

# CADMUS

## Task 3: Social Cost of Carbon and Cost of Carbon Reduction Model Review

August 11, 2021





# Objectives

# Cost of Carbon Reduction (CCR) and Social Cost of Carbon (SCC) Scope of Work

## Task 3a

### **Review State's existing "cost of carbon" calculations**

Check existing assumptions and measures

Identify structural modifications

Identify gaps/missing measures

Discuss integration of CCR model into LEAP model and economic analysis for Climate Action Plan

## Task 3b

### **Social Cost of Carbon and Discount Rate for Economic Analysis**

Review damage and abatement cost methods for social cost of carbon

Review discount rate implications for SCC

Polling exercise to inform recommendation to VCC

## Deliverable

### **8-10 page report**

Summarize findings from Tasks 3a and 3b

Presentation

# Methods


- Review CCR model and workbooks in detail, questions and follow-on remote meetings with Public Service Department (PSD) staff.
- Literature review on future costs, depth of savings, adoption curves.
- Literature review on damage and abatement cost methods for social cost of carbon.
- Literature review and review of social cost of carbon computing platform for discount rate sensitivities.
- Polling exercise with DSSC members and meeting attendees.



# Observations and Recommendations

Based on our Task 3 research and the interactions we have had with the Climate Council Subcommittees and other stakeholders, we offer the following observations and recommendations for consideration of the ANR and the VCC.

The observations and recommendations are those of the report authors, and do not necessarily reflect the views of all members of the technical consultant team.



# Cost of Carbon Reduction Model

# Value and Limitations of CCR

## **Value of Current Model:**

- Near term comparison of costs to state for mitigation options
- Documents current activities and savings for various initiatives underway
- Spreadsheet accounting, relatively easy to maintain and update

## **Limitations of Current Model:**

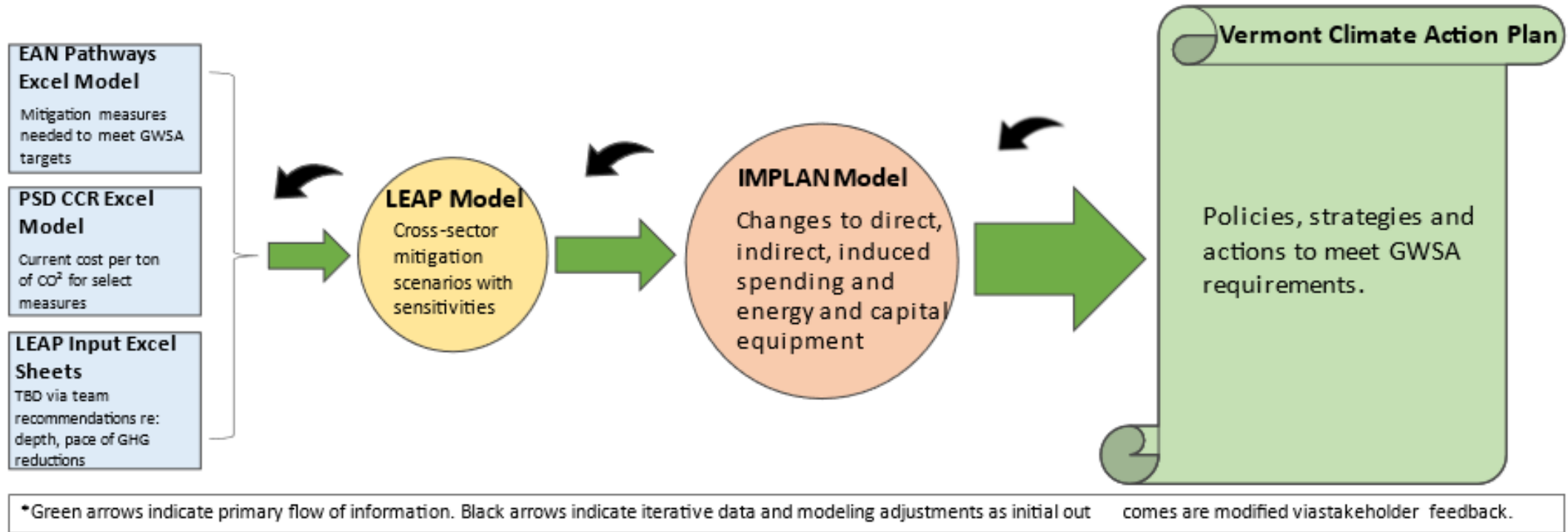
- Snapshot based on current costs, savings and emissions reductions – all of which will change over time
- Does not account for depth and pace of emissions reductions
- Missing categories and measures
- Doesn't address interactive effects

# Potential Enhancements for the CCR Model

- Add measures and categories. For example, centrally ducted and ground source heat pumps, biofuels, district heating.
- Depth and pace of emissions reductions.
- Use of electric avoided costs, and load shapes.
- Costs and savings by income category.
- Revisit use of 3% discount rate.



# Integration with LEAP Modeling and CAP





# Social Cost of Carbon and Discount Rate

# Social Cost of Carbon & Discount Rate

The economic analysis of climate action plans, and mitigation scenarios needs to account for the value of avoided emissions.

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 (CO<sub>2</sub>) emissions into the atmosphere in that year or, equivalently, the benefits of reducing CO<sub>2</sub> emissions by the same amount in that year."

National Academy of Sciences, *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide* (2017), <https://doi.org/10.17226/24651>.

# Social Cost of Carbon & Discount Rate

## Damage Based Estimates

- Global Damages – economic, health, and environmental impacts
- Based on Integrated Assessment Models (IAMs) geophysical and economic models
- Include items such as value of human health/life impacts, also based on best estimates of feedback loops, climate and economy interactions.
- Multiple runs and models used to estimate distribution of values. Accounting for range of inputs on demographic, technical, representative concentration pathways, and other variables.
- Appropriate for cross sector analyses like the Climate Action Plan
- Mean values from range of model runs –
  - Applied discount rate has large impact on values

## Marginal Abatement Cost Methods

- Estimate of cost of abatement for last measure needed to meet targets
- Technology, sector and geography specific
- Also sensitive to discount rate

## Discount Rate

A method for economic analysis to account for impacts that occur in the future

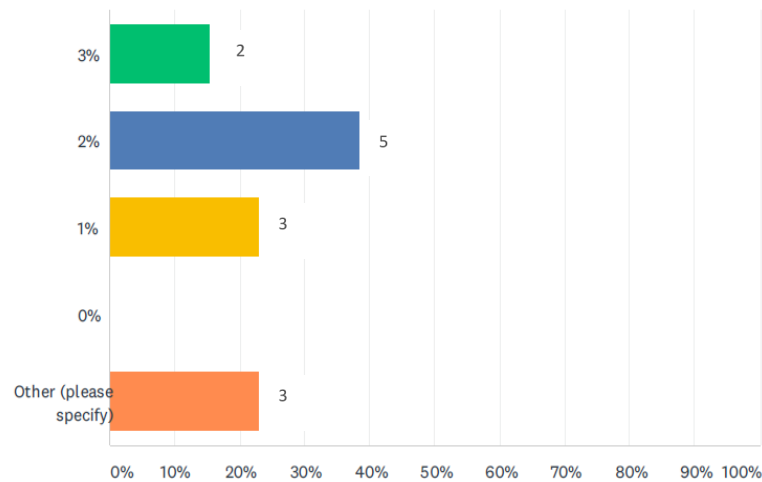
- The selection of discount rate has a significant impacts
- “Social Discount Rate” – puts a higher value on future impacts
- “Private Discount Rate” – puts higher value on near term impacts

# Polling Results

- The results of the polling exercise, though limited in sample size, suggest a 2% discount rate based on qualitative and quantitative responses.

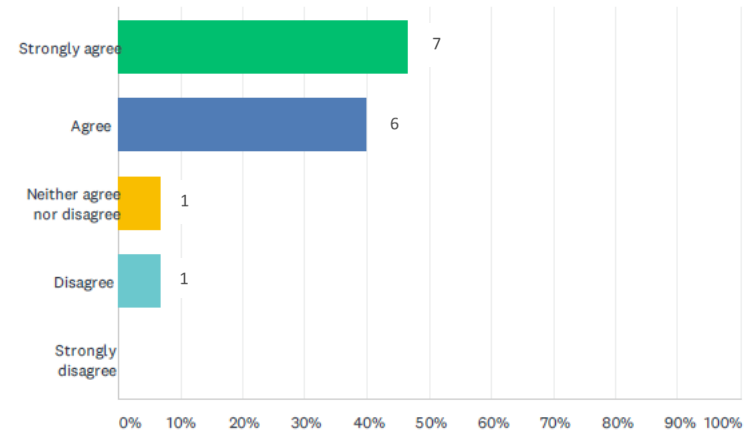
Q8 Based on this information, what discount rate would you recommend for Vermont?

Answered: 13 Skipped: 2



Position C: It is important to account for impacts on future generations and doing so requires striking a balance between short-term economic growth and long-term impacts.

Answered: 15 Skipped: 0



# SCC & Discount Rate

- The polling results are consistent with recent guidelines from New York the Regional Avoided Energy Component Supply Study, and with the anticipated Interagency Working Group Federal Guidelines.
- We recommend the 2% discount rate be forwarded to the VCC to consider and use for the CAP.
- We also recommend global damage-based values based on IAM modeling and suggest the Social Cost of Carbon values from the Resources for the Future models in support of the New York State Guidelines for adoption by the VCC.

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			
	3% Average	2% Average (Central Rate)	1% Average	0% 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"





# Decision Points

# DSSC Decision Points

1. Adopt Task 3 report and forward to full Climate Council.
2. Use CCR model as appropriate for inputs to LEAP and CAP modeling.
3. Continue to maintain and improve CCR tool.
4. Recommend global damage-based estimation of SCC, based on NYDEC values computed by Resources for the Future.
5. Based on polling from DSSC recommend 2% discount rate.



Thank You