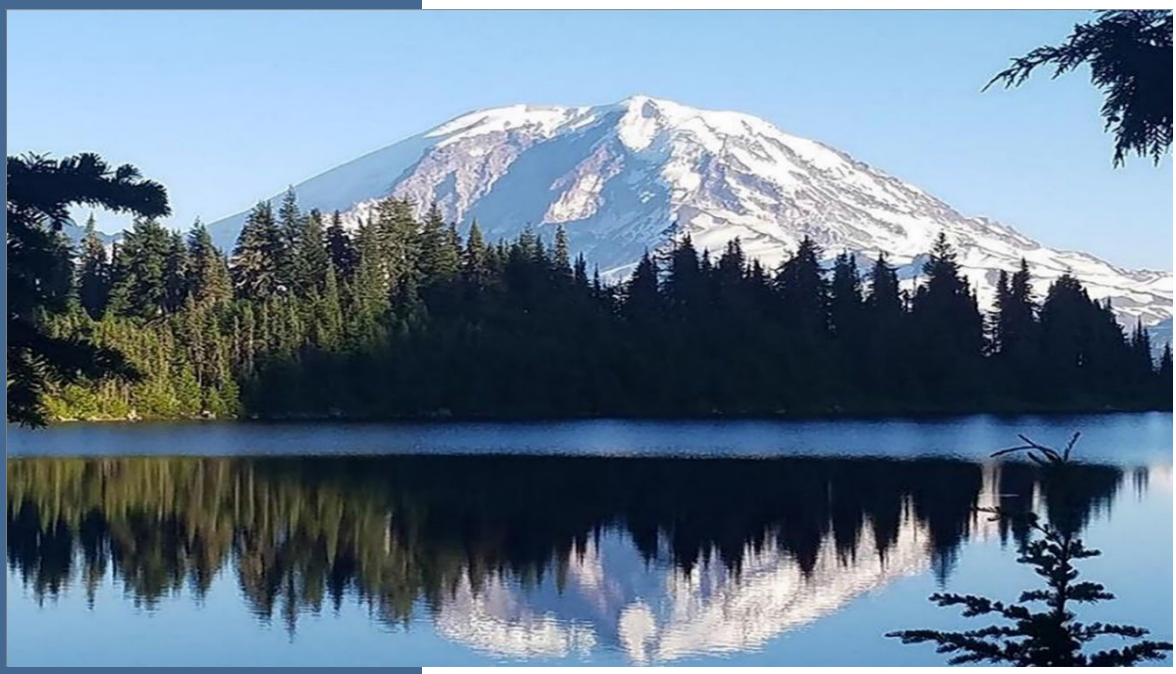

Washington State Greenhouse Gas Emissions Interim Inventory Report: 1990-2022

Climate Pollution Reduction Program
Washington State Department of Ecology
Olympia, Washington

April 2026, Publication 26-14-030

DEPARTMENT OF ECOLOGY
State of Washington

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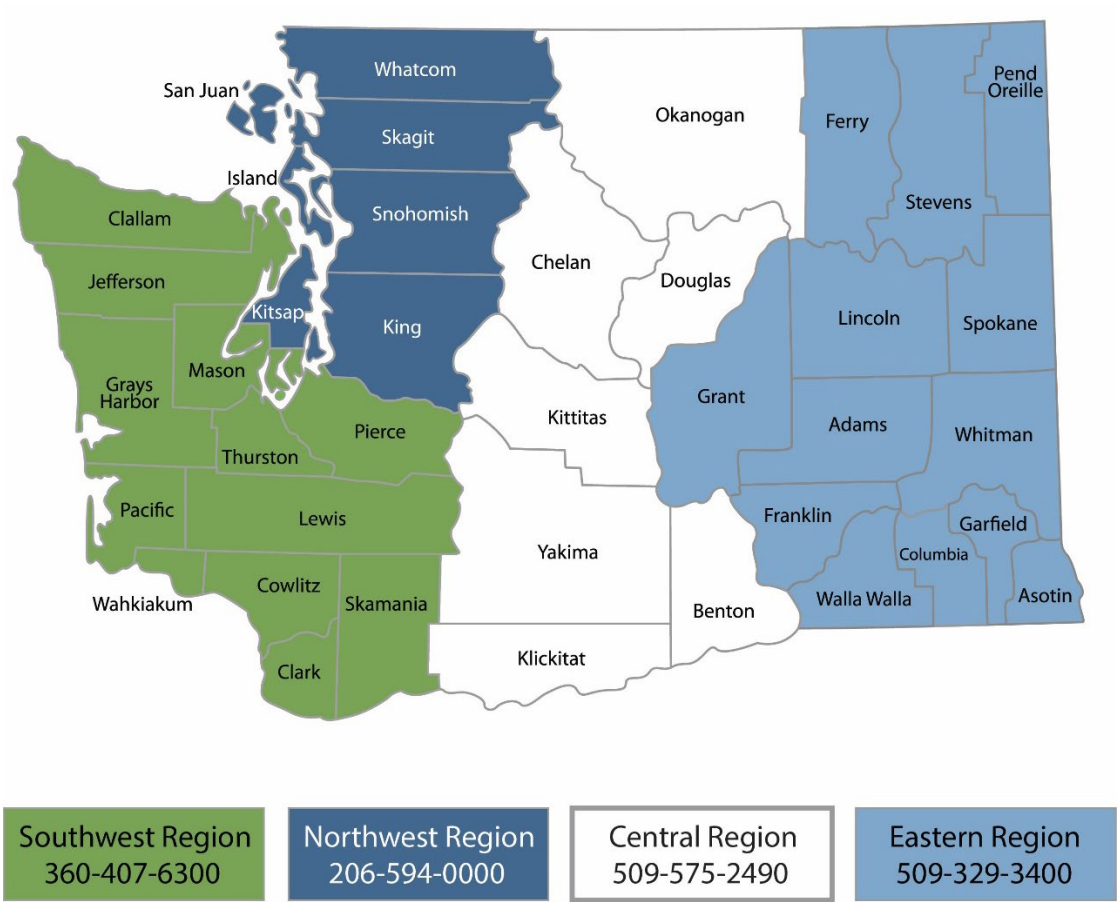
Department of Ecology's Regional Offices

Map of Counties Served



Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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ECOLOGY
State of Washington

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Acronyms and Abbreviations

Acronym	Meaning
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent (a unit of measure that represents the cumulative effect of all greenhouse gases in terms of their warming potential relative to carbon dioxide)
EPA	U.S. Environmental Protection Agency
HFC	Hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
MMT	Million metric tons
MMT CO_2e	Million metric tons of carbon dioxide equivalent
MWh	Megawatt hour
N_2O	Nitrous oxide
NF_3	Nitrogen trifluoride
PFCs	Perfluorocarbons
RCI	Residential, commercial, industrial (building sector)
SF_6	Sulfur hexafluoride
UTC	Washington Utilities and Transportation Commission

List of Figures and Tables

Figures

Tables

Acknowledgements

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- Anthony Abbott, Greenhouse Gas Inventory Supervisor
- Kristin Art, Analyst
- Yanlei Feng, Analyst
- Lynsie Patschke, Analyst
- Vera Pfeiffer, Analyst

Executive Summary

RCW 70A.45.020(2)(a)[2] requires Ecology and Commerce to complete a biennial report on statewide greenhouse gas emissions each even-numbered year through 2030 and annually starting in 2031, called the Washington State Greenhouse Gas Emissions Inventory.[3] This statute also requires interim data updates by December 31, 2027 and December 31, 2029. RCW 70A.45.020(1)[4] requires Washington to reduce its greenhouse gas emissions to specific limits each decade, and these recurring Greenhouse Gas Emission Inventories are the official measure of the state's progress toward these emission levels.

Ecology has been working toward producing annual reports by the required deadlines and developed the capacity to produce this Interim Inventory Report ahead of schedule. In recognition of the importance of this information to legislators and the public, we are releasing this update, based on the most recent available data, well ahead of the due date of the next biennial report in December 2026. Legislators have enacted a suite of climate policies to achieve Washington's emissions reduction limits.

The last full inventory[5] included statewide and sector-specific estimates and analysis through 2021. This Interim Inventory Report includes statewide and sector-specific estimates for 1990-2022, as well as revised estimates for previous years based on methodological changes that improve their accuracy. It does not include the sector specific analyses found in a full inventory. Due to these revisions, legislators and the public should refer to this interim inventory for the most up-to-date annual emissions estimates until the next full inventory is released.

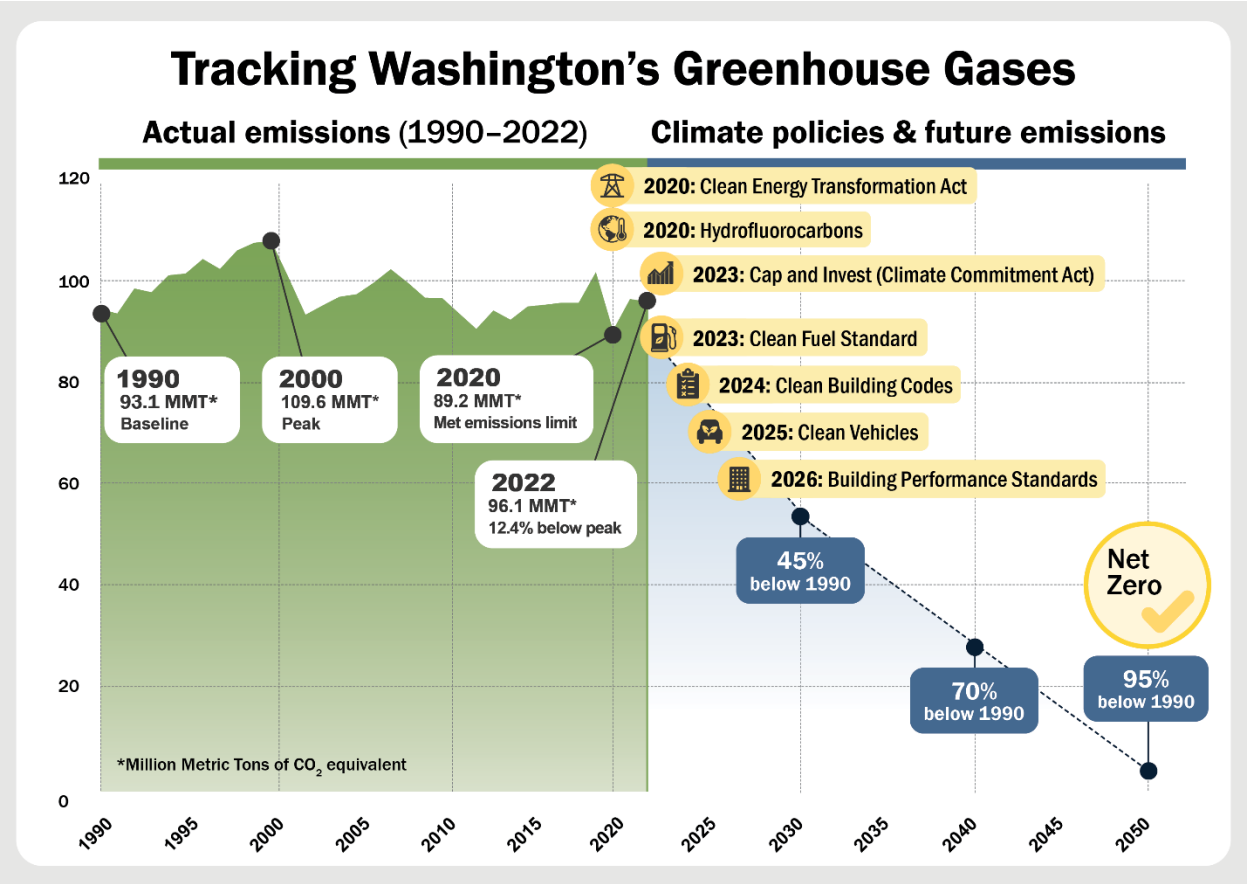
By adjusting the impacts from various greenhouse gases to reflect the cumulative impacts in terms of carbon dioxide, this Interim Inventory Report shows that the state's total emissions in 2022 were 96.1 million metric tons of carbon dioxide equivalent (MMT CO_2e).

The 2022 estimate also continues a long-term downward trend in total emissions since their peak in 2000, even as the state's economy and population grew. Compared to the state's historical peak of 109.6 MMT CO_2e in 2000, Washington's total greenhouse gas emissions declined 12.4% by the end of 2022. The state's 2022 emissions were just 3.2% higher than the 1990 baseline that Washington was required to achieve in 2020 (93.1 MMT CO_2e).

[2] RCW 70A.45.020: Greenhouse gas emissions reductions (https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.45.020).
[3] All of Washington's published inventories can be found at https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/tracking-greenhouse-gases/ghg-inventories
[4] RCW 70A.45.020: Greenhouse gas emissions reductions (https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.45.020).
[5] https://apps.ecology.wa.gov/publications/documents/2414077.pdf

The following trends in this Interim Inventory Report are notable:

- By the end of 2022, Washington's greenhouse gas emissions declined 12.4% compared to their peak in 2000 and were just 3.2% higher than they were in 1990.
- Despite retiring some coal power generation in 2020, coal power remains the largest source of greenhouse gas emissions in the electricity sector.
- When there is less hydropower production due to decreased rainfall or snowpack, Washington relies more on imported electricity or fossil fuel power plants, which increases greenhouse gas emissions.
- Residential, commercial, and industrial (building) emissions from on-site combustion of fossil fuels shifted from petroleum as the principal source to natural gas.



The results of this Interim Inventory Report predate the onset of many of Washington's major climate policies, including the Climate Commitment Act, which took effect in 2023 or later. We expect future inventories will begin to show the collective impact of these policies and to provide more specific analysis of sector trends.

Overview

Through RCW 70A.45.020 [6], Washington established greenhouse gas emission limits (Table 1) and requirements for measuring progress towards those limits through a statewide greenhouse gas inventory. Revisions to this statute in 2025 adjusted language to reflect the reality of data availability, to require interim reports in odd numbered years beginning in 2027, and to require annual reports beginning in 2030. This Interim Inventory Report, while not required by statute, is being released ahead of schedule in recognition of the importance of this information to legislators and the public. It provides an annual update to Washington's biennial State Greenhouse Gas Emissions Inventory and follows the same calculation process described in the last inventory.[7] This Interim Inventory Report does not include the deeper analysis within each sector that is included within the full reports.

Table 1 Washington's greenhouse gas emission limits (RCW 70A.45.020(1)). These limits are periodically adjusted based on a review of scientific evidence.[8] Net-zero emissions are achieved when greenhouse gases added to the atmosphere by people are balanced by removals over a specified period.[9]

Year	Greenhouse gas emissions limit
2020	Reduce to 1990 levels
2030	45% below 1990 levels
2040	70% below 1990 levels
2050	95% below 1990 levels and achieve net-zero emissions

[6] RCW 70A.45.020: Greenhouse gas emissions reductions (https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.45.020).

[7] For a full description of methods see https://apps.ecology.wa.gov/publications/documents/2414077.pdf

[8] As required by *RCW 70.235.040,* Ecology consulted with the University of Washington Climate Impacts Group and published the *2025 Summary Report on the Science of Human Caused Climate Change and Recommendations for Washington State's Greenhouse Gas Emission Reduction Limits* (https://apps.ecology.wa.gov/publications/SummaryPages/2514064.html)

[9] IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Glossary.

Greenhouse gases are released from a wide variety of sources, which the Intergovernmental Panel on Climate Change (IPCC) categorizes as follows: [10]

- *Stationary combustion* occurs when equipment is used to produce electricity, steam, heat, or power (such as boilers or generators). There are two ways these occur:
    - *Direct emissions* result from on-site combustion at the point of use.
    - *Indirect emissions* occur off-site when heat or electricity are purchased from a utility provider.
- *Mobile combustion* occurs when fuel is burned for transportation (such as in cars, trucks, ships, trains, and planes).
- *Industrial process emissions* result from manufacturing cement, aluminum, ammonia, and other products where the process itself creates emissions.
- *Fugitive emissions* are released by production, processing, transmission, storage, or use of fuels and other substances that do not involve combustion (e.g., the release of sulfur hexafluoride from electrical equipment, natural gas pipeline leaks, or emissions of nitrous oxide from fertilizers).

Since the science for greenhouse gas inventories is continuously improving, the methods used to calculate emissions are updated over time. When methodologies advance, Ecology applies them to the whole historical record. This means that calculated values may vary slightly among inventory publications and that the most recent inventory contains the most accurate emissions estimates dating back to 1990. This report is based on Version 2025.1 of the U.S. Environmental Protection Agency's (EPA's) State Inventory Tool (SIT), released in January 2025, and includes method changes that update the following:[11]

The agriculture module now includes carbon dioxide emissions estimates from applying lime and urea to soils. Previously, these categories were estimated in the land use, land use change, and forestry module, and they were not included in the state's total emissions inventory.

[10] IPCC Guidelines for National Greenhouse Gas Inventories (https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html).

[11] State Inventory and Projection Tool, US EPA (https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool). A full list of changes to the SIT are available in the "State, Local, and Tribal Inventory Tool Updates Tracker," available on request at "Contact Us about Energy Resources for State, Local, and Tribal Governments" (https://www.epa.gov/statelocalenergy/forms/contact-us-about-energy-resources-state-local-and-tribal-governments).

The SIT currently provides most of the data used to develop this inventory.[12] The EPA updates this tool annually with the most recently available data from the National Inventory of U.S. Greenhouse Gas Emissions and Sinks.[13] The most current data available from the SIT are from 2022.

Ecology supplements and replaces default data in the SIT with data from the Washington State Department of Commerce for the analysis of electricity consumption[14] to calculate emissions from all electricity *consumed* in our state rather than emissions based solely on electricity *produced* in our state.[15] In 2020, Commerce started separately reporting emissions from unspecified fuel sources for electricity consumed in-state. Fuel mixes used to generate electricity in Washington have relatively low emission rates compared to most other states. Hydropower, natural gas, wind, nuclear, and solar resources contributed 53.8%, 10.4%, 8.1%, 4.4%, and 0.8%, respectively, of Washington's electricity fuel mix in 2022.[16]

[12] State and Tribal Greenhouse Gas Data and Resources (https://www.epa.gov/ghgemissions/state-and-tribal-greenhouse-gas-data-and-resources).

[13] The EPA collects data for its report to United Nations for the Framework Convention on Climate Change. Those data must be verified and then analyzed following guidance from IPCC to create the National Greenhouse Gas Inventory. The National Inventory is then used to create downscaled data, disaggregated by state, which also requires quality assurance. These data populate the EPA's State Inventory Tool. Inventory of U.S. Greenhouse Gas Emissions and Sinks (https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks) which in turn populate the SIT.

[14] RCW 70A.45.020: Greenhouse gas emissions reductions (https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.45.020) and WAC 173-444-040: Greenhouse gas content calculation (https://apps.leg.wa.gov/wac/default.aspx?cite=173-444-040).

[15] Standard emissions accounting guidelines, like the SIT, use production-based approaches, which calculate emissions physically occurring within state boundaries. Washington's official inventory results are production-based in all sectors except for electricity. To make this substitution, Fuel Mix Disclosure program data provided by the Washington State Department of Commerce replace in-state electric power generation emissions from the SIT. The Fuel Mix Disclosure program requires each electric utility in Washington to report the fuel sources used to generate electricity and CO_2 emissions associated with that electricity. Fuel Mix Disclosure (https://www.commerce.wa.gov/growing-the-economy/energy/fuel-mix-disclosure/).

[16] https://deptofcommerce.app.box.com/s/l9sqx4bcfnko3omrpk4tv8n0vbzcvsdz/file/1673766736695

Interim Inventory Results Overview

In 2022, statewide emissions totaled 96.1 MMT CO_2e. Table 2 shows the Washington Statewide Greenhouse Gas Emissions Inventory with data from 1990 through 2022 for selected years[17].

Table 2 Total emissions by sector in million metric tons of carbon dioxide equivalent.

	1990	2000	2010	2019	2020	2021	2022
Total MMT CO_2e	**93.1**	**109.6**	**96.9**	**103.1**	**89.2**	**96.6**	**96.1**
Transportation	**35.4**	**41.9**	**35.3**	**40.6**	**31.6**	**38.1**	**38.6**
Gasoline highway	15.2	19.5	15.9	17.0	13.7	14.9	16.4
Diesel highway	3.5	5.5	7.4	6.7	7.1	7.8	6.9
Non-highway (aviation, marine, rail)	16.7	16.9	11.9	16.9	10.8	15.4	15.3
Alternative fuel vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential, commercial, and industrial buildings	**23.6**	**25.9**	**22.1**	**24.1**	**22.9**	**22.5**	**23.0**
Residential buildings	***3.7***	***5.4***	***5.3***	***6.4***	***6.0***	***6.2***	***6.5***
Coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum	1.3	1.3	1.0	1.0	0.8	0.9	0.8
Natural gas	2.2	4.0	4.2	5.2	5.0	5.2	5.4
Wood	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Commercial buildings	***3.2***	***3.5***	***3.7***	***4.7***	***4.7***	***4.7***	***5.1***
Coal	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum	1.0	0.6	0.9	1.2	1.4	1.4	1.4
Natural gas	2.1	2.8	2.8	3.5	3.2	3.3	3.6
Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial buildings	***16.7***	***17.0***	***13.1***	***13.0***	***12.2***	***11.6***	***11.5***
Coal	0.5	0.3	0.2	0.1	0.1	0.1	0.1
Petroleum	12.2	12.3	9.0	8.6	7.8	7.0	7.0
Natural gas	4.0	4.3	3.7	4.1	4.1	4.3	4.3
Wood	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Electricity consumption	**16.9**	**23.3**	**20.9**	**21.9**	**17.3**	**18.7**	**17.4**
Coal	16.8	17.4	15.8	15.2	8.1	8.8	8.3
Natural gas	0.1	5.3	4.8	6.2	4.2	4.7	3.8
Petroleum	0.0	0.6	0.1	0.0	0.0	0.0	0.0
Unspecified*					5.0	5.2	5.2
Other**	0.0	0.0	0.1	0.4	0.1	0.1	0.1

[17] All values in this and following tables are rounded to one decimal point. A value of 0.0 does not mean zero emissions but represents a small amount that was rounded to million metric tons. All calculations in the main text are based on original unrounded data, which is available in the Inventory Results 1990-2022 excel.

Agriculture	**7.8**	**7.9**	**8.5**	**8.8**	**8.8**	**8.5**	**8.3**
Enteric fermentation	2.9	2.8	2.5	2.9	2.9	2.8	2.8
Manure management	0.9	1.2	1.2	1.5	1.6	1.6	1.5
Agricultural soil management***	4.0	3.9	4.7	4.4	4.3	4.1	4.0
Industrial processes and fugitive emissions	**4.9**	**6.5**	**4.2**	**3.9**	**4.2**	**4.1**	**4.2**
Carbon dioxide emissions	***2.2***	***3.3***	***1.4***	***1.1***	***1.2***	***1.0***	***1.0***
Cement manufacturing	0.0	0.4	0.3	0.4	0.4	0.4	0.4
Lime manufacturing	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Limestone and dolomite use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soda ash	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Aluminum production, CO2	2.0	1.7	0.5	0.3	0.3	0.2	0.2
Iron and steel production	0.0	0.8	0.3	0.3	0.3	0.3	0.3
Ammonia production	0.1	0.1	0.1	0.0	0.1	0.0	0.0
Urea consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HFC, PFC, NF3, and SF6 emissions	***2.8***	***3.2***	***2.8***	***2.8***	***3.0***	***3.1***	***3.1***
Ozone depleting substances substitutes	0.0	1.0	1.8	1.9	2.1	2.2	2.2
Semiconductor manufacturing	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Electric power transmission and distribution systems	0.8	0.4	0.2	0.1	0.1	0.1	0.1
Aluminum production, PFCs	1.9	1.7	0.8	0.7	0.7	0.7	0.7
Waste management	**3.3**	**3.0**	**4.6**	**2.4**	**3.0**	**3.2**	**3.2**
Municipal solid waste	2.9	2.4	3.9	1.7	2.3	2.5	2.5
Wastewater	0.4	0.5	0.6	0.7	0.7	0.7	0.7
Fugitive fossil fuels	**1.1**	**1.3**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
Natural gas industry	1.0	1.1	1.3	1.4	1.4	1.4	1.4
Oil industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal mining	0.1	0.1	0.0	0.0	0.0	0.0	0.0

* Unspecified emissions data are only available in years following 2019. "Unspecified source" means an electricity source for which the fuel attribute is unknown or has been separated from the energy.

** Combined sources. Data from 2002 to 2019 include "landfill gases," "waste," and "other/biogenic, non-biogenic." Data from 2020 forward include "Other Biogenic."

*** “Agricultural soil management” is the sum of emissions from nitrogen-containing fertilizers, liming (carbon-containing fertilizer), urea fertilization (carbon-containing fertilizer), and the burning of agricultural crop waste.

The complete results for this Interim Inventory Report can be found at: Inventory Results 1990-2022.

The largest source of emissions in 2022 was the transportation sector (mobile combustion) at 38.6 MMT CO_2e or 40.2% of total emissions, from fossil fuels used in internal combustion engines. Transportation sector emissions in 2022 were about 1.4% higher than in 2021, which is 9.1% above the 1990 baseline of 35.4 MMT CO_2e for this sector.

The second largest source of emissions in 2022 was on-site fossil fuel combustion at residential, commercial, and industrial buildings (stationary direct) at 23.0 MMT CO_2e or 23.9% of total emissions.[18] Buildings sector emissions in 2022 were 2.0% higher than in 2021, which is 2.78% below the 1990 baseline of 23.6 MMT CO_2e for this sector. Together, the transportation and building sectors accounted for about 64.1% of Washington's total greenhouse gas emissions in 2022.

Emissions from electricity consumption (stationary indirect) were 17.4 MMT CO_2e in 2022, which account for 18.1% of total emissions.[19] Electricity sector emissions in 2022 were 7.1% lower than in 2021. This sector includes emissions comprised of fuels burned at electricity generation facilities that provide power to grid-connected end users.

The remaining sectors are smaller emissions sources: agriculture (8.7%), industrial processes (4.3%), waste management (3.3%), and fugitive fossil fuels (1.5%). Together, they comprise 17.1 MMT CO_2e or 17.8% of emissions.

The following tables and diagrams all point to two general observations. First, Washington's greenhouse gas emissions peaked in most sectors around 2000. Second, emissions estimated for 2022 are 3.2% higher than emissions calculated for the 1990 baseline and 12.4% below the peak emissions that occurred in 2000.

Figure 1 charts the absolute values for each sector to show the relative impacts of each. Overall, the transportation sector's emissions are the largest, and the electricity sector's emissions are the most volatile. Figure 2 charts each sector's contribution to total emissions. Greenhouse gas emissions peaked in 2000 before trending downwards; the years during the COVID-19 pandemic are characterized by high volatility. 00

[18] Fossil fuels are burned in furnaces, stoves, water heat waters, boilers or other machinery. RCI emissions do not include indirect emissions from electricity consumption for machinery.

[19] In **Table 2** Total emissions by sector in million metric tons carbon dioxide equivalent. Electricity emissions are not included within the sectors where it is consumed. When electricity emissions are partitioned among end uses, buildings are the largest source of emissions.

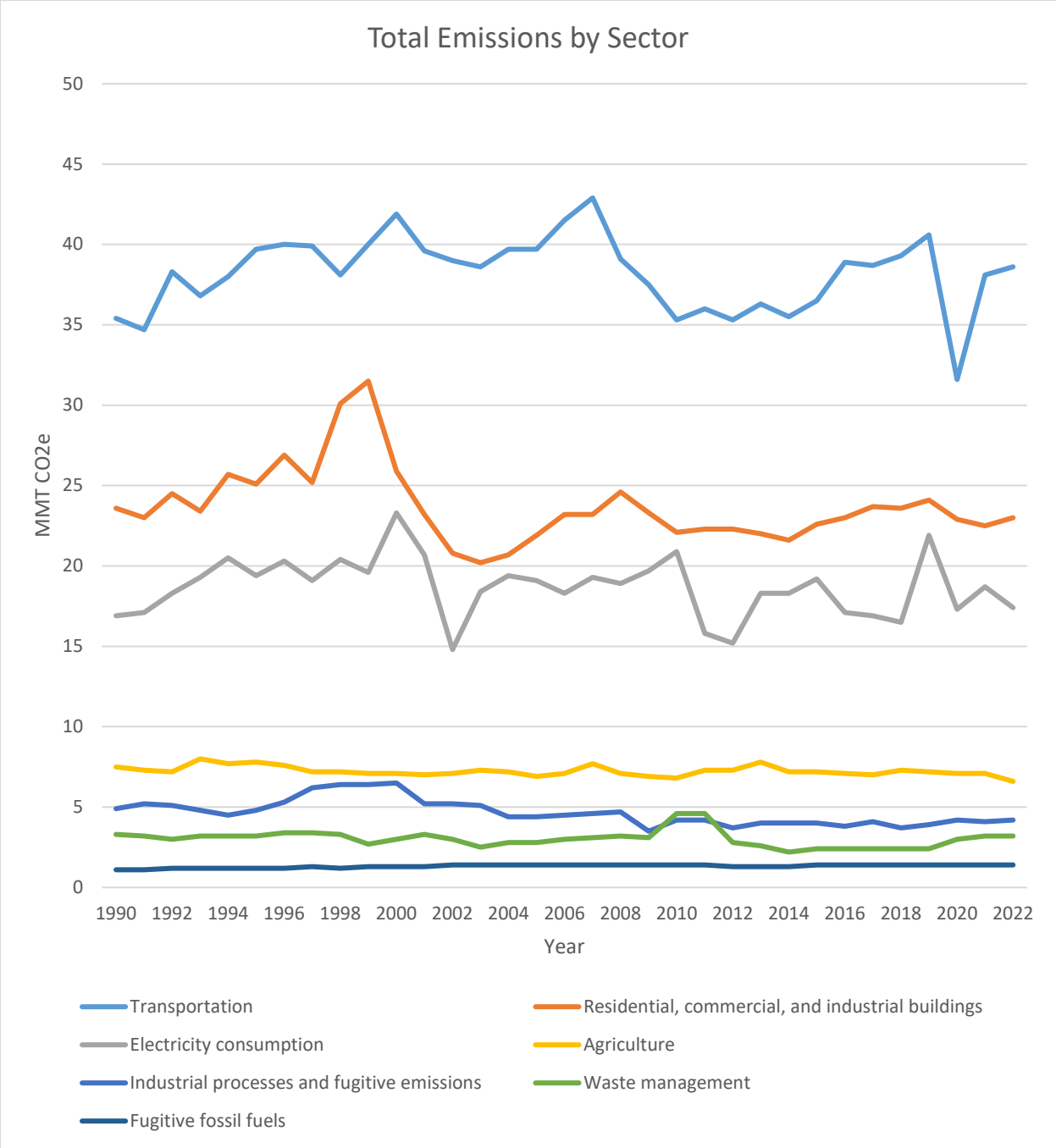


Figure 1 Washington's historical greenhouse gas emissions by sector.

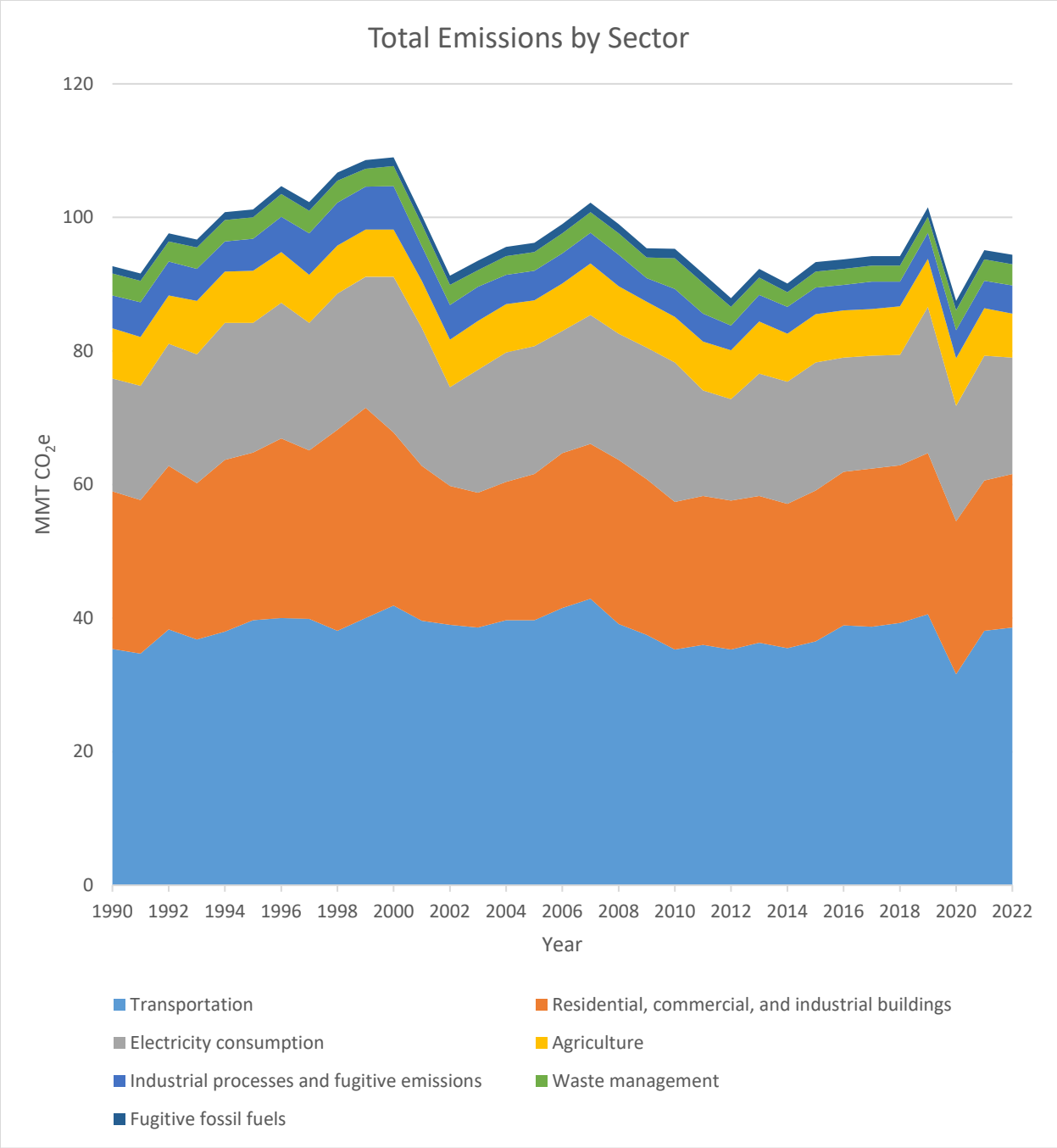


Figure 2 Washington's total historical greenhouse gas emissions.

Sector Trends

The following sections show sector-specific trends in greenhouse gas emissions. To understand how sector emissions are calculated, consider how the emissions from a single factory are attributed to various sectors.

- Emissions from goods and services that come and go from the factory would be captured in transportation sector calculations.
- The electricity that the factory requires to operate would be included in the electricity consumption sector calculations.
- Thermal or electrical energy produced on-site with furnaces or a physical plant would be captured in the residential, commercial and industrial buildings sector.
- Greenhouse gases released as byproducts during the manufacturing process would be captured in industrial sector calculations.

However, sector emissions overlap in multiple ways. For example, industrial production relies on transportation, electricity, and the use of fossil fuels to run machinery on-site. For the sake of emissions analysis, these different emissions sources are separated to prevent double-counting. This means some sectors, like "industrial processes," may appear as low emitters because only emissions unique to industry—its process and fugitive emissions, but not its energy consumption—are included.

Transportation

From 2021 to 2022, transportation emissions rose 1.4% to 38.6 MMT CO_2e, 9.1% above the 1990 baseline of 35.4 MMT CO_2e for this sector. As of 2022, Washington's transportation emissions were 10.0% lower than their sector peak in 2007.

Transportation emissions mainly come from internal combustion engines that burn petroleum-based fuels. Within this sector, the largest emission sources were the combustion of gasoline by highway vehicles and the combustion of a variety of fuels by non-highway vehicles; diesel fuel combustion by highway vehicles also contributed substantially (Table 3 and Figure 3).

Table 3 Emissions from transportation (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Transportation	**35.4**	**41.9**	**35.3**	**40.6**	**31.6**	**38.1**	**38.6**
Gasoline highway	15.2	19.5	15.9	17.0	13.7	14.9	16.4
Diesel highway	3.5	5.5	7.4	6.7	7.1	7.8	6.9
Non-highway (aviation, marine, rail)	16.7	16.9	11.9	16.9	10.8	15.4	15.3
Alternative fuel vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0

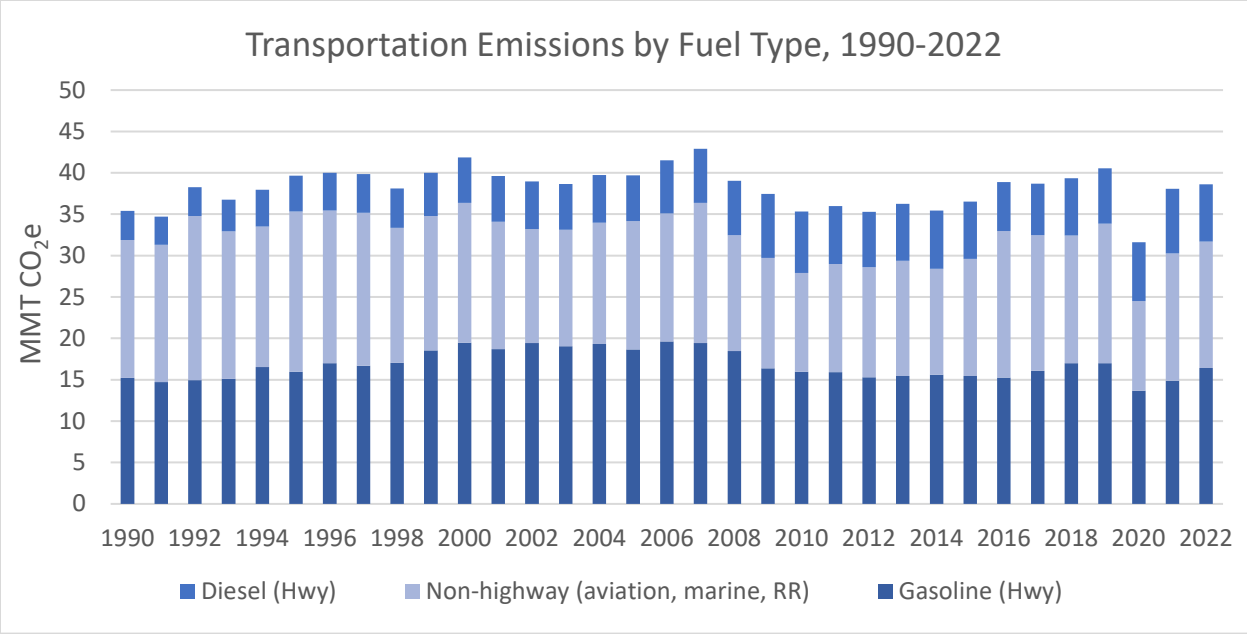


Figure 3 Transportation emissions by fuel types.

Residential, commercial, and industrial buildings

From 2021 to 2022, residential, commercial and industrial (RCI) emissions, also referred to as "building emissions," increased 2.0% to 23.0 MMT CO_2e, which is 2.8% below the 1990 baseline of 23.6 MMT CO_2e for this sector. As of 2022, Washington's building emissions are 11.1% lower than their 2000 levels.

Emissions from this sector peaked earlier, in 1999, at 31.5 MMT CO_2e, and 2022 emissions are 27.1% lower than the peak emissions for this sector. These emission reductions of 8.6 MMT CO_2e from the sector peak represent Washington's most significant emissions reductions, by tonnage, within one sector.

The buildings sector data in SIT calculations include only emissions from on-site combustion of fossil fuels.[20] Electricity consumption data are not included in these values to prevent double counting. Table 4 includes data from the SIT for on-site combustion of fuels.

[20] As an update to the inventory methods, the building sector now includes CH_4 and N_2O emissions from stationary combustion, which are reported as CO_2e and included in the total building sector emissions.

Table 4 Building emissions from on-site fossil fuel combustion by fuel type (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
RCI buildings	**23.6**	**25.9**	**22.1**	**24.1**	**22.9**	**22.5**	**23.0**
Residential buildings	***3.7***	***5.4***	***5.3***	***6.4***	***6.0***	***6.2***	***6.5***
Coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum	1.3	1.3	1.0	1.0	0.8	0.9	0.8
Natural gas	2.2	4.0	4.2	5.2	5.0	5.2	5.4
Wood	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Commercial buildings	***3.2***	***3.5***	***3.7***	***4.7***	***4.7***	***4.7***	***5.1***
Coal	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum	1.0	0.6	0.9	1.2	1.4	1.4	1.4
Natural gas	2.1	2.8	2.8	3.5	3.2	3.3	3.6
Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial buildings	***16.7***	***17.0***	***13.1***	***13.0***	***12.2***	***11.6***	***11.5***
Coal	0.5	0.3	0.2	0.1	0.1	0.1	0.1
Petroleum	12.2	12.3	9.0	8.6	7.8	7.0	7.0
Natural gas	4.0	4.3	3.7	4.1	4.1	4.3	4.3
Wood	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Electricity consumption

This Interim Inventory Report calculates emissions based on electricity *consumed* in our state rather than emissions based solely on electricity *produced* in our state.[21] These are fuels burned at centralized facilities to serve grid-connected end users. Data for electricity consumption emissions was provided by the Washington Department of Commerce. [22]

From 2021 to 2022, electricity consumption emissions decreased 7.1% to 17.4 MMT CO_2e, which is 2.8% above the 1990 baseline of 16.9 MMT CO_2e for this sector. As of 2022, Washington's electricity consumption emissions were 25.4% lower than their 2000 levels (23.3 MMT CO_2e).

[21] Standard emissions accounting guidelines, like the SIT, use production-based approaches, which calculate emissions physically occurring within state boundaries. Washington's official inventory results are production-based in all sectors except for electricity.

[22] Fuel Mix Disclosure (https://www.commerce.wa.gov/growing-the-economy/energy/fuel-mix-disclosure/) and RCW 19.29A.060: Fuel characteristics disclosure—Electricity product categories (https://app.leg.wa.gov/rcw/default.aspx?cite=19.29A.060). Long-term trends are difficult to identify due to a recent adjustment in data collection. Prior to 2020, imported electricity was assigned to fuel mix categories based on Washington's fuel mix ratio. From 2020 onward, imported electricity was assigned to a new unspecified category that uses an emission rate reflective of the entire Western Power Pool after specified claims have been removed, which includes utilities in Washington, Oregon, and Idaho and parts of Montana, Nevada, Utah, and California. While this complicates comparing data before and after 2020, the current approach improves tracking for coming years. In the 2024 legislative session, the repeal of RCW 19.405.070 released Commerce from the requirement to calculate greenhouse gas emissions for this report.

Emissions from the electricity sector peaked in 2000 at 23.3 MMT CO_2e, and 2022 emissions are 25.4% lower than the peak emissions for this sector. Notably, electricity emissions from coal dropped by 45.7% between 2019 and 2022 when provisions in RCW 80.80.040[23] led to the closure of one generating unit at the TransAlta Corporation's coal power plant in Centralia. The remaining plant is slated for closure before 2026. Shifting to 100% non-emitting electricity by 2045 is required by RCW 19.405, Washington's Clean Energy Transformation Act,[24] which took effect in 2019.

Table 5 and Figure 4 show emissions from electricity consumption based on fuel sources. Starting in 2020, unspecified emissions data is reported as a separate category. The unspecified emission category refers to emissions from electricity that do not have an attributed fuel source.

Table 5 Emissions from electricity consumption (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Electricity consumption	**16.9**	**23.3**	**20.9**	**21.9**	**17.3**	**18.7**	**17.4**
Coal	16.8	17.4	15.8	15.2	8.1	8.8	8.3
Natural gas	0.1	5.3	4.8	6.2	4.2	4.7	3.8
Petroleum	0.0	0.6	0.1	0.0	0.0	0.0	0.0
Unspecified*					5.0	5.2	5.2
Other**	0.0	0.0	0.1	0.4	0.1	0.1	0.1

* Unspecified emissions data are only available in years following 2019. These are emissions from electricity that do not have an attributed fuel source. The large drop in natural gas emissions seen from 2019 to 2020 may be attributed to a combination of new data reporting requirements and/or weather variability.

** Combined sources. Data from 2002 to 2019 include "landfill gases," "waste," and "other/biogenic, non-biogenic." Data from 2020 forward include "Other Biogenic."

[23] https://app.leg.wa.gov/RCW/default.aspx?cite=80.80.040
[24] https://app.leg.wa.gov/RCW/default.aspx?cite=19.405

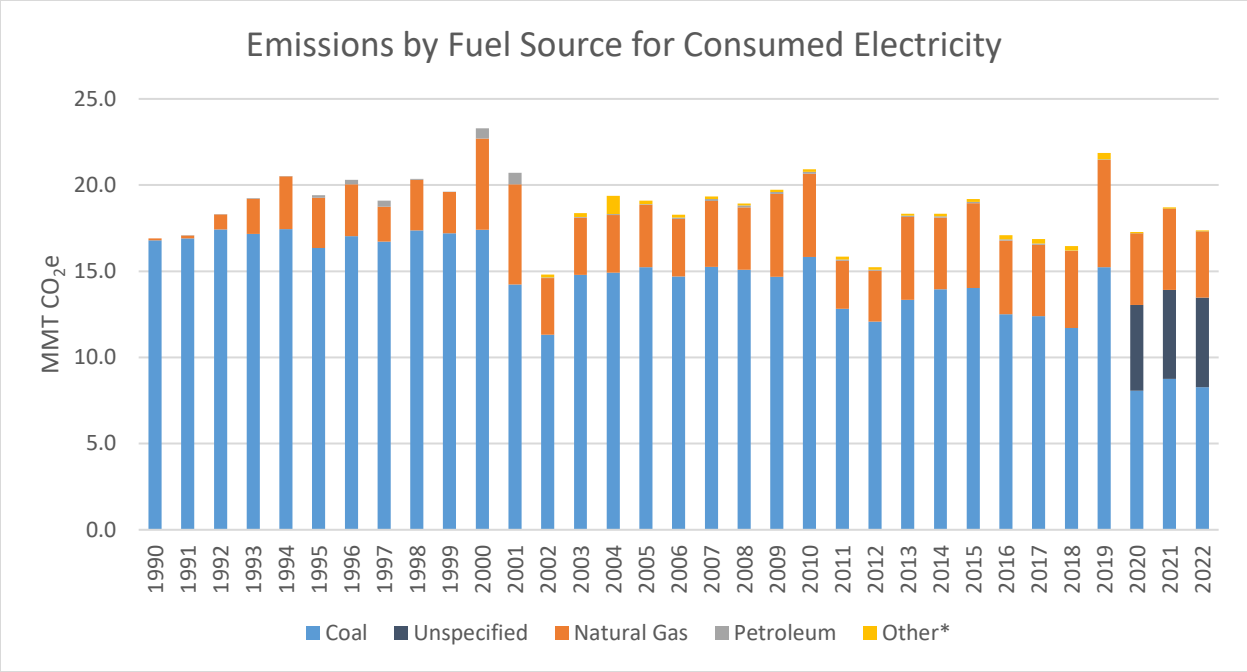


Figure 4 Emissions by fuel source for consumed electricity.

Figure 5 below demonstrates the large influence that hydropower supply plays in determining the greenhouse gas emissions from electricity. Drought, in some years, results in less snowpack to feed Washington's dams through the summer, which reduces the supply of hydropower. When hydropower production increases, it reduces demand for fossil energy use, and greenhouse gas emissions decrease. Hydropower production dropped by approximately 10% over 20 years (see 20-year trendline) and has dropped dramatically since 2017. This reduction in hydropower production has resulted in higher demand from fossil energy sources and larger greenhouse gas emissions in low precipitation years. The uncertain future of northwest hydropower is discussed in the Fifth National Climate Assessment.[25]

[25] See Northwest in Fifth National Climate Assessment (https://nca5.climate.us/).

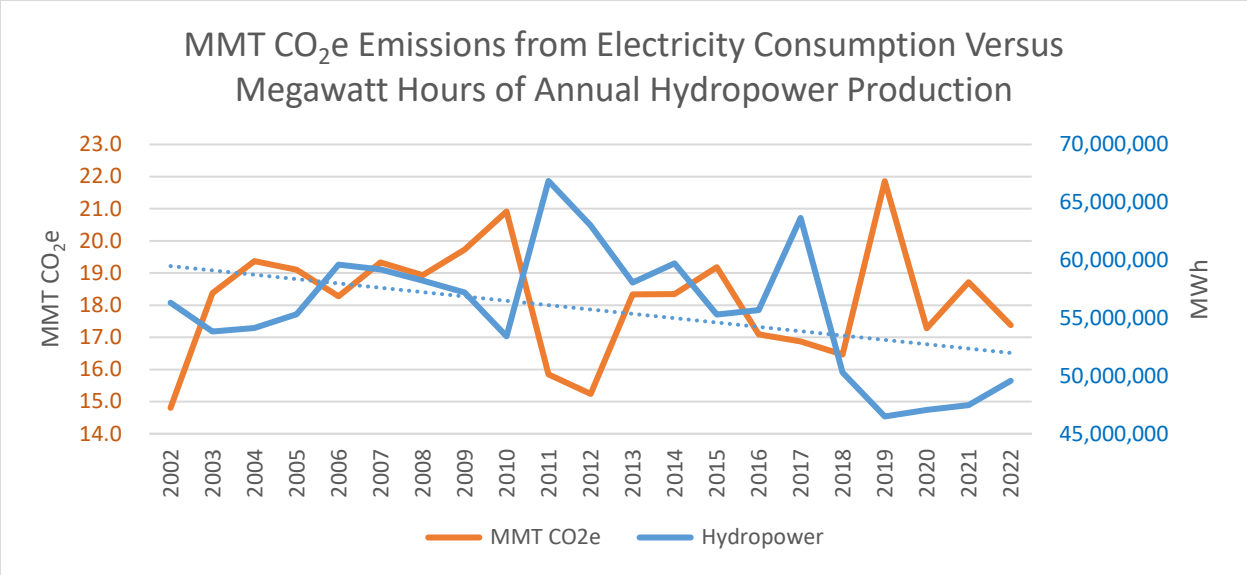


Figure 5 Comparison of consumed electricity and hydropower generation.

Agriculture

From 2021 to 2022, agriculture emissions decreased by 2.3% to 8.3 MMT, which is 7.0% above the 1990 baseline. As of 2022, Washington's agriculture emissions are 4.8% higher than emissions in 2000.

Agricultural activities related to crop and animal production contribute carbon dioxide, methane, and nitrous oxide emissions to the environment. Production of meat and dairy products accounts for about half of greenhouse gas emissions in this sector, while agricultural soil management including nitrogen- and carbon-containing fertilizers and crop residue burning accounts for the other half. The largest source of livestock emissions comes from enteric fermentation from livestock digestion processes, also known as cow burps (Table 6). Data for agricultural emissions were obtained from the state-level EPA inventory[26], due to a known error in the 2025 SIT tool related to methane emissions from manure at the time of production.

[26] EPA (2024). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 U.S. Environmental Protection Agency, EPA 430R-24004. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022.

Table 6 Emissions from agriculture (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Agriculture	**7.8**	**7.9**	**8.5**	**8.8**	**8.8**	**8.5**	**8.3**
Enteric fermentation	2.9	2.8	2.5	2.9	2.9	2.8	2.8
Manure management	0.9	1.2	1.2	1.5	1.6	1.6	1.5
Agricultural soil management*	***4.0***	***3.9***	***4.7***	***4.4***	***4.3***	***4.1***	***4.0***
Nitrogen-containing fertilizers	3.9	3.8	4.7	4.3	4.2	4.0	3.9
Liming	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Urea fertilization	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Burning of agricultural crop waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*** "Agricultural soil management" is the sum of emissions from nitrogen-containing fertilizers, liming (carbon-containing fertilizer), urea fertilization (carbon-containing fertilizer), and the burning of agricultural crop waste.

Industrial processes and fugitive emissions

From 2021 to 2022, industrial processes and fugitive emissions rose 1.1% to 4.2 MMT CO_2e, which is 15.6% below the 1990 baseline of 4.9 MMT CO_2e for this sector. As of 2022, Washington's industrial emissions are 35.6% lower than emissions in 2000.

Industrial emissions occur from chemical reactions and leaks of industrial chemicals associated with manufacturing, excluding the processing and distribution of fossil fuels, which are included in other sectors. Table 7 presents the industrial emissions calculated by the SIT. These do not include emissions from on-site fossil fuel combustion or electricity consumption for buildings and machinery.

Data from the industrial sector indicates that the release of ozone-depleting substance substitutes (mostly refrigerants used in air conditioning) is the largest single contributor to this sector's emissions, making up more than half of the total. Refrigerant emissions are steadily rising. These potent greenhouse gases can be thousands of times more powerful than carbon dioxide, and Washington has regulations aimed at reducing leaks and phasing out the use of harmful refrigerants in stationary refrigeration and air conditioning equipment.[27] While these emissions are currently tracked at the manufacturer level as an industrial product, they are consumed in residential, commercial, industrial, and transportation sectors. Perfluorocarbon (PFC)—organofluorine compounds with the formula CxFy, meaning they contain only carbon and fluorine—released during aluminum production is the second largest source of industrial process emissions.

[27] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.60

Table 7 Emissions from industrial processes and escaped gases (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Industrial processes and fugitive emissions	**4.9**	**6.5**	**4.2**	**3.9**	**4.2**	**4.1**	**4.2**
Carbon Dioxide Emissions	***2.2***	***3.3***	***1.4***	***1.1***	***1.2***	***1.0***	***1.0***
Cement manufacturing	0.0	0.4	0.3	0.4	0.4	0.4	0.4
Lime manufacturing	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Limestone and dolomite use	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soda ash	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Aluminum production, CO_2	2.0	1.7	0.5	0.3	0.3	0.2	0.2
Iron and steel production	0.0	0.8	0.3	0.3	0.3	0.3	0.3
Ammonia production	0.1	0.1	0.1	0.0	0.1	0.0	0.0
Urea consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HFC, PFC, NF_3, and SF_6 Emissions	***2.8***	***3.2***	***2.8***	***2.8***	***3.0***	***3.1***	***3.1***
Ozone depleting substances substitutes	0.0	1.0	1.8	1.9	2.1	2.2	2.2
Semiconductor manufacturing	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Electric power transmission and distribution systems	0.8	0.4	0.2	0.1	0.1	0.1	0.1
Aluminum production, PFCs	1.9	1.7	0.8	0.7	0.7	0.7	0.7

Waste management

From 2021 to 2022, waste management emissions increased 1.3% to 3.2 MMT CO_2e, which is 3.3% below the 1990 baseline. As of 2022, Washington's waste management emissions are 8.2% higher than emissions in 2000.

Emissions from landfills and wastewater treatment include uncaptured methane from the decomposition of organic materials. Where waste methane is burned, CO_2 and N_2O emissions replace methane emissions. Table 8 presents the emissions from waste management calculated by the SIT. Of the 3.2 MMT CO_2e in 2022 from waste management, 2.5 MMT come from municipal solid waste and 0.7 MMT come from wastewater.

Almost all the emissions from municipal solid waste (2.5 MMT CO_2e) come from uncaptured methane resulting from organic material decomposition. Methane makes up 2.3 MMT CO_2e, most of waste management emissions, and these are predominantly from stationary point sources (e.g. landfills). Most wastewater emissions are from municipal and industrial methane (0.6 MMT CO_2e) with municipal N_2O contributing less (0.2 MMT CO_2e).

It is Ecology's policy under chapter RCW 70A.540[28] to reduce methane emissions from municipal solid waste (MSW) landfills. In 2024, Ecology adopted a new rule (Chapter 173-408 WAC, Landfill Methane Emissions)[29] establishing new requirements for municipal solid waste landfills including technology, performance, monitoring, and reporting requirements. These should result in decreasing methane emissions from landfills.

Table 8 Emissions from waste management (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Waste management	**3.3**	**3.0**	**4.6**	**2.4**	**3.0**	**3.2**	**3.2**
Municipal solid waste	2.9	2.4	3.9	1.7	2.3	2.5	2.5
Wastewater	0.4	0.5	0.6	0.7	0.7	0.7	0.7

Fugitive fossil fuel emissions

From 2021 to 2022 fugitive fossil fuel emissions increased by 0.3% to 1.4 MMT CO_2e, 28.1% above the 1990 baseline of 1.1 MMT CO_2e for this sector. As of 2022, Washington's fossil fuel fugitive emissions were 12.4% higher than this sector's emissions in 2000.

Fugitive fossil fuel emissions predominantly consist of methane escaping during the mining, processing, refining, and transport of fossil fuels. Washington does not currently mine or extract fossil fuels, yet it ranks fifth for petroleum fuel refining in the nation[30] and serves as a transit point for natural gas export. Table 9 presents the fossil fuel fugitive emissions calculated by the SIT, which stem mainly from the transmission and distribution of natural gas.[31]

Table 9 Fugitive fossil fuel emissions (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Fugitive fossil fuels	**1.1**	**1.3**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
Natural gas industry	1.0	1.1	1.3	1.4	1.4	1.4	1.4
Oil industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal mining	0.1	0.1	0.0	0.0	0.0	0.0	0.0

[28] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.540
[29] https://ecology.wa.gov/regulations-permits/laws-rules-rulemaking/closed-rulemaking/wac-173-408
[30] https://www.eia.gov/petroleum/refinerycapacity/table3.pdf
[31] As an update to the inventory methods, emissions from petroleum refining and transportation are calculated by estimating the amount of crude oil refined annually using the calculator in the "Oil Data Sources" tab of the Natural Gas and Oil Systems SIT module. It is assumed that the amount of crude oil refined annually is equal to the amount of crude oil transported annually. There is no crude oil production in Washington.

Other emissions

There are emissions that are not included in the total emissions of Washington by IPCC convention.

Bunker fuels

Bunker fuels are those that are transferred into ships and planes that travel internationally and are not included in national or state greenhouse gas inventories by international convention. Instead, these emissions are tracked and accounted for through the International Civil Aviation Organization and the International Maritime Organization (see Table 10).

Table 10 International bunker fuels emissions (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
International bunker fuels	**6.7**	**4.3**	**4.0**	**6.8**	**3.6**	**4.0**	**4.7**
Petroleum	6.7	4.3	4.0	6.8	3.6	4.0	4.7

Land use, land use change, and forestry

Trees, shrubs, and grasses from the varied natural systems of Washington add and remove greenhouse gases from the atmosphere continuously. Natural lands usually act as a sink for carbon; however, this sink varies from year to year due to tree mortality and disturbances. Wildfire contributes to greenhouse gas emissions (Table 11). According to data from the Department of Natural Resources, the number of acres burned from wildfire has trended upward since 1990 (Figure 6). More frequent wildfires in 2015 and 2020 resulted in particularly high greenhouse gas emissions from natural systems. Degradation of these ecosystems leads to decreasing absorption of carbon.

Following precedent established in previous inventories, these emissions are not included in calculation of Washington's total emissions. The inventory is primarily focused on emissions that result directly from Washington's economy. Emissions from natural and working lands are also important, and they are tracked separately to better reveal the state's progress in decarbonizing its economy and the impact of policy interventions.

Table 11 Emissions from land use, land use change, and forestry (MMT CO_2e).

	1990	2000	2010	2019	2020	2021	2022
Total	**(25.6)**	**(17.7)**	**(24.7)**	**(22.7)**	**(9.0)**	**(10.5)**	**(19.5)**
Forest carbon flux	(25.1)	(21.1)	(25.0)	(24.6)	(24.2)	(23.3)	(22.8)
Forest land remaining Forest land	*(25.4)*	*(21.5)*	*(25.6)*	*(25.3)*	*(24.8)*	*(24.3)*	*(23.8)*
Other land converted to forest land	*(3.1)*	*(3.1)*	*(3.1)*	*(3.1)*	*(3.1)*	*(2.7)*	*(2.7)*
Forest land converted to other land	*3.4*	*3.6*	*3.7*	*3.7*	*3.7*	*3.7*	*3.7*
Urban trees	(1.1)	(1.3)	(1.5)	(1.6)	(1.5)	(1.6)	(1.6)
Landfilled yard trimmings and food scraps	(0.5)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Forest fires (CH_4 and N_20)	0.6	4.7	1.0	2.7	15.6	13.9	4.4
N_2O from settlement soils	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Agricultural soil carbon flux	0.3	0.2	1.0	1.1	1.2	0.7	0.7

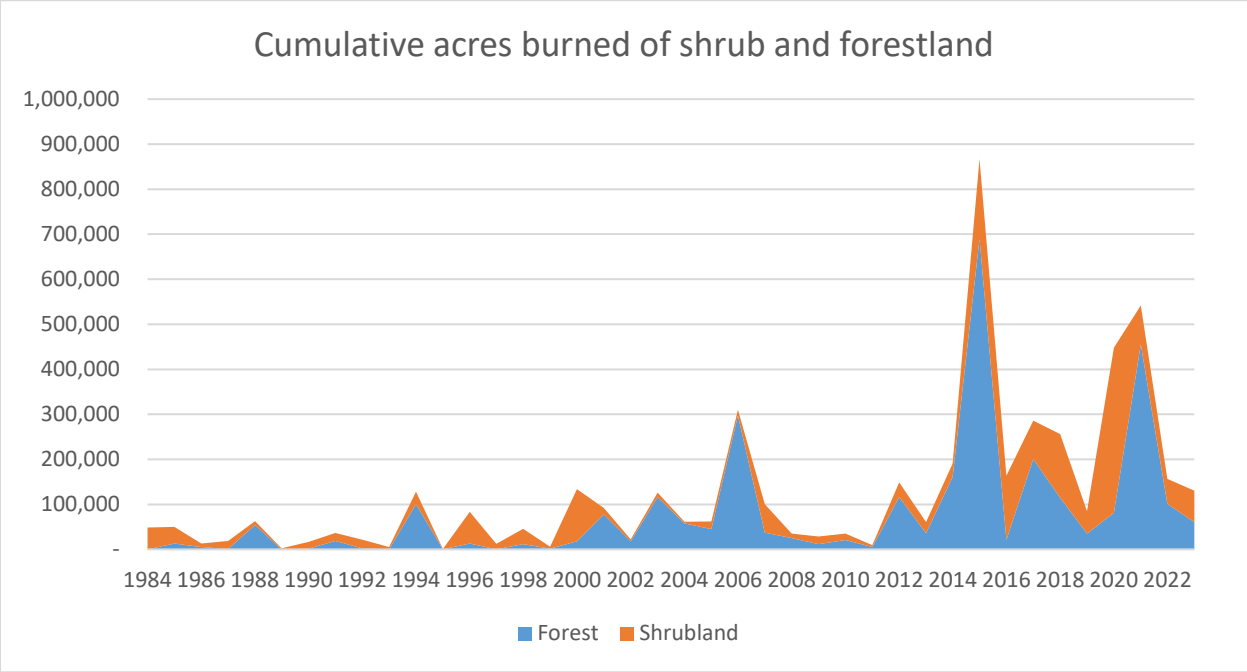


Figure 6 Acreage of forest and shrub consumed by wildfires in Washington.

Conclusion

In 2022, greenhouse gas emissions slightly exceeded the limit for 2020. Nevertheless, the reduction in total emissions since 2000, the year of peak emissions, constitutes notable progress. Climate policies implemented since 2021 are likely to result in more rapid emissions reductions, which will be evident in future inventories. Methodological changes in the SIT resulted in adjustment to emissions values throughout 1990-2022. RCW 70A.45.020 states "By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels, or 90,500,000 metric tons." Ecology has interpreted "or" to mean setting 1990 emissions based on the best current science. Current methods calculate total emissions at 93.1 MMT CO_2e. This means emissions limits are adjusted slightly higher for benchmark years (Table 12).

Table 12 Reduction tonnage based on RCW 70A.45.020 greenhouse gas limits.

1990 Emissions MMT CO_2e*	By Year	% Reduction below 1990	Reduction below 1990 MMT CO_2e	Emissions Limit MMT CO_2e
93.1	2030	45%	41.9	51.2
93.1	2040	70%	65.2	27.9
93.1	2050	95%	88.4	4.7

* Based on the 1990-2022 inventory.

The following trends in this Interim Inventory Report are notable:

- By the end of 2022, Washington's greenhouse gas emissions had declined 13.3% compared to their peak in 2000 and were just 3.2% higher than they were in 1990.
- Despite retiring some coal power generation in 2020, coal power remains the largest source of greenhouse gas emissions in the electricity sector.
- When there is less hydropower production due to less rainfall or snowpack, Washington relies more on imported electricity or fossil fuel power plants which increases greenhouse gas emissions.
- Residential, commercial, and industrial (building) emissions from on-site combustion of fossil fuels shifted from petroleum as the principal source to natural gas.

The next Washington State Greenhouse Gas Emissions Inventory Report is scheduled for publication in December of 2026 and should include data through 2023.