Scientific Underpinning of the Climate Action Plan

To help ensure that Council deliberations and drafting of the Climate Action Plan (CAP) was guided by the latest data, evidence, and peer- reviewed science while employing credible, consistent, and transparent methods of assessment and analysis, the Council created the Science & Data Sub-committee (SDSC). Although not directed by statute, the Council wanted a specific, fifth subcommittee to serve as a resource for the other four statutorily defined sub-committees. The section that follows contains the recommendations of the SDSC that have been adopted by the Council.

Social Cost of Greenhouse Gases

Background: As part of the Initial Vermont Climate Action Plan (CAP) adopted by the Vermont Climate Council (VCC) in December of 2021, estimates of the Social Cost of Carbon (SCC) and of other greenhouse gases were recommended for use in Vermont.[1] At the time the Initial Vermont Climate Action Plan was adopted, the U.S. federal government was in the midst of a comprehensive update to Social Cost of Greenhouse Gases (SC-GHG) estimates, in response to the National Academies of Sciences, Engineering, and Medicine (NASEM) recommendations to update SC-GHG estimates to reflect the latest science. The first paragraph of the executive summary of the resulting EPA report from November 2023 reads:

> These estimates reflect recent advances in the scientific literature on climate change and its economic impacts and incorporate recommendations made by the National Academies of Science, Engineering, and Medicine (National Academies 2017). The SC-GHG allows analysts to incorporate the net social benefits of reducing emissions of greenhouse gases (GHG), or the net social costs of increasing GHG emissions, in benefit-cost analysis and, when appropriate, in decision-making and other contexts. The SC- GHG is the monetary value of the net harm to society from emitting a metric ton of that GHG into the atmosphere in a given year. In principle, the SC-GHG is a comprehensive metric that includes the value of all future climate change impacts (both negative and positive), including changes in net agricultural productivity, human health effects, property damage from increased flood risk, changes in the frequency and severity of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. The SC-GHG, therefore, also reflects the societal net benefit of reducing emissions of the GHG by a metric ton. The SC-GHG is the theoretically appropriate value to use when conducting benefit-cost analyses of policies that affect GHG emissions. In practice, data and modeling limitations restrain the ability of SC-GHG estimates to include all physical, ecological, and economic impacts of climate change, implicitly assigning a value of zero to the omitted climate damages. The estimates are, therefore, a partial accounting of climate change impacts and likely underestimate the marginal benefits of abatement.

[1] See pages 52-55. Initial Vermont Climate Action Plan, Vermont Climate Council, December 2021

Adopted recommendation

Based on a) the EPA's updated Social Cost of Greenhouse Gases (SC-GHG) estimates developed in response to the National Academies of Sciences, Engineering, and Medicine (NASEM) recommendation to incorporate the latest science in estimates of SC-GHG values and b) consistent with the 2021 Initial CAP recommendation to "update[e] the Social Cost of Carbon and discount rate on a regular basis, taking into account new research", the Science & Data Subcommittee unanimously advanced and the Vermont Climate Council unanimously adopted the following recommendations:

1) Vermont should utilize the EPA's updated SC-GHG estimates as provided in the Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances from November, 2023[2] for benefit cost analysis of activities that impact greenhouse gas (GHG) emissions and for GHG emissions-related rules adopted or amended pursuant to 10 V.S.A. chapter 24 and the Climate Action Plan.

2) The EPA's Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances from November, 2023 shares SC-GHG estimates calculated with 1.5%, 2%, and 2.5% discount rates, with 2% selected as the central discount rate. For clarity, we recommend a central discount rate of 2%, as used by the EPA and recommended by a leading panel of economists in the United States.[3] While the estimated social cost per ton of emissions varies by greenhouse gas and the year it is emitted, for reference, the 2023 EPA report establishes an estimated social cost of $190 per ton of CO_2 emitted in 2020 when utilizing a 2% near-term discount rate.[4]

3) The Science & Data Subcommittee of the VCC will continue to track the latest and most relevant scientific literature regarding social cost of greenhouse gas estimates, including any updates released by the federal Interagency Working Group on the Social Cost of Greenhouse Gases or its successors that are in line with NASEM recommendations. What Vermont uses for SC-GHG should continue to be based on NASEM recommendations and the best available science.

   Given the 5-year federal SC-GHG update schedule suggested by the NASEM, the Science & Data Subcommittee and the Vermont Climate Council should plan to review and, if appropriate, update its recommendations regarding SC-GHG estimates in advance of the July 2029 update to Vermont's Climate Action Plan. If there is a change to the EPA's SC-GHG prior to the five-year update, the SDSC and the VCC should review and, if appropriate, update its recommendation based on NASEM recommendations and the best available science at the time.

---

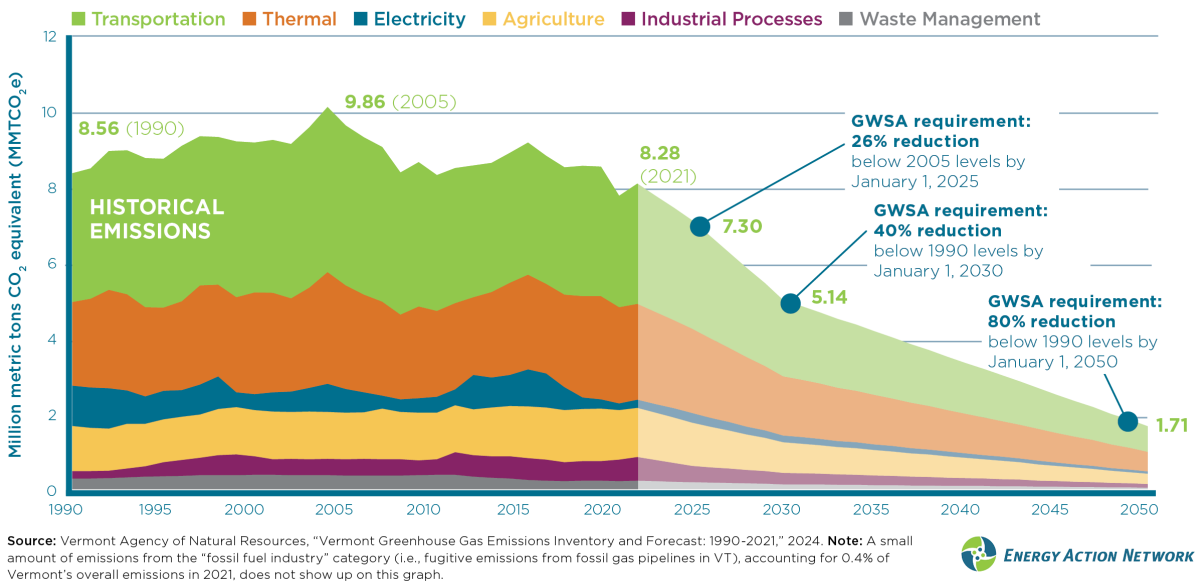
[2] https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

[3] Rennert, K., Errickson, F., Prest, B.C. *et al.* Comprehensive evidence implies a higher social cost of CO2. *Nature* 610, 687–692 (2022). https://doi.org/10.1038/s41586-022-05224-9

[4] See page 4, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf Note: for comparison, among the SCC values adopted as part of the 2021 Climate Action Plan, the estimated social cost of CO_2 emitted in 2020 when utilizing a 2% near-term discount rate was $121 per ton.

Greenhouse Gas Inventory Review and Supplemental Accounting

The Vermont Greenhouse Gas Inventory[5], is published annually by the Agency of Natural Resources (ANR), as required by Vermont statute 10 V.S.A. § 582 and following guidelines for GHG accounting from the Intergovernmental Panel on Climate Change (IPCC) and Environmental Protection Agency (EPA). Vermont's GHG Inventory establishes historic 1990 and 2005 baseline greenhouse gas (GHG) levels for Vermont and tracks changes in GHG emissions through time. The Inventory is vitally important as the primary means of determining progress toward Global Warming Solutions Act (GWSA) statewide emissions reduction obligations. It is important to note that, historically, there has been a three-year lag in emissions inventory reporting, primarily due to delays in calculating agriculture sector emissions (i.e., the Inventory covering 1990-2021 GHG emissions was published in 2024).



Source: Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024. **Note:** 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, does not show up on this graph.

ENERGY ACTION NETWORK

Additionally, beginning in 2024, a supporting companion document began being published with the annual Inventory, detailing the methodologies and data used to inform the Inventory. This methodology document also discusses data and methods for supplemental analysis related to Land Use and Land Use Change (LULUCF) sources and sinks, providing links to relevant reports.[6] The Science and Data Sub-committee (SDSC) of the Council is responsible for reviewing and providing feedback on any updates to Inventory methodology. To ensure that Vermont achieves our legal obligations, it is important that our tracking methods continue to be as transparent and accurate as possible.

[5] https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2021_Final.pdf

[6] https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/_Methodology_Vermont_Greenhouse_Gas_Emissions_Inventory_1990-2021_Final.pdf