

NEW YORK STATE | Department of Environmental Conservation

# Energy

## 2025 NYS GREENHOUSE GAS EMISSIONS REPORT

**SECTORAL REPORT #1**

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# Table of Contents

# Format of This Report

This sectoral report provides a detailed explanation of methods, data, and trends for the energy sector. The accounting used in this sectoral report follows the requirements of the Climate Leadership and Community Protection Act (CLCPA) and aligns with the 6 NYCRR Part 496 regulation, “Statewide GHG Emission Limits.” This includes the use of a 20-Year Global Warming Potential metric provided in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC 2013). The organization of this report and specific methodologies are based on the IPCC Taskforce on National Greenhouse Gas Inventories approach (or “IPCC approach”) as applied in the U.S. national greenhouse gas emissions report (IPCC 2006 and 2019, EPA 2025b). The accompanying *Summary Report* provides a comparison with other accounting methods, including by economic sector or using conventional accounting formats. DEC also intends to provide emission values for all years via the Open Data NY platform.

# Figures and Tables

# Energy

This sectoral report provides information on greenhouse gas (GHG) emissions associated with the energy system. Most emissions in the energy sector are from the combustion of fuels (Table SR1.1). This report also describes emissions within New York State from other uses of fossil fuels (such as for asphalt), the leakage of emissions in the oil and gas system (or fugitive emissions), and the use of greenhouse gases in electricity transmission. The CLCPA requires that this report include emissions that occur outside of the state from imported electricity and imported fossil fuels. These emissions are not typically included in governmental GHG emission reports or the IPCC approach. Emissions from bunker fuels (the portion of transportation fuels used for international transport) are excluded from emission totals and are provided as an informational item ("Excluded Transportation Emissions", Table SR1.1).

The energy system produces the largest portion of GHG emissions in New York (Table SR1.1). In 2023, total energy emissions were 259.53 mmt $CO_2e$ or 73% of statewide gross emissions and 82% of net emissions, when measured using CLCPA accounting. This represents a 24% reduction in gross emissions compared to 1990 and a 1% decrease compared to 2022. The majority of energy sector emissions in 2023 were from fuel combustion (63% of gross total energy emission and 46% of statewide gross total emissions) or were associated with the importing of those fuels or electricity (31% of energy and 23% of total emissions).

Statewide energy emissions for years 1990-2023 follow national trends, with an initial increase in emissions from 1990 through the mid-2000s and then a decline thereafter (EPA 2025b). Importantly, 2023 emissions have mostly returned to levels observed before the COVID-19 pandemic. Minor differences in the emission values included in this report as compared to the 2024 *Statewide GHG Emissions Report* are the result of annual updates and improvements to the methodology and data used to calculate emissions.

Greenhouse gas emissions from the extraction, processing, and transmission of imported natural gas greatly decreased for years 2020-2022 relative to the 2024 Statewide GHG Emissions Report due to updated data and methodology. This report uses an updated fuel lifecycle analysis model made available by the National Energy Technology Laboratory (NETL 2025) that estimates GHG emissions from natural gas systems based on year 2020 operating conditions. The *Imported Fossil Fuels* section of this report and the *Energy Sector Data and Methods* appendix includes more details about the modeling changes for upstream, out of state natural gas emissions.

Further information on the relative contribution of the different emission sources within the energy sector are described in the sections below. The accompanying *Summary Report* provides a breakdown of these sources by economic sector as was used for the New York State Climate Action Council Scoping Plan.

**Table SR1.1 Energy Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Fuel Combustion | 220.95 | 232.86 | 172.72 | 149.28 | 160.60 | 166.36 | 163.82 |
| Other Fossil Fuel Use | 1.43 | 2.20 | 0.97 | 0.89 | 0.96 | 1.02 | 0.84 |
| Fugitive Emissions | 16.77 | 20.10 | 13.74 | 13.41 | 13.21 | 13.36 | 13.38 |
| Electricity Transmission | 4.15 | 1.67 | 0.16 | 0.14 | 0.14 | 0.13 | 0.12 |
| Out of State Energy Emissions* | 99.12 | 131.89 | 89.68 | 72.60 | 79.47 | 81.63 | 81.58 |
| **Gross Total** | **342.42** | **388.73** | **277.27** | **236.31** | **254.38** | **262.50** | **259.74** |
| *% of Statewide Gross Total* | *82%* | *83%* | *75%* | *72%* | *73%* | *74%* | *73%* |
| **Net Total** | **335.60** | **379.98** | **266.80** | **228.21** | **246.10** | **253.63** | **251.46** |
| *% of Statewide Net Total* | *91%* | *91%* | *84%* | *82%* | *83%* | *83%* | *82%* |
| Excluded Transportation Emissions | 15.31 | 13.80 | 18.03 | 8.72 | 10.85 | 15.01 | 16.96 |

*Not an IPCC Category; Note: Totals may not sum due to independent rounding.

The primary greenhouse gas emitted by the energy sector is carbon dioxide ($CO_2$) representing 76% of energy emissions in 2023 (Table SR1.2). Under the IPCC approach for national governments, the $CO_2$ produced by burning biogenic or plant-based fuels (e.g., wood, biodiesel, ethanol) is reported but treated separately from other anthropogenic emissions. In this report, biogenic sources of $CO_2$ are included in gross emission totals but are omitted from net totals following IPCC guidelines.[1] Biogenic $CO_2$ accounted for 3% of statewide gross energy emissions in 2023.

The second most common GHG is methane ($CH_4$; 24% of energy emissions), primarily from leakage or intentional venting in the oil and gas system in New York and through the fuel system. Notably, 76% of energy sector methane is associated with out-of-state sources. Nitrous oxide ($N_2O$) is also a byproduct of fuel combustion, but at a lower emission rate than the gases above. Finally, the major source of sulfur hexafluoride ($SF_6$) globally is as an insulating gas in electricity transmission and distribution equipment, but its leakage rate in New York declined significantly since the 1990s.

[1] Per 6 NYCRR Part 496.

**Table SR1.2 2023 Energy Emissions by Gas (mmt $CO_2e$ GWP20)**

| Emission Category | $CO_2$ | Biogenic $CO_2$ | $CH_4$ | $N_2O$ | $SF_6$ |
|---|---|---|---|---|---|
| Fuel Combustion | 152.89 | 8.28 | 1.72 | 0.92 | na |
| Other Fossil Fuel Use | 0.84 | na | na | na | na |
| Fugitive Emissions | 0.13 | na | 13.25 | + | na |
| Electricity Transmission | na | na | na | na | 0.12 |
| Out of State Energy Emissions* | 35.21 | + | 46.24 | 0.13 | na |
| **Gross Total** | **189.07** | **8.28** | **61.21** | **1.06** | **0.12** |

* Not an IPCC Category; "+" less than 0.01mmt; "na" not applicable; Note: Totals may not sum due to independent rounding.

## Fuel Combustion

This IPCC category represents emissions associated with the burning of fossil and biogenic fuels. Fuel combustion is the largest source of GHG emissions in the state. This includes fuels combusted for electricity generation, transportation, and heating in residential, commercial, and industrial buildings in New York (Table SR1.3). Petroleum refining represented a source of fuel combustion emissions in the 1990 baseline year, but operations ceased in New York in 1991.

NYSERDA (2024a) and the included *Energy Sector Data and Methods* appendix are technical supplements cited throughout this report and provide additional information on the data and methods used in this section. Unless otherwise noted, the Energy Information Administration State Energy Data System (EIA SEDS) was used as the primary data source for the fuel combustion analysis and this section of the report is organized to align with that dataset. The EIA SEDS is the authoritative source of information on the nationwide transmission of fuels, and aligns with the EPA's national greenhouse gas emissions report (EPA 2025b). However, there are minor differences in how emission sources are organized in the IPCC approach. For example, industrial fuel combustion includes emission sources from industries that the IPCC approach splits across multiple subcategories.

The electricity sector experienced the largest decrease in fuel combustion emissions since 1990 with a 59% reduction in emissions (Table SR1.3). In contrast, transportation sector emissions grew 4% from 1990 to 2023 and accounted for 45% of total fuel combustion emissions in 2023. Additionally, 2023 transportation emissions were 16% higher than 2020, representing a return to historic trends as the economy recovered from the impacts of the COVID-19 pandemic. Fuel use in residential buildings, such as for heating and cooking, constituted the second largest source of state fuel combustion emissions (21% of fuel combustion emissions) in 2023, followed by electricity generation (16% of fuel combustion emissions) and commercial fuel use (13% of fuel combustion emissions), respectively. Lastly, the industrial sector contributed 5% of 2023 total fuel combustion emissions (Table SR1.3).

**Table SR1.3 Fuel Combustion Emissions, 1990-2023 (mmt CO2e GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Electric Power | 63.63 | 56.21 | 22.12 | 24.13 | 25.57 | 27.79 | 26.28 |
| Residential | 39.18 | 46.44 | 40.72 | 34.45 | 36.77 | 37.70 | 35.08 |
| Commercial | 27.24 | 29.93 | 22.61 | 19.92 | 21.37 | 21.68 | 21.10 |
| Industrial | 20.75 | 13.73 | 9.01 | 8.01 | 8.36 | 8.04 | 8.45 |
| Transportation | 70.13 | 86.55 | 78.25 | 62.77 | 68.55 | 71.14 | 72.92 |
| Petroleum Refining | 0.01 | no | no | no | no | no | no |
| **Gross Total** | **220.95** | **232.86** | **172.72** | **149.28** | **160.60** | **166.36** | **163.82** |

“no” not occurring; Note: Totals may not sum due to independent rounding.

Petroleum fuel burning produced over half (53%) of New York fuel combustion emissions in 2023 (Table SR1.4). This result stems from the heavy use of petroleum fuels for transportation (Table SR1.9). Next, natural gas consumption produced 44% of fuel combustion emissions in 2023 for New York (Table SR1.4). Note that 2023 emissions from petroleum fuel combustion declined 35%, and emissions from natural gas consumption increased 51% from 1990 levels. Emissions from coal combustion declined 99% from 1990 levels and contributed the least to fuel combustion emissions in 2023.

**Table SR1.4 Fuel Combustion Emissions by Fuel Category, 1990-2023 (mmt CO2e GWP20)**

| Fuel Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Petroleum Fuels | 131.67 | 140.14 | 92.68 | 73.88 | 82.26 | 84.74 | 86.24 |
| Natural Gas | 47.59 | 59.02 | 71.08 | 69.32 | 72.24 | 74.69 | 71.68 |
| Coal | 33.60 | 23.95 | 1.31 | 0.54 | 0.51 | 0.58 | 0.46 |
| Wood | 8.09 | 9.75 | 7.65 | 5.53 | 5.59 | 6.35 | 5.44 |
| **Gross Total** | **220.95** | **232.86** | **172.72** | **149.28** | **160.60** | **166.36** | **163.82** |

Note: Totals may not sum due to independent rounding.

## Electricity Generation

This category addresses emissions from facilities whose primary activity is to generate electricity that will be transmitted via the electricity grid. Per IPCC approach, this category excludes electricity generated for local use, or distributed sources of generation such as industrial facilities or combined heat and power (CHP) facilities (a form of industrial fuel combustion). Although some excess portion of electricity may be shared with the electricity grid, that is not the main function of these emission sources. Instead, all emissions associated with on-site combustion of fuels is covered in the Residential, Commercial, and Industrial Fuel Combustion section below. Additionally, this section focuses on emission sources located within New York. Emissions resulting from Imported Electricity are described in a separate section below.

The mix of fuels used to generate electricity in New York has changed over time. For the 1990-2023 timeseries, these fuels included coal, distillate fuel oil, natural gas, petroleum coke, residual fuel oil, and wood. Following the adoption of State regulations setting $CO_2$ emission limits for electric generating facilities, 2021 was the first year to have zero emissions from coal combustion for electricity generation. Additional information on the sources of fuels used in New York can be found in the annual NYSERDA "Patterns and Trends" report and NYISO "Gold Book" and "Power Trends" reports (e.g., NYSERDA 2024, NYISO 2024a and b).

### *Methodology*

Emissions from fuel combustion are generally estimated by applying standard emission factors to the volume or energy content (Btus) of fuels used in each sector. An alternative approach would be to summarize data reported by facilities as part of state or federal air pollution regulations, however these data sources do not cover all sources or gases for the full 1990-2023 timeseries. For this report, the EIA SEDS dataset provided the annual Btus of fuel consumed in New York and emission factors for $CO_2$, $CH_4$, and $N_2O$ were taken from the EPA (NYSERDA 2024a, EPA 2025b Annex 2).

### *Results*

Electricity sector emissions for year 2023 decreased 59% from 1990 levels, representing the largest reduction in fuel combustion emissions (Table SR1.3). This trend corresponds with the transition from coal and petroleum-based products (i.e., distillate fuel, petroleum coke, residual fuel) to natural gas, that produces fewer GHG emissions per unit of energy consumed than those fuels (Table SR1.5). As described in NYSERDA (2024a), emissions from the extraction, processing, transmission, and distribution of these fuels have not followed the same pattern. Note that the electricity sector, as reported by the SEDS dataset, did not use petroleum coke as a fuel source in New York prior to 1996 nor after 2011.

**Table SR1.5 Electricity Emissions by Fuel Type, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Coal | 25.04 | 20.60 | 0.46 | 0.16 | no | no | no |
| Distillate Fuel | 0.47 | 0.69 | 0.16 | 0.08 | 0.09 | 0.45 | 0.07 |
| Natural Gas | 12.59 | 16.52 | 20.73 | 23.19 | 24.50 | 26.04 | 25.85 |
| Petroleum Coke | no | 1.33 | no | no | no | no | no |
| Residual Fuel | 25.45 | 16.59 | 0.17 | 0.10 | 0.40 | 0.77 | 0.21 |
| Wood | 0.07 | 0.49 | 0.60 | 0.61 | 0.58 | 0.53 | 0.15 |
| **Gross Total** | **63.63** | **56.21** | **22.12** | **24.13** | **25.57** | **27.79** | **26.28** |

"+" less than 0.01mmt; "no" not applicable; Note: Totals may not sum due to independent rounding.

## Residential, Commercial, and Industrial Fuel Combustion

This sectoral category includes emissions from fuels combusted in residential, commercial, and industrial buildings such as for space heating, cooking, and industrial processes. Based on the

EIA SEDS data, the types of fuels used from 1990 to 2023 in residential and commercial buildings in New York included coal, distillate fuel oil, kerosene, liquefied petroleum gas (LPG), natural gas, residual fuel oil, and wood. The industrial sector used coal, distillate fuel oil, kerosene, LPG, natural gas, petroleum coke, residual fuel oil, special naphthas, and wood as fuels. Additional information on the sources of fuels used in New York can be found in the annual NYSERDA "Patterns and Trends" report (e.g., NYSERDA 2024).

### *Methodology*

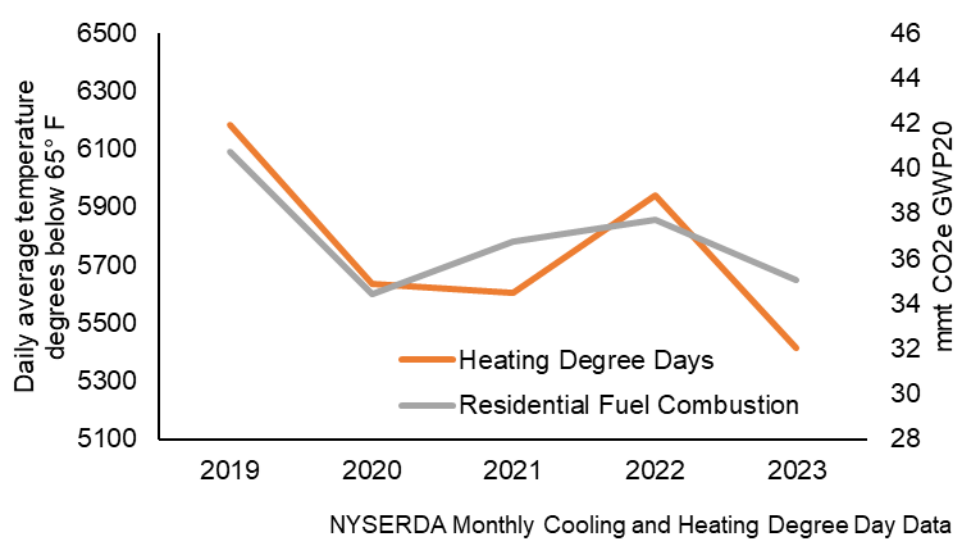
The method used to estimate emissions from fuel combustion in buildings is the same as that used for electricity generation. The EIA SEDS dataset supplied annual Btus of fuel consumed in New York and the EPA provided emission factors for $CO_2$, $CH_4$, and $N_2O$ used in this section (EPA 2025b; NYSERDA 2024a). Distillate fuel oil emission factors were applied to kerosene, and natural gas emission factors were applied to LPG. One notable aspect of this analysis is that when using the EIA SEDS dataset, states must also consider the volume of fuels that were not combusted but used for other purposes, as described in the Other Uses of Fossil Fuels section below.

### *Results*

Fuel combustion emissions related to space heating strongly depend on air temperature. In particular, the severity of weather in the cold season affects residential fuel combustion emissions in a given year, with colder weather demanding more fuel use to heat residential buildings. Figure SR1.1 compares residential fuel combustion emissions to the number of heating degree days in New York State, or the total number of degrees that the daily average temperature fell below 65° F in that year.[2] The timeseries in Figure SR1.1 are positively correlated, with a correlation coefficient of 0.90, suggesting a strong relationship between the ambient air temperature and residential fuel use. However, other factors such as economic trends and technological changes influence residential fuel combustion for a given year.

[2] Available at https://www.nyserda.ny.gov/about/publications/ea-reports-and-studies/weather-data/monthly-cooling-and-heating-degree-day-data

**Figure SR1.1 Heating Degree Days and Fuel Combustion**




When comparing 1990 emission levels to emissions in recent years (2019-2023), fuel combustion emissions from Residential, Commercial, and Industrial (RCI) sources were 17-26% lower overall (Table SR1.6). However, the largest portion of emissions is from residential fuel combustion, which was up to 4% higher in 2019 compared to 1990. Commercial fuel combustion emissions in 2023 were 23% below 1990 totals and industrial fuel combustion emissions were 59% below 1990 levels, likely in part to the decline in manufacturing over this time period.

**Table SR1.6 RCI Fuel Combustion Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Residential | 39.18 | 46.44 | 40.72 | 34.45 | 36.77 | 37.70 | 35.08 |
| Commercial | 27.24 | 29.93 | 22.61 | 19.92 | 21.37 | 21.68 | 21.10 |
| Industrial | 20.75 | 13.73 | 9.01 | 8.01 | 8.36 | 8.04 | 8.45 |
| **Gross Total** | **87.17** | **90.10** | **72.35** | **62.38** | **66.49** | **67.43** | **64.62** |

Note: Totals may not sum due to independent rounding.

As in the case of the electricity sector, there has been a transition in the RCI energy sectors away from fuels with higher combustion emissions (Table SR1.7). While emissions from natural gas combustion increased 25%, emissions from all other fuels decreased 60% from 1990-2023.

**Table SR1.7 RCI Fuel Combustion Emissions by Fuel Type, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Coal | 8.56 | 3.35 | 0.85 | 0.38 | 0.51 | 0.58 | 0.46 |
| Distillate Fuel | 21.79 | 29.96 | 12.42 | 9.42 | 12.24 | 12.35 | 11.39 |
| Natural Gas | 34.73 | 41.73 | 48.52 | 44.49 | 45.55 | 46.10 | 43.51 |
| Wood | 8.02 | 9.25 | 7.05 | 4.92 | 5.02 | 5.83 | 5.29 |
| Other | 14.07 | 5.80 | 3.51 | 3.17 | 3.17 | 2.57 | 3.44 |
| **Gross Total** | **87.17** | **90.10** | **72.35** | **62.38** | **66.49** | **67.43** | **64.62** |

Note: Totals may not sum due to independent rounding.

## Transportation

Emissions from the transportation sector are distinguished from other sources of fuel combustion emissions in that they are predominantly emitted by mobile sources or sources that can be moved. Road transportation comprises the largest subcategory of emissions and includes passenger cars and trucks, commercial light-duty trucks, motorcycles, buses, and heavy-duty trucks. Non-road transportation sources include aviation, marine, and rail as well as equipment used for agriculture, construction, landscaping, or recreation. The IPCC approach also includes emissions associated with the operation of oil and natural gas pipelines and distribution. In this report, the leakage of emissions in this infrastructure is described below in the Fugitive Emissions section.

Transportation fuels used in New York for 1990-2023 included motor gasoline, diesel, compressed natural gas (CNG), and blended biofuels (ethanol and biodiesel). Emissions of gasoline and diesel blended with biofuels are reported together with the fossil portion of the fuel, and the biogenic $CO_2$ accounted for separately. One key aspect of transportation emissions accounting relates to the treatment of fuels used for international transport, or bunker fuels (Table SR1.10). The current report follows the IPCC guidance and focuses on fuels used for domestic transportation and so only considers fuels used for trips that start in New York and whose destination is within the United States.

### *Methodology*

Non-Road Transportation: Non-road emission sources were estimated using fuel volume data from EIA SEDS and the Federal Highway Administration (FHWA) Highway Statistics Series (FHWA 2025), and emission factors from the EPA, with minor adjustments as described in NYSERDA (2024a). A key exception is the analysis of aviation emissions which is based on a combination of EIA SEDS fuel volumes and information from the Bureau of Transportation Statistics. This approach enables New York to include fuel volumes that the EIA SEDS dataset allocates to neighboring states as well as distinguish between domestic and international flights. As described above, emissions from international flights were excluded from emission totals, but were provided as an informational item. Additionally, it is not possible at this time to determine the portion of marine residual and distillate fuels that are not bunker fuels, i.e., not used for ocean-going trips. So, these fuels were all treated as bunker fuels and excluded from the

analysis (a total of 1.08mmt $CO_2e$). This may be reassessed in future reports if new data are made available (see Planned Improvements).

Road Transportation: Road transportation emissions include two additional layers of complexity compared to other types of fuel combustion. First, vehicular tailpipe emissions of methane and nitrous oxide depend on the control technology used in different vehicle makes, models, and years. Second, motor vehicles move easily across state borders and may contain fuels purchased in other states. The EIA SEDS dataset provides an estimate of fuels sold in New York, but not fuels purchased elsewhere and combusted in New York. Given these complexities, the EIA SEDS fuel volumes may not accurately capture emissions from road transportation.

The U.S. EPA requires states to use the Motor Vehicle Emissions Simulator (MOVES) model for estimating air pollution emissions from “on-road” transportation. This model is also ideal for estimating statewide greenhouse gas emissions as it estimates tailpipe emissions based on total vehicle miles travelled (VMT), rather than fuel sales. DEC’s MOVES modeling inputs are provided to the EPA’s National Emissions Inventory (or “NEI”, EPA 2023). EPA then publishes emission estimates based on these inputs. These published emissions were used as the emission estimates for 2011 and 2014 while the emissions for 2017 and 2019-2023 were from DEC modeling of inputs. Emissions for years without modelling in this period are estimated with interpolation. Emission estimates for 1990 through 2010 were conducted by the NYSERDA contractor, Eastern Research Group Inc. (ERG), and are further described in NYSERDA (2024a).

Emissions for on-road vehicles in 2023 rely on output from the fifth version of the EPA MOVES model (EPA 2025c). MOVES5 reflects EPA regulations such as the Light- and Medium-Duty Multi-Pollutant Rule and Greenhouse Gas Standards for Heavy-Duty Vehicles – Phase 3, and includes emissions from vehicles up to 40 years old. Additionally, MOVES5 calculations are based on updated data for fuel characteristics, vehicle populations, and vehicle activity. Chapter 2 of the MOVES5 documentation describes any modeling changes from the fourth version of MOVES (MOVES4) in detail.

### *Results*

Transportation is the largest source of fuel combustion emissions and has on average increased substantially since 1990 for the 2019-2023 period. In 2023, road transportation emissions decreased by nearly 1.1 mmt $CO_2e$ or 2% since 1990 (Table SR1.8) and represented 81% of transportation fuel combustion emissions and 21% of statewide total emissions. Total non-road source emissions increased 39% in 2023 relative to 1990, with increases in each non-road emission source. Note that aviation emissions steadily increased from the COVID-19 pandemic in 2020 and do not include emissions associated with international aviation (Table SR1.10).

**Table SR1.8 Transportation Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| **Road** | **60.21** | **74.86** | **64.51** | **52.99** | **56.48** | **57.18** | **59.11** |
| **Non-Road** | **9.92** | **11.69** | **13.73** | **9.78** | **12.07** | **13.96** | **13.81** |
| Aviation | 5.90 | 6.69 | 7.35 | 3.66 | 5.32 | 6.80 | 7.21 |
| Rail | 0.12 | 0.85 | 0.58 | 0.47 | 0.54 | 0.61 | 0.60 |
| Marine | 0.45 | 0.61 | 0.80 | 0.88 | 1.01 | 0.80 | 0.58 |
| Other Transportation | 3.19 | 2.98 | 3.37 | 3.31 | 3.24 | 3.54 | 3.35 |
| Pipeline | 0.26 | 0.57 | 1.64 | 1.47 | 1.96 | 2.22 | 2.08 |
| **Gross Total** | **70.13** | **86.55** | **78.25** | **62.77** | **68.55** | **71.14** | **72.92** |

Note: Totals may not sum due to independent rounding.

Gasoline consumption produced 64% of transportation fuel combustion emissions in 2023, representing the largest source of transportation GHG emissions (Table SR1.9). Diesel emissions have increased 6.86 mmt $CO_2e$ since 1990 and accounted for 23% of 2023 transportation emissions. Gasoline and jet fuel experienced sharp declines in emissions in 2020 as an effect of the COVID-19 pandemic but have steadily increased from 2021-2023.

**Table SR1.9 Transportation Emissions by Fuel Type, 1990-2023 (mmt $CO_2e$ GWP20)**

| Fuel Type | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Aviation Gasoline | 0.06 | 0.10 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| CNG | + | 0.21 | 0.19 | 0.18 | 0.23 | 0.33 | 0.24 |
| Diesel | 9.67 | 15.24 | 15.09 | 13.71 | 14.67 | 16.61 | 16.53 |
| Gasoline | 54.19 | 63.85 | 53.97 | 43.76 | 46.37 | 45.19 | 46.86 |
| Jet Fuel | 5.84 | 6.59 | 7.32 | 3.63 | 5.29 | 6.77 | 7.18 |
| Natural Gas | 0.26 | 0.57 | 1.64 | 1.47 | 1.96 | 2.22 | 2.08 |
| Residual Fuel | 0.12 | na | na | na | na | na | na |
| **Gross Total** | **70.13** | **86.55** | **78.25** | **62.77** | **68.55** | **71.14** | **72.92** |

“+” less than 0.01mmt; “na” not applicable; Note: Totals may not sum due to independent rounding.

As described above, the IPCC approach omits fuels used for international transport and these emissions were excluded from this analysis as well. As New York State receives a significant volume of the United States international travel and shipping, these emissions are significant and are listed in Table SR1.10 below.

**Table SR1.10 Excluded Transportation Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Bunker (Aircraft) | 11.58 | 8.25 | 13.68 | 6.17 | 7.43 | 10.75 | 12.49 |
| Bunker (Marine Vessel) | 0.60 | 2.63 | 0.72 | 0.78 | 1.19 | 1.25 | 1.08 |
| **Excluded Total** | **12.18** | **10.88** | **14.40** | **6.95** | **8.62** | **11.99** | **13.57** |

Note: Totals may not sum due to independent rounding.

## Petroleum Refining

The EIA SEDS dataset suggests that one refinery operated in New York in 1990 and ceased operations in 1991. Emissions for this facility were calculated for 1990 and 1991 by scaling national refinery emissions for those years to New York based on the state's crude oil distillation capacity. Emissions were estimated as 0.01mmt $CO_2e$ for both 1990 and 1991.

## Other Fossil Fuel Use

While the majority of emissions from fossil fuels are the result of fuel combustion or leakage, there are also emissions associated with other non-energy uses of fossil fuels. This includes emissions that might occur during the manufacturing or use of plastics, asphalt, or lubricants. Some of these uses result in longer term storage of carbon, rather than emissions. Nationwide, the EPA estimates that 36% of the carbon consumed in fossil fuels for non-energy uses is emitted as $CO_2$.[3] The IPCC approach include these other uses of fossil fuels in the Industrial Process and Product Use sector. This report follows the national greenhouse gas inventory, which includes these emissions in the energy sector (EPA 2025b).

### *Methodology*

The EIA SEDS dataset provides total fuel volumes, but an additional step is needed to estimate how much fuel was used in New York for different products. The U.S. national inventory was used to determine the percentage of each type of fuel that was either combusted, used for other reasons that resulted in emissions, or not associated with emissions (i.e., stored) for each year in the time series (EPA 2025a, NYSERDA 2024a). For those fuel volumes that were determined to be used for other reasons that resulted in emissions, it is assumed that 100% of the carbon content was oxidized and released as $CO_2$, and no $CH_4$ or $N_2O$ emissions were produced.

### *Results*

Although these non-combustion activities are not a major source of annual emissions, emissions declined 42% from 1990 to 2023, suggesting a reduction in the use of these fuels in New York State.

[3] EPA (2025b) 3.2 Carbon Emitted from Non-Energy Uses of Fossil Fuels (CRF Source Category 1A)

**Table SR1.11 Emissions from Other Uses by Fuel Type, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Coal | 0.02 | 0.76 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Lubricants | 0.87 | 0.75 | 0.55 | 0.49 | 0.52 | 0.55 | 0.40 |
| Miscellaneous Petroleum Products | 0.23 | 0.12 | 0.15 | 0.14 | 0.14 | 0.20 | 0.19 |
| Natural Gas | 0.09 | 0.06 | 0.12 | 0.12 | 0.13 | 0.10 | 0.10 |
| Special Napthas | 0.08 | 0.04 | 0.06 | 0.05 | 0.05 | 0.06 | 0.06 |
| Other Fuels | 0.14 | 0.47 | 0.07 | 0.08 | 0.11 | 0.10 | 0.08 |
| **Gross Total** | **1.43** | **2.20** | **0.97** | **0.89** | **0.96** | **1.02** | **0.84** |

Note: Totals may not sum due to independent rounding.

## Fugitive Emissions from Fossil Fuels

This IPCC category represents emissions associated with the intentional venting or unintentional leakage of greenhouse gases from oil and natural gas infrastructure in New York. This includes many individual sources from extraction, through the transmission and distribution system, and at the “customer side” or the final delivery location. As described in the *Summary Report*, governmental greenhouse gas inventories use “bottom-up” methods that attempt to catalogue annual emissions from all sources across a wide geographic area. Additionally, the fugitive emissions analysis in this section and in the Imported Fossil Fuels section considers “top-down” information, or data collected from sensors that are not associated with specific emission sources. Top-down information can complement bottom-up inventories and provide valuable points of comparison.

### *Methodology*

The NYS Oil and Gas Methane Inventory (NYSERDA 2024b) and NYSERDA (2024a) technical supplement describes the data and methodology used in this section. For these analyses, NYSERDA contracted with researchers at Abt Associates Inc. and Eastern Research Group, and received technical support from DEC, other State agencies, and outside experts. DEC hosted a public hearing in March 2021 to describe the analyses and take feedback on data sources and methodology. DEC continues to welcome feedback on this and any part of the current analyses. Note that these analyses will reflect new information and data that becomes available for future iterations of this report (see Planned Improvements).

### *Results*

Based on the analysis provided by NYSERDA (2024a, b), oil and gas industry emissions within New York declined 20% from 1990 levels (Table SR1.12). However, emissions from this industry remain high, and constituted 4% of total emissions in 2023 despite providing a small portion of fuel used in the state. This analysis was also used to generate upstream and downstream emission factors by fuel type for use by State agencies, as provided in the accompanying *Summary Report*.

**Table SR1.12 Oil and Gas Fugitive Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Gas | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Carbon dioxide | 0.05 | 0.09 | 0.28 | 0.17 | 0.10 | 0.12 | 0.13 |
| Methane | 16.72 | 20.01 | 13.46 | 13.24 | 13.11 | 13.25 | 13.25 |
| Nitrous oxide | + | + | + | + | + | + | + |
| **Gross Total** | **16.77** | **20.10** | **13.74** | **13.41** | **13.21** | **13.36** | **13.38** |

"+" less than 0.01mmt; Note: Totals may not sum due to independent rounding.

## Electricity Transmission

This IPCC category is typically included in the Industrial Process and Product Use sector but represents an emission source associated with energy systems. Emissions of sulfur hexafluoride ($SF_6$) are primarily emitted from leaks in electric system substations and switchgear. In addition to leaks, $SF_6$ emissions can occur during installation, servicing, and disposal of circuit breakers, switchgear, and other gas insulated equipment. To address the high rate of $SF_6$ emissions in the 1990s, EPA established the Electric Power Systems Partnership, which resulted in a significant decline in annual emission rates nationwide.[4] However, these systems are still the industry standard and new $SF_6$ equipment continues to be installed. $SF_6$ is one of the most potent known greenhouse gases as measured on a GWP basis and exhibits a stable molecular structure. This chemical stability means that $SF_6$ degrades slowly in the atmosphere, affecting earth's climate for thousands of years.

### *Methodology*

Per the U.S. EPA SIT (EPA 2025a), national emissions estimates were scaled to New York State using the ratio of New York State to U.S. electricity sales (MWh), with one notable adjustment. Based on feedback from EPA, $SF_6$ emissions were calculated separately for Consolidated Edison Inc. (ConEd), which historically represented a larger share of U.S. emissions than standard methodology would indicate. Electricity sales attributable to ConEd were deducted from national and state totals and $SF_6$ was estimated separately for ConEd. Publicly reported ConEd $SF_6$ emissions were used, where available. For the earlier years of 1990-1995, the 1996 ratio of ConEd to total national emissions was applied to the annual U.S. emissions estimate.

### *Results*

Based on this assessment, emissions of $SF_6$ were greatest in the early years of the time series and declined substantially in subsequent years. The emission rate has remained relatively stable with a slight downward trend in recent years, likely due to the servicing of existing equipment and the continuing installation of new $SF_6$ equipment across the state.

[4] https://www.epa.gov/eps-partnership/eps-partnership-accomplishments

**Table SR1.13 Electricity Transmission $SF_6$ Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Electricity Transmission | 4.15 | 1.67 | 0.16 | 0.14 | 0.14 | 0.13 | 0.12 |
| **Gross Total** | **4.15** | **1.67** | **0.16** | **0.14** | **0.14** | **0.13** | **0.12** |

## Out of State Energy Emissions

The CLCPA requires that this emissions report include two categories of emissions that occur outside of the State's jurisdictional boundaries: (1) emissions associated with imported electricity and (2) emissions produced from the "extraction and transmission" of imported fossil fuels (Table SR1.14). With the exception of emissions associated with imported electricity, DEC is unaware of out of state energy emissions analyses in other GHG inventory reports because governmental GHG inventories do not typically include these emissions sources. Further, the IPCC approach does not account for these emission categories. Note that the emission sources reported here may be included in reporting by the states in which they are located. National emission reports will not attribute these emissions to New York State or to facilities located in New York.

The data and methods used for these two analyses are described at a high level below and in greater detail in NYSERDA (2024a) and the *Energy Sector Data and Methods* appendix. In general, this analysis estimates the "upstream", out-of-state emissions associated with imported electricity and the fossil fuel volumes described in other sections of this report.

This report follows IPCC approach and excludes emissions from bunker fuels, or fuels used for international transport ("Excluded Transportation Emissions", Table SR1.14). This is explained in more detail in the Fuel Combustion section above. For this section, this means that this report excludes the upstream, out-of-state emissions for the volume of fuel that was used as a bunker fuel in New York.

**Table SR1.14 Out of State Energy Emissions, 1990-2023 (mmt $CO_2e$ GWP20)**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Imported Electricity | 0.91 | 7.80 | 7.81 | 6.53 | 8.42 | 8.71 | 9.54 |
| Imported Fossil Fuels | 98.21 | 124.09 | 81.87 | 66.07 | 71.05 | 72.92 | 72.04 |
| **Gross Total** | **99.12** | **131.89** | **89.68** | **72.60** | **79.47** | **81.63** | **81.58** |
| Excluded Transportation Emissions | **3.13** | **2.91** | **3.63** | **1.77** | **2.23** | **3.01** | **3.39** |

Note: Totals may not sum due to independent rounding.

## Imported Electricity

This emission category refers to emissions connected with electricity imported into New York that was generated at facilities outside of New York. The amount of power imported into New

York in any given year is determined by a variety of factors that are beyond the scope of this report.

### *Methodology*

The data and methodology used in this report are described in the accompanying report from NYSERDA (2024a) and the *Energy Sector Data and Methods* appendix. For this analysis, NYSERDA contracted with researchers at ERG and received technical support from DEC and other State agencies as well as from outside experts. DEC continues to welcome feedback on this and any part of the current analysis. This analysis included both net electricity imports from the surrounding regional electricity grids as well as imports from specific electricity generation units in New Jersey that are directly connected to New York's electricity grid.

### *Results*

Emissions of $CO_2$, $CH_4$, and $N_2O$ from imported electricity were low in 1990 but have been greater than 6.5 mmt $CO_2e$ per year since 2002. In other words, although emissions were higher in 2023 compared to 1990, this is not a new trend. Instead, emissions from imported electricity have stayed between 6.5 and 10.52 mmt $CO_2e$ for almost twenty years, and below 9.6 mmt $CO_2e$ for the last five years. Note that imported electricity emissions increased after 2021 largely due to the closure of the Indian Point electricity generation facility.

## Imported Fossil Fuels

This category of emissions encompasses a wide variety of individual emission sources including those associated with the extraction of fuels, transport to refineries, the processing and blending of finished fuels, and the transport of those fuels to the New York State border. This category does not include emission sources within New York State, as these are described in the other sections of this report. For comparison, the Fuel Combustion section above assessed the emissions resulting from the combustion of a certain volume of fuel. This Imported Fuels analysis estimated the emissions that occurred during extraction, production, and transmission or distribution of those fuels to New York. Just as the Fuel Combustion analysis applied a combustion emission factor to fuel volumes, this analysis calculated and then applied emission factors related to the upstream fuel cycle.

### *Methodology*

The data and methodology used in this section of the report are described in the accompanying *Energy Sector Data and Methods* appendix and in the technical documentation from NYSERDA (2024a). For that analysis, NYSERDA contracted with ERG and received technical support from DEC, other State agencies, and outside experts. DEC also hosted a public hearing in March 2021 to describe the analysis and take feedback on data sources and methodology. DEC continues to welcome feedback on this and any part of the current analysis. In this report, DEC has conducted a recalculation of upstream, out-of-state emissions from natural gas imports using a recently released updated methodology, the NETL Natural Gas Lifecycle Analysis Model based on year 2020 operating conditions (NETL 2025). The accompanying *Energy Sector Data and Methods* appendix includes more details about the changes in data and methods underlying upstream natural gas emissions.

The methodologies used in this section of the report are unique because this sector encompasses a large, complex set of infrastructures that are not located in New York and are not currently subject to New York State laws or reporting requirements. There is also no comprehensive federal data source that provides all of the necessary information. The closest source of information are fuel lifecycle models that estimate emissions associated with a product across all stages, from the extraction of raw materials through the final end-use of the product. However, lifecycle models are not updated annually and they may utilize information collected across multiple years. There is also no lifecycle analysis tool that will provide information specific to New York State. Instead, the research team used a combination of lifecycle models, historical emission and fuel data, and spatial information to reconstruct the full time series. NYSERDA (2024a) also describes approaches to assess sensitivities and address specific sources of uncertainty. For this report, DEC uses emission outputs from the "high sensitivity" approach, which represented the most precautionary approach and applies the highest emission factors.

### *Results*

Emissions of $CO_2$, $CH_4$, and $N_2O$ from imported fossil fuels in 2023 declined 27% since 1990 (Table SR1.15). The statewide demand for fossil fuels determines the level of emissions in this category along with the operating conditions of the fossil fuel system for a given year. The COVID-19 pandemic drove a significant reduction in energy and fuel demand in 2020, which also affected imported fossil fuels emissions.

Upstream, out-of-state emissions associated with imported coal decreased 76% from 1990 to 2023 (Table SR1.15) following in-state coal combustion emissions trends (Table SR1.4, SR1.5, SR1.7). For imported natural gas, upstream, out-of-state emissions decreased 9% in year 2023 from 1990 levels. This result primarily reflects lower emission factors from the NETL natural gas lifecycle analysis model and not decreased natural gas consumption in New York. Upstream, out-of-state emissions from natural gas imports decreased significantly for years 2020-2022 under the new NETL methodology. For year 2022, upstream natural gas emissions decreased by 21.20 mmt $CO_2$e GWP20 (35%) relative to the emissions included in the 2024 Statewide GHG Emissions Report. The *Energy Sector Data and Methods* appendix and NYSERDA (2024a) provides additional background and supplemental information, including comparisons of aggregate emission rates associated with different fuel basins that provided fuel to New York. This analysis was also used to generate upstream emission factors by fuel type for use by State agencies, as provided in the accompanying *Summary Report*.

**Table SR1.15 Imported Fossil Fuel Emissions by Fuel Type, 1990-2023 (mmt CO2e GWP20)**

| Fuel Type | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| CNG | + | 0.17 | 0.04 | 0.03 | 0.03 | 0.07 | 0.03 |
| Coal | 9.24 | 6.00 | 1.40 | 1.18 | 1.16 | 1.64 | 2.22 |
| Diesel/Distillate | 10.15 | 13.35 | 8.48 | 7.13 | 8.43 | 8.97 | 8.55 |
| Gasoline | 22.24 | 27.37 | 20.53 | 16.67 | 17.92 | 17.03 | 17.58 |
| Jet Fuel | 1.50 | 1.66 | 1.85 | 0.92 | 1.34 | 1.71 | 1.81 |
| Natural Gas | 43.66 | 66.25 | 47.32 | 38.00 | 39.78 | 41.22 | 39.67 |
| Other Fuels | 11.42 | 9.28 | 2.26 | 2.13 | 2.40 | 2.28 | 2.19 |
| **Gross Total** | **98.21** | **124.09** | **81.87** | **66.07** | **71.05** | **72.92** | **72.04** |

"+" less than 0.01mmt; Note: Totals may not sum due to independent rounding.

As discussed in the sections above, the IPCC approach omits fuels used for international transport, so the associated upstream, out of state emissions from those fuels has also been excluded from this analysis (Table SR1.16).

**Table SR1.16 Excluded Emissions by Fuel Type, 1990-2023 (mmt $CO_2e$ GWP20)**
**Informational Purposes Only**

| Emission Category | 1990 | 2005 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Diesel/Distillate | 0.03 | 0.03 | 0.09 | 0.08 | 0.09 | 0.10 | 0.09 |
| Jet Fuel | 2.97 | 2.20 | 3.44 | 1.56 | 1.91 | 2.69 | 3.11 |
| Residual Fuel | 0.13 | 0.68 | 0.11 | 0.13 | 0.23 | 0.23 | 0.19 |
| **Gross Total** | **3.13** | **2.91** | **3.63** | **1.77** | **2.23** | **3.01** | **3.39** |

"+" less than 0.01mmt; Note: Totals may not sum due to independent rounding.

# Planned Improvements

### Fuel Combustion

The apportionment of SEDS fuel data to excluded bunker fuels is an area for future improvement. Fuel combustion emissions were estimated using SEDS data, but these data do not provide the share of fuels for international (bunker) trip use. Two areas of specific interest for improvement are marine diesel/distillate and airline jet fuel. Due to lack of information, marine diesel/distillate use is currently assigned entirely to bunker fuels. Information will be sought to determine the share of this fuel use being used domestically and include these emissions in the State gross total. Additional approaches to the apportionment of aviation jet fuel use will be evaluated. One of these approaches is the use of Bureau of Transportation Statistics T-100 segment data to estimate emissions and fuel use.

### Fugitive Emissions from Fossil Fuels

DEC and partners will continue to research and evaluate methods for reconciling bottom-up and top-down estimates of fugitive emissions. Some of the areas of potential future analysis are summarized in NYSERDA (2024b), including further evaluations of top-down measurements taken in New York State, as they become available, and expanding the scope of potential emission sources in commercial and industrial buildings. Further refinements to the analyses conducted in NYSERDA (2024) may also result in improvements to the estimate of in-state fugitive emissions (Out of State Emissions, below).

### Electricity Transmission

Current methodology relies on apportioning national electricity transmission $SF_6$ emissions to New York State. With the promulgation of 6 NYCRR Part 495,“Sulfur Hexaflouride Standards and Reporting”, DEC will begin collecting state-specific data for this category in future years. The primary sources of emissions will begin report submissions for data year 2027, which can then be incorporated into improved emission estimates.

### Out of State Emissions

DEC will continue to refine the methodologies used to estimate upstream energy emissions, particularly from imported fossil fuels. This report represents the best available data and methods that could be used to produce an annualized inventory of sources relevant to New York State for the 1990-2023 time period. However, the measurement of emissions from the fuel system is an active area of research and any new and relevant information will be incorporated whenever possible. DEC welcomes feedback on alternative data and methods that may improve the accuracy of this assessment and the ability to identify and characterize emission sources outside of New York.

# Abbreviations

| | |
|---|---|
| Btu | British thermal unit |
| $CH_4$ | Methane |
| CHP | Combined heat and power |
| CLCPA | NYS Climate Leadership and Community Protection Act |
| CNG | Compressed natural gas |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| DEC | NYS Department of Environmental Conservation |
| EIA | Energy Information Administration, U.S. Department of Energy |
| EPA | U.S. Environmental Protection Agency |
| FHWA | U.S. Federal Highway Administration |
| GHG | Greenhouse gas |
| GWP | Global Warming Potential |
| GWP100 | 100-Year Global Warming Potential |
| GWP20 | 20-Year Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| LPG | Liquefied petroleum gas(es) |
| mmt | Million metric tons |
| MOVES | Motor Vehicle Emission Simulator model |
| $N_2O$ | Nitrous oxide |
| NA | Not applicable |
| NEI | National Emissions Inventory |
| NETL | National Energy Technology Laboratory |
| NYCRR | New York Codes, Rules and Regulations |
| NYISO | New York Independent System Operator |
| NYS | New York State |
| NYSERDA | NYS Energy Research and Development Authority |
| RCI | Residential, Commercial, Industrial |
| SEDS | EIA State Energy Data System |
| $SF_6$ | Sulfur hexafluoride |
| SIT | EPA State Inventory Tool |

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