasoline Usage (Gallons)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 162,017,522.0      | 149,176,560.7      | -9% (decrease)        |
| Diesel Fuel Usage (Gallons)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20,086,074.0       | 35,788,477.7       | +44% (increase)       |
| Overall Transportation Emissions (MTCDE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1,715,930          | 1,709,112          | -0.4% (decrease)      |
| <b>Total County-wide Emissions (MTCDE)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>7,747,589.0</b> | <b>7,958,330.4</b> | <b>+3% (increase)</b> |
| <b>Note:</b><br>1. Where 2010 fuel consumption data was not found within the 2010 Albany County GHG EI, the fuels were compared by their total emissions (MTCDE).<br>2. 2010 data was taken from reported values within tables B2, B3, and the "Albany County GHG Emissions 2010" Table within the Baseline GHG EI Report.<br>3. Despite a 70% increase in Coal emissions, coal heating accounts for a very small portion of EHUs within the County. A total of 214 EHUs within the County prefer to heat with coal. |                    |                    |                       |

Despite increases in energy usage throughout the County, overall GHG emissions have only increased by 3%. Changes in emission factors, GWPs, and an overall greener electricity grid contribute to decreasing emissions despite an increase in energy use.

Table 4-2 highlights emission changes between 2010 and 2022.

| <b>Table 4-2<br/>2010 Emissions vs. 2022 Emissions by Emission Source</b> |                               |                               |
|---------------------------------------------------------------------------|-------------------------------|-------------------------------|
| <b>Emission Source</b>                                                    | <b>2010 Emissions (MTCDE)</b> | <b>2022 Emissions (MTCDE)</b> |
| Residential Energy Usage                                                  | 666,695                       | 835,430.3                     |
| Commercial Energy Usage                                                   | 716,214                       | 922,472.5                     |
| Industrial Energy Usage                                                   | 3,588,817                     | 4,135,705.0                   |
| On-Road Transportation                                                    | 1,496,750                     | 1,547,430.7                   |
| Non-Road Transportation                                                   | 219,180                       | 161,681.0                     |
| Agricultural Operations                                                   | 26,544                        | 52,297.5                      |

| <b>Table 4-2</b>                                                                                                                                                                                                                                                                                                                                                               |                                   |                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|
| <b>2010 Emissions vs. 2022 Emissions by Emission Source</b>                                                                                                                                                                                                                                                                                                                    |                                   |                                   |
| <b>Emission Source</b>                                                                                                                                                                                                                                                                                                                                                         | <b>2010 Emissions<br/>(MTCDE)</b> | <b>2022 Emissions<br/>(MTCDE)</b> |
| Waste Management Operations                                                                                                                                                                                                                                                                                                                                                    | 152,126.0                         | 166,024.0                         |
| <b>County-wide Emissions</b>                                                                                                                                                                                                                                                                                                                                                   | <b>7,747,589.0</b>                | <b>7,933,591.8</b>                |
| <b>Notes:</b> <ol style="list-style-type: none"> <li>2022 emissions based on 100-year global warming potentials obtained from IPCC AR5.</li> <li>2010 emissions were based on GWPs obtained from IPCC AR3. Source of GWPs from 2010 based on the most recent published IPCC Assessment Report available prior to the publishing of the 2010 Baseline GHG EI Report.</li> </ol> |                                   |                                   |

#### 4.2. Actions Taken to Date

Since taking the CSC Pledge in 2009, the County has developed a comprehensive green policy that applies to all communities within this inventory. This has led to a number of initiatives and designations including the following:<sup>18</sup>

- December 2013: Local Styrofoam ban law
- March 2017: Clean Energy Community Designation (the first County in the region)
- January 2021: Wind Turbine Development at the Port of Albany
- May 2021: Implementation of EV charging stations
- July 2021: SCOOT Program (alternative forms of transportation)
- August 2021: Rollout of Reusable Bags for Groceries

#### 4.3. Recommendations Moving Forward

To decrease GHG emissions in years to come, it is important to make community operations more energy efficient to align with State and regional goals. In addition, energy efficiency has the potential to result in cost savings, which could motivate members of the general public and local industries.

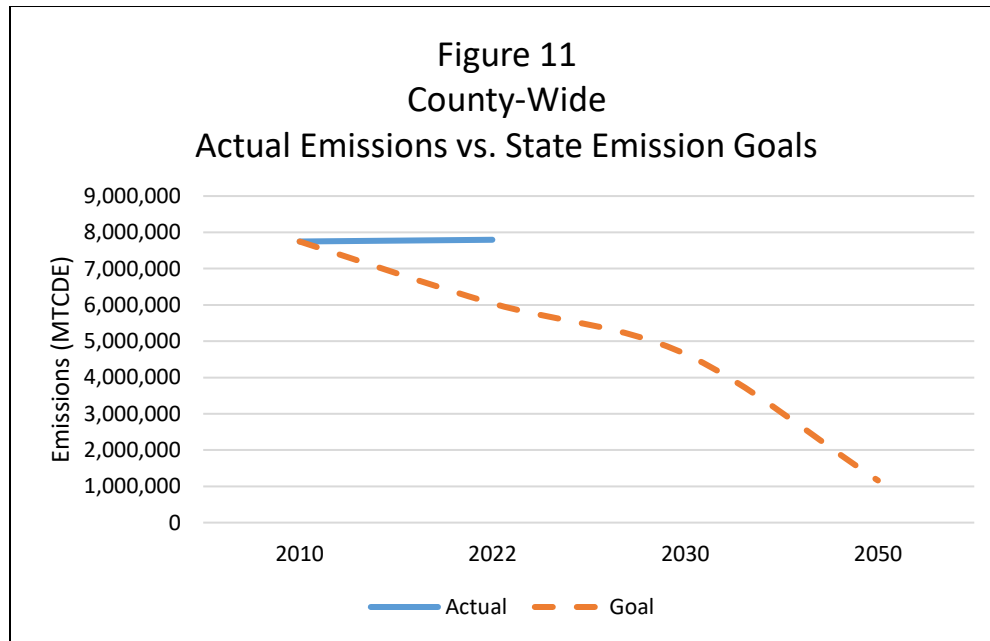
To further reduce emissions with the intent of aligning with the state's climate goals, it will be important to continue following the County's Climate Action Plan, updating it as needed, establishing and tracking the progress of the County's climate action policies and strategies, and working with the communities.

#### 4.4. Emissions Reduction Goal

As discussed in this emissions inventory, inventoried communities' generated GHG emissions are from the combustion of utility and non-utility fuels for heating private residences, electricity usage, fuel usage by commercial and industrial sources, transportation, agricultural operations,

<sup>18</sup> Albany County, "Team Green," 2023. [Team Green | Albany County, NY.](#)

and waste management operations. The following figure shows the progress of the community emissions with respect to the NYS climate action goals.



Note: Since no GHG data was collected from the County prior to 2010, the 2010 GHG emission levels will be used as the baseline emissions level for state reduction goals.

There are significant opportunities for emission reductions throughout the large emission sectors. The County can reduce community emissions through proper policymaking and by continuing their commitment to being a green community. As the CLCPA takes effect, and with NY states plan to have 100% clean (emission free) electricity by 2040, emissions are anticipated to decrease in the years to come.

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## **Appendix A**

### **Calculation Inputs and Fuel Usage Raw Data**

**Conversion Units**

|                       |            |            |
|-----------------------|------------|------------|
| 1 GWh =               | 1000000    | kWh        |
| 1 gallon =            | 42         | barrels    |
| 1 MWH =               | 3,412,000  | BTUs       |
| 1 Cord (wood) =       | 2.90       | tons       |
| 1 kg =                | 2.2        | lbs        |
| 1 trillion =          | 1000000000 | # Base     |
| 1 scf =               | 1000       | mcf        |
| 1 kg =                | 1000       | MT         |
| 1 mcords (wood) =     | 1000       | cords      |
| 1 US Short Ton=       | 0.907      | Metric Ton |
| 1 trillion =          | 1000000    | million    |
| 1 MWh                 | 1000       | kWh        |
| 1 Therm Natural Gas = | 96.7       | scf        |

**Heat Contents**

|                           |        |             |
|---------------------------|--------|-------------|
| Propane                   | 91,452 | BTU/Gallons |
| 1 Gallon No. 2 Fuel Oil = | 0.14   | mmBTU       |
| 1 Gallon Diesel Fuel =    | 0.1333 | mmBTU       |

### Emission Factors

| Fuel                | Emission Factors | Units       | Source                                    |
|---------------------|------------------|-------------|-------------------------------------------|
| Electricity         | 275.40           | lb CO2e/MWh | eGRID2022 NYUP Region                     |
| Natural Gas         | 54.86            | kg CO2/mcf  | Tool: Community Operations Module v2023.1 |
| Propane             | 5.72             | kg CO2/gal  | Tool: Community Operations Module v2023.2 |
| Distillate Fuel Oil | 10.15            | kg CO2/gal  | Tool: Community Operations Module v2023.3 |
| Diesel Fuel         | 10.21            | kgCO2/gal   | Tool: Community Operations Module v2023.1 |
| Gasoline            | 8.5              | kgCO2/gal   | Tool: Community Operations Module v2023.2 |

### Global Warming Potentials (GWPs)

| GHG Emitted | GWP (CO2e) |
|-------------|------------|
| CO2         | 1          |
| CH4         | 28         |
| N2O         | 265        |

GWP Source: Intergovernmental Panel on Climate Change. "5th Assessment Report." IPCC, Nov 2014.

### Heat Content

| Fuel        | Heat Content | Units           | Source                             |
|-------------|--------------|-----------------|------------------------------------|
| Wood        | 93.80        | kg CO2/mmBTU    | 40 CFR Part 98 Subpart C Table C-1 |
| Wood        | 17.48        | mmBTU/Short ton | 41 CFR Part 98 Subpart C Table C-1 |
| Coal        | 103.69       | kg CO2/mmBTU    | 42 CFR Part 98 Subpart C Table C-1 |
| Natural Gas | 0.001026     | mmBTU/scf       | 42 CFR Part 98 Subpart C Table C-1 |

Note: Emission Factors from the Tool: Community Operations Module are actually from the Government Operations Module. They should be the same however, the updated version of the Tool does not actually include emission factors.

| Local Community Data                                         |              |                                                                       |                                                             |                                                                 |                                                                         |
|--------------------------------------------------------------|--------------|-----------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------|
| Municipality                                                 | Type         | Electricity/Steam (# Housing Units with Fuel as Major Heating Source) | Nat Gas (# Housing Units with Fuel as Major Heating Source) | Propane/LPG (# Housing Units with Fuel as Major Heating Source) | Distillate Fuel Oil (# Housing Units with Fuel as Major Heating Source) |
| Menands                                                      | Village      | 347                                                                   | 2,076                                                       | 1,622                                                           | 17                                                                      |
| Colonie                                                      | Village      | 218                                                                   | 2,435                                                       | 35                                                              | 213                                                                     |
| Voorheesville                                                | Village      | 220                                                                   | 800                                                         | 38                                                              | 44                                                                      |
| Bethlehem                                                    | Town         | 2,123                                                                 | 10,321                                                      | 366                                                             | 1,195                                                                   |
| Colonie                                                      | Town         | 6,015                                                                 | 25,009                                                      | 821                                                             | 1,440                                                                   |
| Altamont                                                     | Village      | 152                                                                   | 457                                                         | 0                                                               | 58                                                                      |
| Cohoes                                                       | City         | 1,288                                                                 | 6,326                                                       | 58                                                              | 151                                                                     |
| Guilderland                                                  | Town         | 2,510                                                                 | 10,189                                                      | 403                                                             | 1,243                                                                   |
| Watervliet                                                   | City         | 1,225                                                                 | 3,688                                                       | 65                                                              | 85                                                                      |
| Albany                                                       | City         | 14,988                                                                | 25,996                                                      | 518                                                             | 777                                                                     |
| Green Island                                                 | Village/Town | 334                                                                   | 900                                                         | 110                                                             | 0                                                                       |
| Ravena                                                       | Village      | 315                                                                   | 676                                                         | 24                                                              | 365                                                                     |
| New Scotland                                                 | Town         | 378                                                                   | 1,296                                                       | 391                                                             | 1,226                                                                   |
| Coeymans                                                     | Town         | 373                                                                   | 910                                                         | 391                                                             | 1,057                                                                   |
| Knox                                                         | Town         | 50                                                                    | 19                                                          | 262                                                             | 469                                                                     |
| Rensselaerville                                              | Town         | 135                                                                   | 10                                                          | 179                                                             | 363                                                                     |
| Berne                                                        | Town         | 64                                                                    | 6                                                           | 230                                                             | 598                                                                     |
| Westerlo                                                     | Town         | 62                                                                    | 27                                                          | 143                                                             | 687                                                                     |
| Total                                                        |              | 30,797                                                                | 91,141                                                      | 5,656                                                           | 9,988                                                                   |
| <b>Source:</b><br><sup>1</sup> ACS 5-Year Housing Data, 2021 |              |                                                                       |                                                             |                                                                 |                                                                         |

| Local Community Data                              |              |                                                                 |                                                                 |                             |
|---------------------------------------------------|--------------|-----------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------|
| Municipality                                      | Type         | 1Wood (# Housing Units<br>with Fuel as Major<br>Heating Source) | 1Coal (# Housing Units<br>with Fuel as Major<br>Heating Source) | 1# Housing<br>Units (Total) |
| Menands                                           | Village      | 0                                                               | 1                                                               | 2,177                       |
| Colonie                                           | Village      | 6                                                               | 0                                                               | 3,121                       |
| Voorheesville                                     | Village      | 0                                                               | 0                                                               | 1,147                       |
| Bethlehem                                         | Town         | 155                                                             | 0                                                               | 14,864                      |
| Colonie                                           | Town         | 92                                                              | 80                                                              | 35,702                      |
| Altamont                                          | Village      | 24                                                              | 0                                                               | 706                         |
| Cohoes                                            | City         | 41                                                              | 0                                                               | 9,074                       |
| Guilderland                                       | Town         | 163                                                             | 17                                                              | 15,442                      |
| Watervliet                                        | City         | 29                                                              | 0                                                               | 5,914                       |
| Albany                                            | City         | 0                                                               | 0                                                               | 50,529                      |
| Green Island                                      | Village/Town | 0                                                               | 0                                                               | 1,532                       |
| Ravena                                            | Village      | 35                                                              | 0                                                               | 1,415                       |
| New Scotland                                      | Town         | 181                                                             | 0                                                               | 3,744                       |
| Coeymans                                          | Town         | 309                                                             | 0                                                               | 3,704                       |
| Knox                                              | Town         | 115                                                             | 95                                                              | 1,120                       |
| Rensselaerville                                   | Town         | 119                                                             | 0                                                               | 1,225                       |
| Berne                                             | Town         | 164                                                             | 4                                                               | 1,527                       |
| Westerlo                                          | Town         | 249                                                             | 17                                                              | 1,586                       |
| Total                                             |              | 1,682                                                           | 214                                                             | 154,529                     |
| <b>Source:</b><br>1 ACS 5-Year Housing Data, 2021 |              |                                                                 |                                                                 |                             |

| State-Wide Residential Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                        |                                     |                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------|------------------------|
| Fuel Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <sup>1</sup> # Homes with Fuel as Major Heating Source | <sup>2</sup> Total Fuel Consumption | Fuel Consumption Units |
| Electricity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1,190,880                                              | 52,157,000,000.00                   | kWh                    |
| Electricity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1,190,880                                              | 52,157,000.00                       | MWh                    |
| Natural Gas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 4,542,443                                              | 446,000,000,000.00                  | scf                    |
| Propane/LPG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 400,969                                                | 6,656,000.00                        | Barrels                |
| Propane/LPG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 400,969                                                | 279,552,000.00                      | Gallons                |
| Distillate Fuel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                        | 17,739,000.00                       | Barrels                |
| Kerosene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                        | 440,000.00                          | Barrels                |
| Distillate Fuel (1,2,4,Kerosene)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1,279,260                                              | 7.64E+08                            | Gallons                |
| Wood                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 99,080                                                 | 21                                  | mcords (Alb Co. Total) |
| Coal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 14,109                                                 | -                                   | trillion BTU           |
| <sup>1</sup> Total # NYS Equivalent Housing Units =                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8,585,784                                              |                                     |                        |
| <b>Sources:</b><br><sup>1</sup> Number of housing units that prefer each fuel type - ACS 5-Year Housing Data, 2021<br><sup>2</sup> Total fuel consumption data - EIA State Energy Data System. New York Residential Energy Consumption Estimates, 2021<br>*Note: NYS no longer reports residential coal consumption but ACS data shows coal burning homes in the inventory boundary. Distillate fuel oil use is used in this scenario to estimate coal consumption as directed in the 2015 CDC Guidance. |                                                        |                                     |                        |

| State-Wide Commercial Data                                                                                       |                                     |                        |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------|
| Fuel Type                                                                                                        | <sup>1</sup> Total Fuel Consumption | Fuel Consumption Units |
| Electricity/Steam                                                                                                | 69,920,000,000                      | kWh                    |
| Electricity/Steam                                                                                                | 69,920,000                          | MWh                    |
| Natural Gas                                                                                                      | 298,000,000,000                     | scf                    |
| Propane                                                                                                          | 2,731,000                           | Barrels                |
| Propane/LPG                                                                                                      | 114,702,000                         | Gallons                |
| Distillate Fuel                                                                                                  | 8,453,000                           | Barrels                |
| Kerosene                                                                                                         | 42,000                              | Barrels                |
| Distillate Fuel (1,2,4,Kerosene)                                                                                 | 356,790,000                         | Gallons                |
| Wood                                                                                                             | 21                                  | mcords (Alb Co. Total) |
| Coal                                                                                                             | 0                                   | trillion BTU           |
| <b>Source:</b> <sup>1</sup> EIA State Energy Data System. New York Commercial Energy Consumption Estimates, 2021 |                                     |                        |

### Industrial Energy

| Industrial Emitter                                                  | CO <sub>2</sub> e GHG (MTCDE) |
|---------------------------------------------------------------------|-------------------------------|
| Global Companies LLC (Selkirk, 12158)                               | 1,140                         |
| Lafarge Building Materials, Inc.                                    | 923,792                       |
| Norlite Corp                                                        | 50,582                        |
| Owens-Corning Insulating Systems                                    | 42,981                        |
| Sabic Innovative Plastics US LLC                                    | 36,006                        |
| Buckeye Albany Terminal                                             | 11,701                        |
| Citgo Glenmont Terminal                                             | 29                            |
| Power Generation Facility                                           | Emissions 2022 (MTCDE)        |
| Bethlehem Energy Center                                             | 2,092,920.6                   |
| NYS OGS Sheridan Steam Plant                                        | 76,114.2                      |
| Albany Landfill GTE Facility                                        | 1,190.9                       |
| Selkirk Cogeneration Project                                        | 192,784.6                     |
| Source: NY DEC Title V Reporting, Title V Emissions Inventory. 2022 |                               |

### Total Industrial Consumption

| Time Period                                                                                                       | Natural Gas (therms) | Electricity (MWh) |
|-------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|
| July - Dec. 2022                                                                                                  | 2,490,052            |                   |
| July - Dec. 2023                                                                                                  | 5,511,493            |                   |
| <b>*Jan. - Dec. 2022 (Assumed)</b>                                                                                | <b>8,001,545</b>     | <b>16,178,000</b> |
| Sources:                                                                                                          |                      |                   |
| NYSERDA, Utility Energy Registry, 2022.                                                                           |                      |                   |
| *Note: Natural gas total industrial consumption assumed to be the total of Jul. - Dec. 2022 and Jul. - Dec. 2023. |                      |                   |

| Commercial Sector Data                                                                                                                                                                                                                                                                                                                                                      |                         |                                           |                                               |                                     |                              |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------|-----------------------------------------------|-------------------------------------|------------------------------|------------------------|
| Name                                                                                                                                                                                                                                                                                                                                                                        | <sup>1</sup> NAICS Code | <sup>2</sup> Employees<br>(Albany County) | <sup>3</sup> Avg SF/worker<br>(Albany County) | Total SF /worker<br>(Albany County) | <sup>4</sup> Employees (NYS) | Total SF /worker (NYS) |
| State Gov.                                                                                                                                                                                                                                                                                                                                                                  | 952                     | 42,894                                    | 809                                           | 34,701,246                          | -                            | -                      |
| Health Care                                                                                                                                                                                                                                                                                                                                                                 | 62                      | 29,749                                    | 501                                           | 14,904,249                          | 1559694                      | 781406694              |
| Retail Trade                                                                                                                                                                                                                                                                                                                                                                | 44-45                   | 22,488                                    | 1,246                                         | 28,020,048                          | 929746                       | 1158463516             |
| Local Gov.                                                                                                                                                                                                                                                                                                                                                                  | 953                     | 15,450                                    | 809                                           | 12,499,050                          | 1072524                      | 867671916              |
| Professional services                                                                                                                                                                                                                                                                                                                                                       | 54                      | 14,602                                    | 434                                           | 6,337,268                           | 1351262                      | 586447708              |
| Food services                                                                                                                                                                                                                                                                                                                                                               | 72                      | 13,631                                    | 2,074                                         | 28,270,694                          | 779405                       | 1616485970             |
| Finance and Insurance                                                                                                                                                                                                                                                                                                                                                       | 53                      | 11,842                                    | 434                                           | 5,139,428                           | 513415                       | 222822110              |
| Drinking Places                                                                                                                                                                                                                                                                                                                                                             | 722                     | 11,684                                    | 2,074                                         | 24,232,616                          | -                            | -                      |
| Waste Services                                                                                                                                                                                                                                                                                                                                                              | 56                      | 10,236                                    | 434                                           | 4,442,424                           | 518676                       | 225105384              |
| Support Services                                                                                                                                                                                                                                                                                                                                                            | 561                     | 9,752                                     | 434                                           | 4,232,368                           | 494429                       | 214582186              |
| Other                                                                                                                                                                                                                                                                                                                                                                       | 81                      | 9,182                                     | 1,105                                         | 10,146,110                          | 441479                       | 487834295              |
| <b>Totals</b>                                                                                                                                                                                                                                                                                                                                                               |                         | 191,510                                   | -                                             | 172,925,501                         | 7660630                      | 6160819779             |
| <b>Sources:</b><br><sup>1</sup> North American Industry Classification System (NAICS) U.S. Census Bureau, 2022<br><sup>2</sup> NAICS Sector Employment 2018 Counties   Tableau Public, 2018<br><sup>3</sup> North American Industry Classification System (NAICS) U.S. Census Bureau, 2022<br><sup>4</sup> NAICS Sector Employment 2018 NY Dashboard   Tableau Public, 2018 |                         |                                           |                                               |                                     |                              |                        |

|                                                                |             |     |
|----------------------------------------------------------------|-------------|-----|
| <b>NY Commercial Electric Consump.</b>                         | 141,424,000 | MWh |
| <b>Source:</b> EIA New York energy consumption estimates, 2021 |             |     |

Vehicle fuel usage data from Capital Transportation Commission - Albany County

| <b>Vehicle Fuel Type</b> | <b>Number of Vehicles</b> | <b>% of fleet</b> |
|--------------------------|---------------------------|-------------------|
| DIESEL                   | 13,144                    | 5.6%              |
| ELECTRIC                 | 2,467                     | 1.0%              |
| FLEX                     | 1,269                     | 0.54%             |
| GAS                      | 221,955                   | 93.9%             |
| OTHER                    | 31                        | 0.013%            |
| Total                    | 236,399                   | 100.0%            |

Note: Electric cars were not counted in gasoline/diesel fuel emission estimates.

Source: NY Vehicle and Boat Registrations by Fuel Type per County, 2022.

#### MPG Efficiency of Vehicles (miles/gallon)

| <b>Fuel</b>                                                            | <b>Vehicle Type</b> | <b>Fuel Efficiency (MPG)</b> |
|------------------------------------------------------------------------|---------------------|------------------------------|
| Gasoline                                                               | Car                 | 24.2                         |
| Gasoline                                                               | Light Truck/Van     | 17.5                         |
| Diesel Fuel                                                            | Transit Shuttle     | 7.1                          |
| Diesel Fuel                                                            | Delivery Truck      | 6.5                          |
| Diesel Fuel                                                            | School Bus          | 6.2                          |
| Diesel Fuel                                                            | Class 8 Truck       | 5.29                         |
| Diesel Fuel                                                            | Transit Bus         | 3.26                         |
| Diesel Fuel                                                            | Refuse Truck        | 2.53                         |
|                                                                        | Diesel Avg.         | 5.15                         |
|                                                                        | Gas Avg.            | 20.85                        |
| <b>Source:</b> US Dept. of Energy Alternative Fuels Data Center, 2022. |                     |                              |

#### On Road

|                                                     |                 |            |
|-----------------------------------------------------|-----------------|------------|
| <b>Albany County Total VMT</b>                      | 3,312,740,000.0 | Miles/year |
| <b>Source:</b> NYSDOT Total VMT Albany County, 2017 |                 |            |

#### All Non-Road Travel

| <b>GHG Emitted</b>                                                          | <b>Emissions (US Short tons/year)</b> |
|-----------------------------------------------------------------------------|---------------------------------------|
| CO2                                                                         | 147,774.7                             |
| CH4                                                                         | 39.7                                  |
| <b>Source:</b><br>NYSDEC. Non Road Source Emission Outputs, Estimated 2023. |                                       |

|                                                                                       |      |
|---------------------------------------------------------------------------------------|------|
| <b>Heating Degree Days (HDD)<br/>Coefficient for Capital District of<br/>New York</b> | 1.12 |
| <b>Source:</b> New York Community and Regional GHG Inventory Guidance, 2015           |      |

### Industrial Emitters

|                                                       |      |
|-------------------------------------------------------|------|
| Unaccounted Small Industry Not Reporting to DEC (61%) | 1.61 |
|-------------------------------------------------------|------|

Source: New York Community and Regional GHG Inventory Guidance, 2015

Note: Total usage is shown as 61% in addition to the calculated number.

### T&D Losses

|                    |      |
|--------------------|------|
| Assumed T&D Losses | 1.8% |
|--------------------|------|

Source: New York Community and Regional GHG Inventory Guidance, 2015

|                                   |         |
|-----------------------------------|---------|
| Albany County Population (People) | 334,775 |
|-----------------------------------|---------|

Source: ACS 5-Year Housing Data, 2021

### Ozone Depleting Substances (ODS)

|                  |       |              |
|------------------|-------|--------------|
| ODS per Capita = | 0.371 | MTCDE/Capita |
|------------------|-------|--------------|

Source: New York Community and Regional GHG Inventory Guidance, 2015

### SF6

|                   |             |             |
|-------------------|-------------|-------------|
| SF6 Emission Rate | 9.21134E-05 | MTCDE/MMBTU |
|-------------------|-------------|-------------|

Source: New York Community and Regional GHG Inventory Guidance, 2015

|                                   |      |                |
|-----------------------------------|------|----------------|
| MSW generation per person for NYS | 2.80 | lbs/person/day |
|-----------------------------------|------|----------------|

Source: UCRRRA Waste Reduction, 2022

### Rail

| Municipality    | Type         | Length of Track |
|-----------------|--------------|-----------------|
| Menands         | Village      | 3.3             |
| Colonie         | Village      | 1.6             |
| Voorheesville   | Village      | 4               |
| Bethlehem       | Town         | 70.6            |
| Colonie         | Town         | 12.1            |
| Altamont        | Village      | 1.6             |
| Cohoes          | City         | 2.6             |
| Guilderland     | Town         | 26.3            |
| Watervliet      | City         | 1.5             |
| Albany          | City         | 25.3            |
| Green Island    | Village/Town | 1.1             |
| Ravena          | Village      | 2.1             |
| New Scotland    | Town         | 5.7             |
| Coeymans        | Town         | 5.4             |
| Knox            | Town         | 4.8             |
| Rensselaerville | Town         | 0               |
| Berne           | Town         | 0               |
| Westerlo        | Town         | 0               |

Source:

New York State GIS Clearing House, Albany County Railroad Track Shapefile, 2022.

|                                                            |           |
|------------------------------------------------------------|-----------|
| 1Total Diesel Usage for Rail Travel in Alb. County (gal) = | 2,609,348 |
| Source: 1NYS Locomotive Survey, 2002.                      |           |

#### Air travel

|                                                      |              |
|------------------------------------------------------|--------------|
| 1Total jet fuel usage (Gal)                          | 1,050,000.00 |
| Source: 1Albany Airport, Annual Flight Budget, 2023. |              |

#### Direct Emissions (Scope 1)

|                                                                       |                   |
|-----------------------------------------------------------------------|-------------------|
| <i>Albany Rapp Road Landfill</i>                                      |                   |
| Greenhouse Gas                                                        | 1Emissions (tons) |
| CO2                                                                   | 56499             |
| Methane                                                               | 2965.67           |
| <i>Colonie Landfill</i>                                               |                   |
| Greenhouse Gas                                                        | 1Emissions (tons) |
| CO2                                                                   | 94                |
| Methane                                                               | 1229.99           |
| Source: 1NYS DEC Title V Reporting, Title V Emissions Inventory. 2022 |                   |

**Biogenic Emissions**

|                                                                           |       |                          |
|---------------------------------------------------------------------------|-------|--------------------------|
| <sup>1</sup> Percent Landfill GTE combustion Biogenic                     | 44%   |                          |
| <sup>1</sup> Percent On-Road Gasoline Combustion Biogenic                 | 6.78% |                          |
| <sup>2</sup> 1 MTCDE Scope 1 Wood Combustion Emissions =                  | 47.5  | MTCDE Biogenic Emissions |
| Sources:                                                                  |       |                          |
| <sup>1</sup> New York Community and Regional GHG Inventory Guidance, 2015 |       |                          |
| <sup>2</sup> Albany County 2010 GHG Inventory, 2010.                      |       |                          |

## **Appendix B**

### **GHG Emissions Inventory Calculations and Outputs**

## Residential Energy

| Fuel                                     | # Housing Units with Fuel as Major Heating Source |                |
|------------------------------------------|---------------------------------------------------|----------------|
|                                          | Albany County                                     | New York State |
| Electricity/Steam                        | 30,797                                            | 1,190,880      |
| Natural Gas                              | 91,141                                            | 4,542,443      |
| Propane/LPG                              | 5,656                                             | 400,969        |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) | 9,988                                             | 1,279,260      |
| Wood                                     | 1,682                                             | 99,080         |
| Coal                                     | 214                                               | 14,109         |

| Fuel                                           | Total State-Wide Residential Fuel Consumption | Total County-Wide Residential Fuel Consumption | Total County-Wide Residential Fuel Consumption Adjusted for Climate Differences |
|------------------------------------------------|-----------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------|
| Electricity/Steam (MWh)                        | 52,157,000                                    | 1,348,816.95                                   | 1,510,674.98                                                                    |
| Natural Gas (scf)                              | 446,000,000,000                               | 8,948,683,780.95                               | 10,022,525,834.67                                                               |
| Propane/LPG (Gallons)                          | 279,552,000                                   | 3,943,312.61                                   | 4,416,510.12                                                                    |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) (Gal) | 763,518,000                                   | 5,961,272.75                                   | 6,676,625.49                                                                    |
| Wood (mcords)                                  |                                               | 0.25                                           | 0.28                                                                            |
| Coal (mmBTU)                                   |                                               | 17,881.43                                      | 20,027.20                                                                       |

## Conversions (if needed)

| Fuel                                           | Total County-Wide Residential Fuel Consumption | Notes                            |
|------------------------------------------------|------------------------------------------------|----------------------------------|
| Electricity/Steam (MWh)                        | 1,510,674.98                                   | No conversion needed             |
| Natural Gas (mcf)                              | 10,022,525.83                                  |                                  |
| Propane/LPG (gal)                              | 4,416,510.12                                   | No conversion needed             |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) (gal) | 6,676,625.49                                   | No conversion needed             |
| Wood (mmBTU)                                   | 14,377.95                                      | mcords to cords to tons to mmBTU |
| Coal (mmBTU)                                   | 20,027.20                                      | No conversion needed             |

| Fuel                                     | Emissions (lb CO2) | Emissions (kg CO2) | Scope 1 Emissions (MTCDE) | Biogenic Emissions (MTCDE) |
|------------------------------------------|--------------------|--------------------|---------------------------|----------------------------|
| Electricity/Steam                        | 416,039,890.5      | 189,109,041.13     | 189,109.04                | -                          |
| Natural Gas                              | -                  | 549,865,834.87     | 549,865.83                | -                          |
| Propane/LPG                              | -                  | 25,262,437.87      | 25,262.44                 | -                          |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) | -                  | 67,767,748.67      | 67,767.75                 | -                          |
| Wood                                     | -                  | 1,348,651.88       | 1,348.65                  | 64,060.96                  |
| Coal                                     | -                  | 2,076,620.64       | 2,076.62                  | -                          |
| Total                                    |                    |                    | 835,430.34                |                            |

## Commercial Energy

| Fuel                                           | Total Local Commercial Square Footage (CSF) that uses each fuel | Total State Commercial Square Footage (CSF) that uses each fuel | Total County-Wide Commercial Fuel Consumption | Total County-Wide Commercial Fuel Consumption Adjusted for Climate Differences |
|------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------|
| Electricity/Steam (MWh)                        | 34,463,348                                                      | 957,727,636                                                     | 2,516,036.06                                  | 2,817,960.39                                                                   |
| Natural Gas (scf)                              | 101,991,232                                                     | 3,653,116,347                                                   | 8,319,851,941.51                              | 9,318,234,174.49                                                               |
| Propane/LPG (Gal)                              | 6,329,340                                                       | 322,466,657                                                     | 2,251,358.34                                  | 2,521,521.34                                                                   |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) (Gal) | 11,177,060                                                      | 1,028,804,460                                                   | 3,876,211.07                                  | 4,341,356.40                                                                   |
| Wood (Tons)                                    | 1,882,240                                                       | 79,681,961                                                      | 0.50                                          | 0.56                                                                           |
| Coal (mmBTU)                                   | 239,476                                                         | 11,346,718                                                      | 0.00                                          | 0.00                                                                           |

| Fuel                                           | Total County-Wide Commercial Fuel Consumption Adjusted for Climate Differences | Notes                |
|------------------------------------------------|--------------------------------------------------------------------------------|----------------------|
| Electricity/Steam (BTU)                        | 2,817,960.39                                                                   | No conversion needed |
| Natural Gas (scf)                              | 9,318,234,174.49                                                               | No conversion needed |
| Propane/LPG (Gal)                              | 2,521,521.3                                                                    | No conversion needed |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) (Gal) | 4,341,356.40                                                                   | No conversion needed |
| Wood (mmBTU)                                   | 9.71                                                                           |                      |
| Coal (mmBTU)                                   | 0.00                                                                           | No conversion needed |

| Fuel                                     | Emissions (lb CO2) | Emissions (kg CO2) | Emissions (MTCDE) | Biogenic Emissions (MTCDE) |
|------------------------------------------|--------------------|--------------------|-------------------|----------------------------|
| Electricity/Steam                        | 776,066,291.54     | 352,757,405.25     | 352,757.41        | -                          |
| Natural Gas                              | -                  | 511,226,281.52     | 511,226.28        | -                          |
| Propane/LPG                              | -                  | 14,423,102.04      | 14,423.10         | -                          |
| Distillate Fuel Oil (No. 1,2,4 Kerosene) | -                  | 44,064,767.43      | 44,064.77         | -                          |
| Wood                                     | -                  | 910.95             | 0.91              | 43.27                      |
| Coal                                     | -                  | 0.00               | 0.00              | -                          |
| Total                                    |                    |                    | 922,472.47        |                            |

Industrial Energy

*Total Industrial Emissions*

| Industrial Emitter                          | CO2e GHG (MTCDE) |
|---------------------------------------------|------------------|
| Global Companies LLC (Selkirk, 12158)       | 1,140            |
| Lafarge Building Materials, Inc.            | 923,792          |
| Norlite Corp                                | 50,582           |
| Owens-Corning Insulating Systems            | 42,981           |
| Sabic Innovative Plastics US LLC            | 36,006           |
| Buckeye Albany Terminal                     | 11,701           |
| Citgo Glenmont Terminal                     | 29               |
| Total Reported                              | 1,066,231.0      |
| Total (With Unaccounted for Small Industry) | 1,716,631.9      |

*Total Industrial Emissions from Natural Gas and Electricity<sup>1</sup>*

|                   | Therms      | scf           | mmBTU     | kg CO2       | MTCDE    |
|-------------------|-------------|---------------|-----------|--------------|----------|
| Total Natural Gas | 6,165,657.0 | 596,219,031.9 | 611,720.7 | 33,560,834.2 | 33,560.8 |

|                | MWh       | kg CO2       | MTCDE    |
|----------------|-----------|--------------|----------|
| Total Electric | 200,529.9 | 25,102,698.7 | 25,102.7 |

Note:

1. Total natural gas and electricity usage calculated based on reported values from the Utility Energy Registry.
2. Total natural gas and electricity from industrial sources needed to calculate Ozone Depleting Substances and SF6 emitted.

## Electric and Heat Power Generation

| Power Generation Facility    | Emissions 2022 (MTCDE) | Biogenic Emissions |
|------------------------------|------------------------|--------------------|
| Bethlehem Energy Center      | 2,092,920.60           | -                  |
| NYS OGS Sheridan Steam Plant | 76,114.20              | -                  |
| Albany Landfill GTE Facility | 1,190.90               | 666.90             |
| Innovative/Colonie           | 27,098.35              | 15,175.08          |
| Selkirk Cogeneration Project | 192,784.60             | -                  |
| Total                        | 2,374,266.67           |                    |

### T&D Losses:

|                    |      |
|--------------------|------|
| Assumed T&D Losses | 1.8% |
|--------------------|------|

| County Total Natural Gas Consumption (MTCDE) | T&D Losses (MTCDE) |
|----------------------------------------------|--------------------|
| 1,094,653                                    | 19,708.8           |

### Ozone Depleting Substances (ODS)

|                                                                      |       |              |
|----------------------------------------------------------------------|-------|--------------|
| ODS per Capita =                                                     | 0.371 | MTCDE/Capita |
| Source: New York Community and Regional GHG Inventory Guidance, 2015 |       |              |

| Total Population | Total ODS Usage (MTCDE) |
|------------------|-------------------------|
| 334,775          | 124,201.5               |

### SF6

|                                                                      |             |             |
|----------------------------------------------------------------------|-------------|-------------|
| SF6 Emission Rate                                                    | 9.21134E-05 | MTCDE/MMBTU |
| Source: New York Community and Regional GHG Inventory Guidance, 2015 |             |             |

| Municipality    | Total Electricity Consumption | Total SF6 Emissions (MTCDE) |
|-----------------|-------------------------------|-----------------------------|
| Albany (County) | 566,969                       | 52.2                        |

## On-Road

| Vehicle Fuel Type | Number of Vehicles | % of Fleet |
|-------------------|--------------------|------------|
| DIESEL            | 13,144             | 5.56%      |
| ELECTRIC          | 2,467              | 1.04%      |
| FLEX              | 1,269              | 0.54%      |
| GAS               | 221,955            | 93.89%     |
| OTHER             | 31                 | 0.01%      |
| Total             | 236,399            | 100.00%    |

## MPG Efficiency of Vehicles (miles/gallon)

| Fuel        | Vehicle Type    | Fuel Efficiency (MPG) |
|-------------|-----------------|-----------------------|
| Gasoline    | Car             | 24.2                  |
| Gasoline    | Light Truck/Van | 17.5                  |
| Diesel Fuel | Transit Shuttle | 7.1                   |
| Diesel Fuel | Delivery Truck  | 6.5                   |
| Diesel Fuel | School Bus      | 6.2                   |
| Diesel Fuel | Class 8 Truck   | 5.29                  |
| Diesel Fuel | Transit Bus     | 3.26                  |
| Diesel Fuel | Refuse Truck    | 2.53                  |
|             | Diesel Avg.     | 5.15                  |
|             | Gas Avg.        | 20.85                 |

|                         |                  |            |
|-------------------------|------------------|------------|
| Albany County Total VMT | 3,312,740,000.00 | Miles/year |
|-------------------------|------------------|------------|

| Fuel        | Total Gallons Consumed | Emissions (kg CO2) | Emissions (MTCDE) | Biogenic Emissions MTCDE |
|-------------|------------------------|--------------------|-------------------|--------------------------|
| Diesel Fuel | 35,788,477.71          | 365,400,357.41     | 365,400.4         | -                        |
| Gasoline    | 149,176,560.69         | 1,268,000,765.84   | 1,268,000.8       | 85,970.45                |
|             |                        | Total              | 1,547,430.7       |                          |

All Non-Road Travel

*Rail*

|                                                       |              |
|-------------------------------------------------------|--------------|
| Total Diesel Usage for 2002 RR in Alb. County (gal) = | 2,609,384.00 |
|-------------------------------------------------------|--------------|

| Total Length of Track (Miles) | Total Diesel Fuel Consumed (Gal) | Total Emissions (MTCDE) |
|-------------------------------|----------------------------------|-------------------------|
| 168                           | 2,609,384.00                     | 26,641.00               |

| GHG Emitted                                              | Emissions (US Short tons/year) | Emissions (MT) | Emissions (MTCDE) |
|----------------------------------------------------------|--------------------------------|----------------|-------------------|
| CO2                                                      | 147,774.71                     | 134,031.7      | 134,031.7         |
| CH4                                                      | 39.70                          | 36.0           | 1,008.2           |
|                                                          |                                | Total          | 135,039.9         |
| Nonroad Total Emissions MTCDE (DEC Provided and RR Data) |                                |                | 161,681           |

## Waste Management

### Direct Emissions (Scope 1)

#### City of Albany Rapp Road Landfill

| Greenhouse Gas | Emissions (tons) | Emissions (MTCDE) |
|----------------|------------------|-------------------|
| CO2            | 56,499           | 56,499            |
| Methane        | 2,966            | 83,039            |
| Total          |                  | 107,898           |

Note: 31,639 MTCDE are considered Biogenic

#### Town of Colonie Landfill

| Greenhouse Gas | Emissions (tons) | Emissions (MTCDE) |
|----------------|------------------|-------------------|
| CO2            | 94               | 94                |
| Methane        | 1,229.99         | 34,439.72         |
| Total          |                  | 34,481.08         |

Note: 53 MTCDE are considered Biogenic

### Scope 3 Emissions (Landfill Methane)

|                         |           |
|-------------------------|-----------|
| Total Emissions (MTCDE) | 13,034.86 |
|-------------------------|-----------|

#### Source:

1. EPA WARM Model, 2020

### Indirect Emissions (Wastewater)

|                                      |           |
|--------------------------------------|-----------|
| Total Emissions (MTCDE) <sub>1</sub> | 23,644.65 |
|--------------------------------------|-----------|

#### Note:

1. Calculated in EPA State Inventory Tool - Wastewater Module.

|                                   |            |       |
|-----------------------------------|------------|-------|
| Waste Management Total Emissions: | 179,058.91 | MTCDE |
|-----------------------------------|------------|-------|

### Agricultural Emissions

|                                              |           |       |
|----------------------------------------------|-----------|-------|
| Ag soil/Fertilizers <sub>1</sub>             | 43,031.40 | MTCDE |
| Total from Enteric Fermentation <sub>1</sub> | 9,266.50  | MTCDE |
| Total                                        | 52,297.90 | MTCDE |

#### Source:

1. Calculated in EPA State Inventory Tool - Agriculture Module

## Overall Emissions Summary Totals

### Residential

| Fuel                   | 2022 MTCDE        |
|------------------------|-------------------|
| Electricity            | 189,109.04        |
| Natural Gas            | 549,865.83        |
| Propane                | 25,262.44         |
| Distillate Fuel Oil    | 67,767.75         |
| Wood                   | 1,348.65          |
| Coal                   | 2,076.62          |
| <b>Total Emissions</b> | <b>835,430.34</b> |

### Commercial

| Fuel                   | 2022 MTCDE        |
|------------------------|-------------------|
| Electricity            | 352,757.41        |
| Natural Gas            | 511,226.28        |
| Propane                | 14,423.10         |
| Distillate Fuel Oil    | 44,064.77         |
| Wood                   | 0.91              |
| Coal                   | 0.00              |
| <b>Total Emissions</b> | <b>922,472.47</b> |

### Industrial/Power Generation

| Facility                              | 2022 MTCDE          |
|---------------------------------------|---------------------|
| Global Companies LLC (Selkirk, 12158) | 1,140.00            |
| Lafarge Building Materials, Inc.      | 923,792.00          |
| Norlite Corp                          | 50,582.00           |
| Owens-Corning Insulating Systems      | 42,981.00           |
| Sabic Innovative Plastics US LLC      | 36,006.00           |
| Buckeye Albany Terminal               | 11,701.00           |
| Citgo Glenmont Terminal               | 29.00               |
| <b>Total Emissions</b>                | <b>1,066,231.00</b> |

### T&D Losses (2022 MTCDE)

|  |          |
|--|----------|
|  | 19703.80 |
|--|----------|

### Industrial Sources (Power Generation)

| Facility                     | 2022 MTCDE          |
|------------------------------|---------------------|
| Bethlehem Energy Center      | 2,092,920.60        |
| NYS OGS Sheridan Steam Plant | 76,114.20           |
| Albany Landfill GTE Facility | 1,190.90            |
| Selkirk Cogeneration Project | 192,784.60          |
| <b>Total Emissions</b>       | <b>2,362,343.40</b> |

|           | 2022 MTCDE |
|-----------|------------|
| SF6 Usage | 52.2       |
| ODS       | 124,201.53 |

**On Road Transportation**

| <b>Fuel</b>            | <b>2022 MTCDE</b> |
|------------------------|-------------------|
| Gasoline               | 1,268,001         |
| Diesel Fuel            | 365,400           |
| <b>Total Emissions</b> | <b>1,547,431</b>  |

**Non Road Transportation**

|              | <b>2022 MTCDE</b> |
|--------------|-------------------|
| <b>Total</b> | <b>161,681</b>    |

**Waste Management**

| <b>Facility</b>          | <b>2022 MTCDE</b> |
|--------------------------|-------------------|
| Albany Rapp Rd LF        | 107,898           |
| Colonie Town LF          | 34,481            |
| All Wastewater Emissions | 23,645            |
| <b>Total Emissions</b>   | <b>179,059</b>    |

**Agriculture**

|                             | <b>2022 MTCDE</b> |
|-----------------------------|-------------------|
| Enteric Fermentation/Manure | 43,031.40         |
| Soils/Fertilizer            | 9,266.50          |
| <b>Total Emissions</b>      | <b>52,297.90</b>  |

|                                       |                     |
|---------------------------------------|---------------------|
| <b>Total County Wide (2022 MTCDE)</b> | <b>7,958,330.40</b> |
|---------------------------------------|---------------------|

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*The power to*  
**solve**<sup>SM</sup>

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