

Overview and analysis of the latest Vermont GHG Inventory and Forecast (1990-2021)

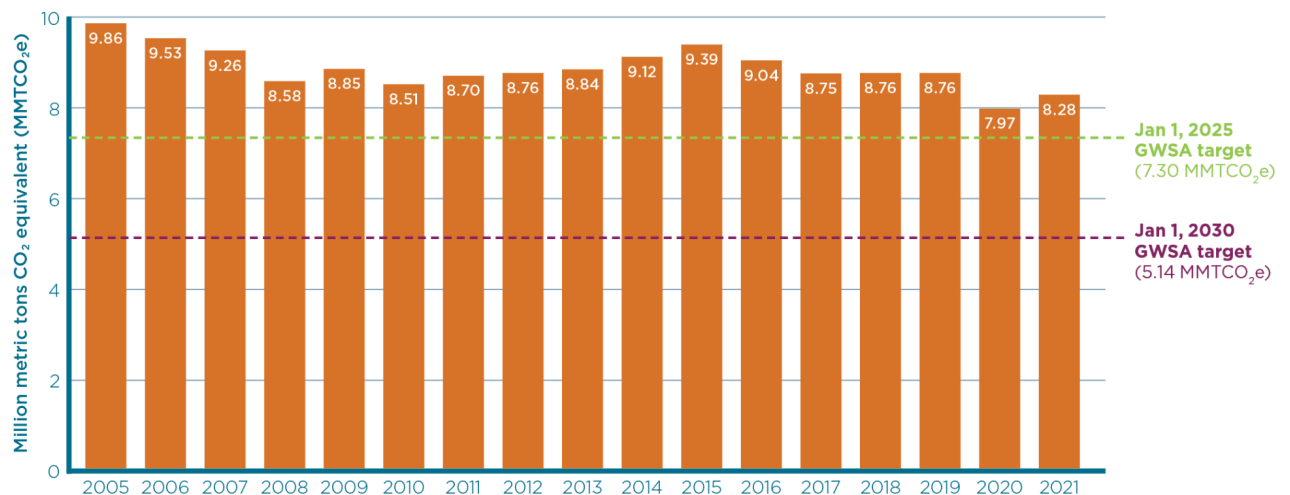
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Vermont's [Global Warming Solutions Act](#) (GWSA) requires that statewide annual GHG emissions be at least 26% below 2005 levels in 2024 (or by January 1, 2025, as stated in statute). Vermont's legally-binding climate pollution reduction targets ensure that [Vermont does our part](#) toward science-based international commitments designed to help avoid the worst impacts of climate destabilization.

[Vermont's most recent Greenhouse Gas Emissions Inventory and Forecast](#), published by the Agency of Natural Resources (ANR), updates emissions data through 2021. The Inventory reports that **statewide annual GHG emissions in 2021 were 16% below 2005 levels**. Therefore, over the past 16 years, comparing 2005 to 2021, Vermont achieved just over 60% of the reductions necessary to meet the first GWSA target.

Given reporting delays, we are unlikely to have complete data for 2024 statewide annual emissions until after 2025. However, this does not change the fact that Vermont still needs to reach the emissions reductions target by the end of *this year* (2024) to meet the first legal obligation of the GWSA. **As of the beginning of 2022, nearly 1 million metric tons of annual GHG reductions (or nearly 40% of the required reduction by Jan. 1, 2025) were still needed.** (2005 emissions were 9.86 MMTCO₂e; 2021 emissions were 8.28 MMTCO₂e; the January 1, 2025 (or 2024 annual) target is 7.30 MMTCO₂e).

Vermont GHG emissions (2005-2021) and GWSA targets

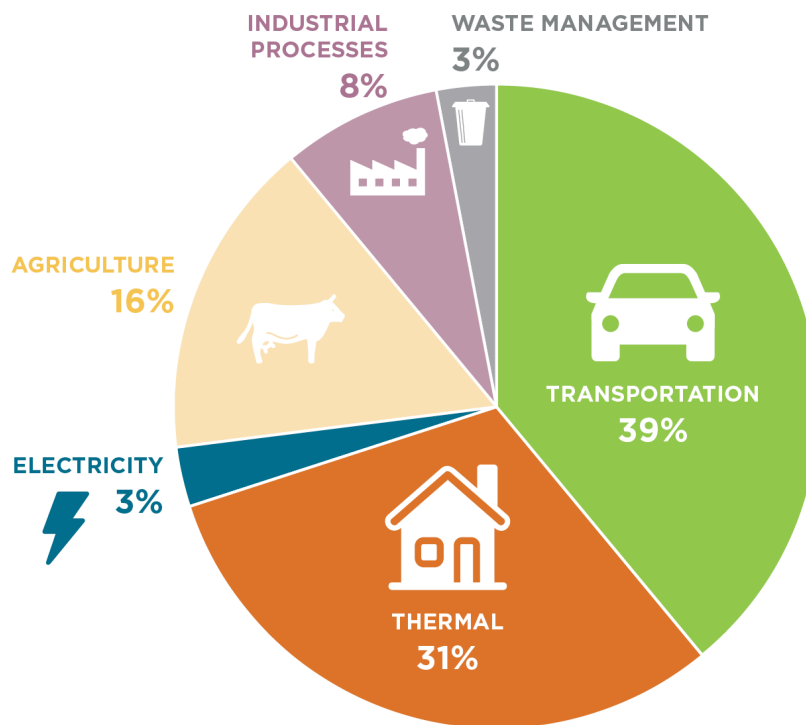


Source: Vermont Agency of Natural Resources, Vermont GHG Emissions Inventory and Forecast: 1990-2021, 2024.

The second target of the GWSA requires statewide emissions to be at least 40% below 1990 levels in 2029 (or by January 1, 2030). **Through 2021, Vermont's annual GHG emissions were only 3% below 1990 levels, or just 8% of the way toward the second GWSA target.** This means that Vermont's annual emissions will need to be more than 3 million metric tons lower in 2029 than they were in 2021. (1990 emissions were 8.56 MMTCO₂e; 2021 emissions were 8.28 MMTCO₂e; the January 1, 2030 (or 2029 annual) target is 5.14 MMTCO₂e).

Vermont almost certainly cannot achieve its legally obligated emissions reductions by Jan. 1, 2030 without comprehensive policy and regulatory action to curb climate pollution from the transportation and thermal (aka Residential, Commercial, and Industrial (RCI) Fuel use) sectors, which together are responsible for 70% of statewide emissions. Such action has yet to be fully implemented in accordance with Climate Action Plan recommendations approved by the Vermont Climate Council back in 2021.

Vermont's GHG emissions by sector, 2021



Sources: Vermont Agency of Natural Resources, Vermont GHG Emissions Inventory and Forecast: 1990-2021, 2024. **Note:** There is a small amount of emissions from the "fossil fuel industry" category (i.e. fugitive emissions from fossil gas pipelines in VT), accounting for 0.4% of Vermont's overall emissions in 2021, that does not show up on this graph.

2021 GHG emissions relative to 2020

2021 statewide annual emissions increased by 4% compared to 2020. This was primarily driven by a rebound in transportation sector emissions as the pandemic eased, which accounted for nearly 3/4 of the year-to-year total emissions increase.

Note regarding Inventory methodology changes

When changes are made to the data inputs and methodology of the Inventory, those changes must be reflected in all years going back to 1990. Because of this, the latest data from ANR show different annual GHG totals going back to 1990 than reported in previously published Inventories. A major reason for the differences is a change in data input chosen by ANR. Specifically, ANR is now using comprehensive statewide fuel sales data from the Vermont Department of Taxes to calculate thermal sector (RCI) emissions rather than previously used and less precise survey data from the Energy Information Administration's (EIA's) State Energy Data System (SEDS).¹

Along with using the Tax Department's more refined data source, this year ANR also moved reporting of emissions from "other dyed diesel" (which is used for things like construction, farm and logging equipment, rail, and other off-road, non-stationary sources) from the thermal sector, where SEDS/EIA reports them (and where ANR had historically reported them), to the transportation sector. This is why the latest Inventory reports higher transportation sector emissions and lower thermal (RCI) sector emissions over the 1990-2021 period compared to previous inventories.

Note regarding updated GHG Forecasts

In this latest Inventory, ANR moved from producing 5- and 10-year forecasts in alignment with GHG Inventory data inputs and methodologies to instead utilizing projections from the LEAP/Vermont Pathways model. However, **LEAP/Vermont Pathways data inputs and methodologies do not align with those of the Inventory and have historically produced significantly different emissions estimates than those reported in the official Inventory.**²

Comparing the seven years (2015-2021) for which there are statewide GHG estimates in both the official Inventory and the LEAP/VT Pathways model, the LEAP/VT Pathways model has consistently underreported GHG emissions relative to the official Inventory every year. The scale of the underreporting is an average of about

¹ For additional explanation of this methodology change, see Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Inventory Report and Forecast - Methodologies, 1990-2021," 2024, pages 8-11. https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/Methodology_Vermont_Greenhouse_Gas_Emissions_Inventory_1990-2021_Final.pdf

² See the video recording and accompanying slides from Climate Councilor Jared Duval at the January 29, 2024 Vermont Climate Council meeting: <https://climatechange.vermont.gov/event/climate-council>

555,000 metric tons of CO₂e per year, ranging between roughly 300,000 and 850,000 metric tons. For context, ANR’s assertion that Vermont is “on track” to meet the first requirement of the GWSA is based on a LEAP/VT Pathways model estimate that emissions will only be 13,000 metric tons under the Jan. 1, 2025 requirement.³ If the historic average difference between the Inventory and the LEAP/VT Pathways model persists, 13,000 metric tons under the legal requirement in LEAP/VT Pathways would translate to somewhere around 542,000 metric tons over the legal requirement in the official Inventory. The official Inventory – not the LEAP/VT Pathways model – is what GWSA emissions reduction compliance – is legally measured pursuant to.

Year	Actual Reported GHG Emissions, Official VT GHG Inventory (thousand metric tons CO₂e)	LEAP Modeled "VT Pathways" Baseline Emissions (thousand metric tons CO₂e)	Difference (thousand metric tons CO₂e)	Percentage difference
2015	9,392	8,528	-864	-9.2%
2016	9,041	8,316	-725	-8.0%
2017	8,746	8,226	-520	-5.9%
2018	8,759	8,244	-515	-5.9%
2019	8,750	8,390	-360	-4.1%
2020	7,965	7,668	-297	-3.7%
2021	8,280	7,675	-605	-7.3%

Sources: Actual reported emissions from Vermont ANR, "Vermont Greenhouse Gas Inventory and Forecast, 1990-2021", 2024. LEAP Modeled emissions from ANR/EFM LEAP Baseline analysis, provided by ANR on July 26, 2024.

As the contracted authors of the LEAP/VT Pathways model have themselves stated, “Inventory and LEAP methods are different” and LEAP/VT Pathways projections are “not meant to document attainment of [GWSA] requirements”.⁴

³ “Updated Vermont Pathways Baseline Emissions” presentation to the Cross-Sector Mitigation Subcommittee of the Vermont Climate Council, June 13, 2024. Available at https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Cross-Sector_Mitigation_Subcommittee/Documents/06-12-2024_CAO_pathways_update.pdf

⁴ Energy Futures Group slides from 01/17/24. Available as Enclosure 2 at <https://www.clf.org/wp-content/uploads/2024/07/2024.07.23-CLF-Notice-of-Alleged-Violation-with-enclosures-FINAL.pdf>