Vermont Revenue-Neutral Carbon Fee Study

Expected emissions and macroeconomic impacts of a statewide fee

For the Burlington Electric Department

October 8, 2019
Project Overview/Introduction

- We modeled a carbon fee applied to heating and transportation fuels (including industrial process heating), but not to electricity
- The price begins at $30 per ton and rises at 10% above inflation every year until 2034, after which it rises 5% above inflation each year
- The net revenues from the carbon fee are returned as dividends to Vermont households and businesses
  - Returned per capita to households
  - Returned to businesses proportional to employment or to value added (GDP)
  - “Net” revenue because some carbon revenue is transferred to make up for declines in gas tax and other fuel tax revenues

Summary result: Emissions fall 11% by 2030, and 21% by 2040, with a negligible but slightly positive effect on the state’s economy and jobs
Modeled Carbon Fee

- The fee begins at $30 per ton and rises at 10% above inflation every year until 2034, after which it rises 5% above inflation each year.
Emissions Impact
Vermont Emissions Reduction

- Emissions in 2030 are 11% lower relative to 2030 emissions in the BAU scenario, and 25% lower than today
- Emissions in 2040 are 21% lower than BAU, and 37% lower than today
Impact on Fuels

• Largest fall in *tons of CO₂ emissions* is from gasoline, since it is such a large share of the total emissions

• Natural gas consumption has the largest *proportional* drop, since it is relatively inexpensive and the carbon price is a larger *percentage* increase in its cost
Impact from Electrification

- Statewide, electricity consumption increases 7% relative to the BAU by 2030 and 14% relative to the BAU by 2040
- This is partially offset by expected decreases resulting from energy efficiency
Burlington Emissions Reduction

• If the carbon fee causes both phases of the District Energy project to move forward, the emissions reduction increases substantially

• Burlington’s slightly larger emissions reduction proportion is because natural gas consumption declines the most

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<th>Relative to BAU</th>
<th>Relative to Today</th>
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<tbody>
<tr>
<td></td>
<td>2030   2040</td>
<td>2030   2040</td>
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<tr>
<td>Carbon fee</td>
<td>-13%   -25%</td>
<td>-20%   -41%</td>
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<tr>
<td>Carbon fee, with District Energy</td>
<td>-22%   -28%</td>
<td>-32%   -46%</td>
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Economic Impact
Economic Modeling Approach

1. Divide the economy into slices
   - Three main sectors: residential, commercial, and industrial
   - Commercial and industrial sectors are further divided into NAICS code groups (1-8)

2. Evaluate effects through four channels
   - **Transportation**
     - Reduced gasoline spending, Increased EV purchases
   - **Thermal**
     - Reduced spend on fossil fuels, Investment in heat pumps/weatherization
   - **Electric sector**
     - New investment in solar in Vermont
   - **Spending**
     - Changes in household/business spending

3. Sum up impacts to annual changes for 2019-2029
   - Jobs
   - Income
   - GDP
Modeling the Rebate

Two different approaches to business rebating were modeled:

(1)  A rebate to businesses in proportion to share of jobs in Vermont
(2)  A rebate to businesses in proportion to share of GDP in Vermont
Key Assumptions

- Fifteen percent of carbon fee revenue come from out-of-state sources (tourists), generating a small windfall for Vermont households and businesses.

- State retains carbon fee revenue to offset lost tax revenue resulting from reduced consumption of fossil fuels.

- No significant dynamic/feedback effects on Vermont businesses due to rising marginal costs, interstate competitiveness effects.

- *De minimis* changes in electric grid investments from carbon fee effects (annual sales in 2030 very similar to today).
Average per-year benefits:
• $21M in new GDP
• $14M in new income
• 313 new jobs
Overall GDP Impact: GDP-Based Rebate

Average per-year benefits:
• $20M in new GDP
• $13M in new income
• 292 new jobs

GDP-based business rebate produces very slightly worse results than jobs-based rebate.
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