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

EAN Pathways Excel Model
Mitigation measures needed to meet GWSA targets

PSD CCR Excel Model
Current cost per ton of CO₂ for select measures

LEAP Input Excel Sheets
TBD via team recommendations re: depth, pace of GHG reductions

LEAP Model
Cross-sector mitigation scenarios with sensitivities

IMPLAN Model
Changes to direct, indirect, induced spending and energy and capital equipment

Vermont Climate Action Plan
Policies, strategies and actions to meet GWSA requirements.

*Green arrows indicate primary flow of information. Black arrows indicate iterative data and modeling adjustments as initial outcomes are modified via stakeholder feedback.
Social Cost of Carbon and 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 (CO2) emissions into the atmosphere in that year or, equivalently, the benefits of reducing CO2 emissions by the same amount in that year."

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.
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.
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