

9 DRAFT Social Cost of Carbon

The Science and Data Sub-committee (SDSC) oversaw the development and presentation of material on the method and assumptions for estimating the Social Cost of Carbon for the Vermont CAP, as well as a review of the Vermont Department of Public Service's "Cost of Carbon Reductions" spreadsheet model¹. The Climate Council approved the recommended SCC, underscoring the need for the economic analysis of climate action plans and mitigation scenarios to account for the value of avoided emissions.

The Social Cost of Carbon is an estimate of the value of economic, environmental, and health damages associated with a unit (typically a metric tonne) of emissions.² The SDSC adopted the Social Cost of Carbon findings from the report completed for the Climate Council Titled "*Social Cost of Carbon and Cost of Carbon Model Review Analyses and Recommendations to Support Vermont's Climate Council and Climate Action Plan*"³ and recommended a the use of a stream of values that can be used to estimate the avoided damages of emissions associated with greenhouse gas mitigation measures. Specifically, the SDSC recommended, and the Council agreed that Vermont should:

1) Value greenhouse gas emissions costs (and avoided costs) by utilizing a global damage-based estimation of the Social Cost of Carbon, based on models developed for the New York Department of Environmental Conservation (NYDEC) by Resources for the Future.⁴

2) Recognize that the estimation of the Social Cost of Carbon is highly dependent on how costs and savings that occur in the future are valued in the present, as represented in

¹ A full description of the model can be found as part of the [Public Service Department's Annual Energy Report](#).

² The National Academy of Sciences defines the Social Cost of Carbon as "an estimate, in dollars, of the present discounted value of the future damage caused by a metric ton increase in carbon dioxide (CO₂) emissions into the atmosphere in that year or, equivalently, the benefits of reducing CO₂ emissions by the same amount in that year."

³ Energy Futures Group, August 14, 2021 (Revised August 31, 2021)

<https://aoa.vermont.gov/sites/aoa/files/Boards/VCC/SCC%20and%20Cost%20of%20Carbon%208-31%20DH%20revised.pdf>

⁴ Greenhouse Gas Emissions other than CO₂ can and should appropriately value the cost of greenhouse gas emissions or benefit associated with mitigation of those emissions. The Energy Futures Group report presents Social Cost of Methane and a Social Cost of Nitrous Oxide values. Other gases, until better information can be developed, can and should be converted to Carbon Equivalent emissions.

a “discount rate”,⁵ and that the NYDEC guidelines offer a range of possible discount rates that value future damages and cost of those. Based on literature review conducted in the report, polling of the Science and Data Subcommittee and meeting attendees, as well as discussion of the whole Council, the Council determined it is reasonable to utilize the Social Cost of Carbon developed using the central discount rate of 2%. Because the value of the Social Cost of Carbon is highly dependent on the assumption for a discount rate, it was agreed that sensitivities to the economic analysis using Social Cost of Carbon’s developed using discount rates of 1%-3% should be completed, illustrating a range of possible economic outcomes associated with different valuations of future costs and benefits of mitigation measures.

3) Plan for updating of the Social Cost of Carbon and discount rate on a regular basis, taking into account new research that may be published that impact Social Cost of Carbon and application of the discount rate.

The resulting Social Cost of Carbon Dioxide (and range of outcomes), which will be utilized in estimating the economic impact of this Climate Action Plan and its mitigation scenarios is provided in Exhibit X, below. As the Exhibit shows, a higher discount rate represents a lower valuation of costs the future relative to the present, and thus the Social Cost of Carbon is lower, while a lower discount rate values the future more highly and results in a higher Social Cost of Carbon (which in turn improves the economic benefit/cost analysis for mitigation measures).

⁵ A discount rate is a method to place a present value on costs or benefits that will occur at a future date.

U.S Social Cost of Carbon Dioxide by Discount Rate, Adjusted for New York State (2020\$ per metric ton of CO2)

Emissions Year	Recommended Range of Discount Rates			0% Average
	3% Average	2% Average (Central Rate)	1% Average	
2020	51	121	406	2,130
2021	52	123	409	2,125
2022	53	124	411	2,119
2023	54	126	414	2,114
2024	55	128	416	2,108
2025	56	129	418	2,103
2026	57	131	421	2,098
2027	59	132	423	2,093
2028	60	134	426	2,088
2029	61	136	428	2,083
2030	62	137	430	2,077
2031	63	139	433	2,072
2032	64	141	435	2,067
2033	65	142	437	2,061
2034	66	144	440	2,056
2035	67	146	442	2,050
2036	69	147	444	2,045
2037	70	149	446	2,040
2038	71	151	449	2,035
2039	72	152	451	2,030
2040	73	154	453	2,024
2041	74	156	456	2,020
2042	75	158	459	2,015
2043	77	160	461	2,011
2044	78	162	464	2,006
2045	79	164	467	2,002
2046	80	166	469	1,995
2047	81	167	471	1,989
2048	82	169	472	1,983
2049	84	170	474	1,976
2050	85	172	476	1,970

See DEC (2020) "Establishing a Value of Carbon"

Source: [Appendix: Value of Carbon, New York Department of Environmental Conservation, revised June 2021.](https://www.dec.ny.gov/docs/administration_pdf/vocapprev.pdf)
[https://www.dec.ny.gov/docs/administration_pdf/vocapprev.pdf.](https://www.dec.ny.gov/docs/administration_pdf/vocapprev.pdf)

With regard to the review of the Public Service Department's "Cost of Carbon Reductions" tool, which presented an initial cost-effectiveness comparison between selected technologies and/or policies on the basis of dollar per ton of Carbon Dioxide, the Technical Consultants found that the model has value for understanding the relative cost-effectiveness for near-term investment provided by several technological measures, as it was intended to be. However, a number of improvements were recommended. In addition, a greenhouse gas

mitigation technology/policy supply curve will be developed in conjunction with ongoing modeling. The SDSC recommended that no further action by the Council was necessary with regard to the specific Cost of Carbon model evaluated, but that Vermont:

1) Continue to maintain and update the accounting for mitigation pathways to promote transparency and consistency in assumptions. This could come in the format of the “Cost of Carbon” model that the Department of Public Service creates, or through other reasonable means.

2) Initially through technical consultant and to be updated regularly by the State of Vermont, create a greenhouse gas mitigation technology/policy supply curve that estimates the relative net cost of mitigation policies and/or technologies per ton of greenhouse gas emissions saved.

The full Technical Report that provides recommendations on both of these issues [is available on the Council’s website](#).