Vermont Revenue-Neutral Carbon Fee Study

Expected emissions and macroeconomic impacts of a statewide fee

For the Burlington Electric Department

October 8, 2019

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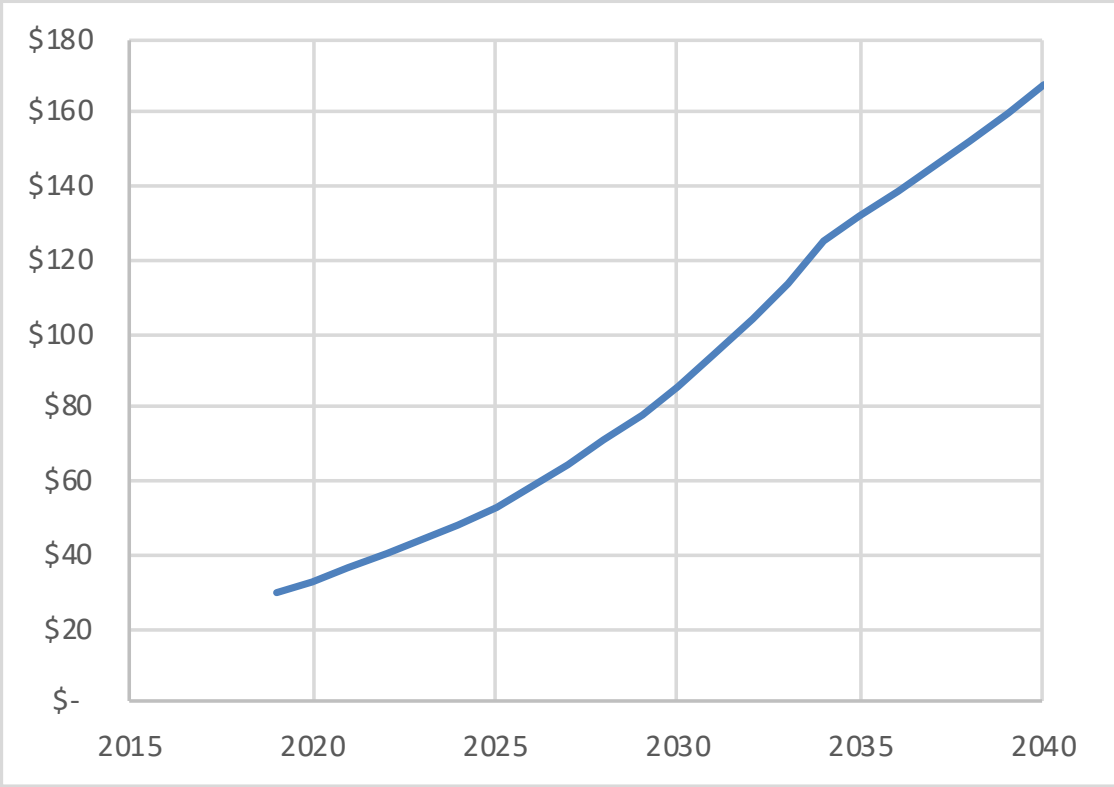
Project Overview/Introduction

- 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

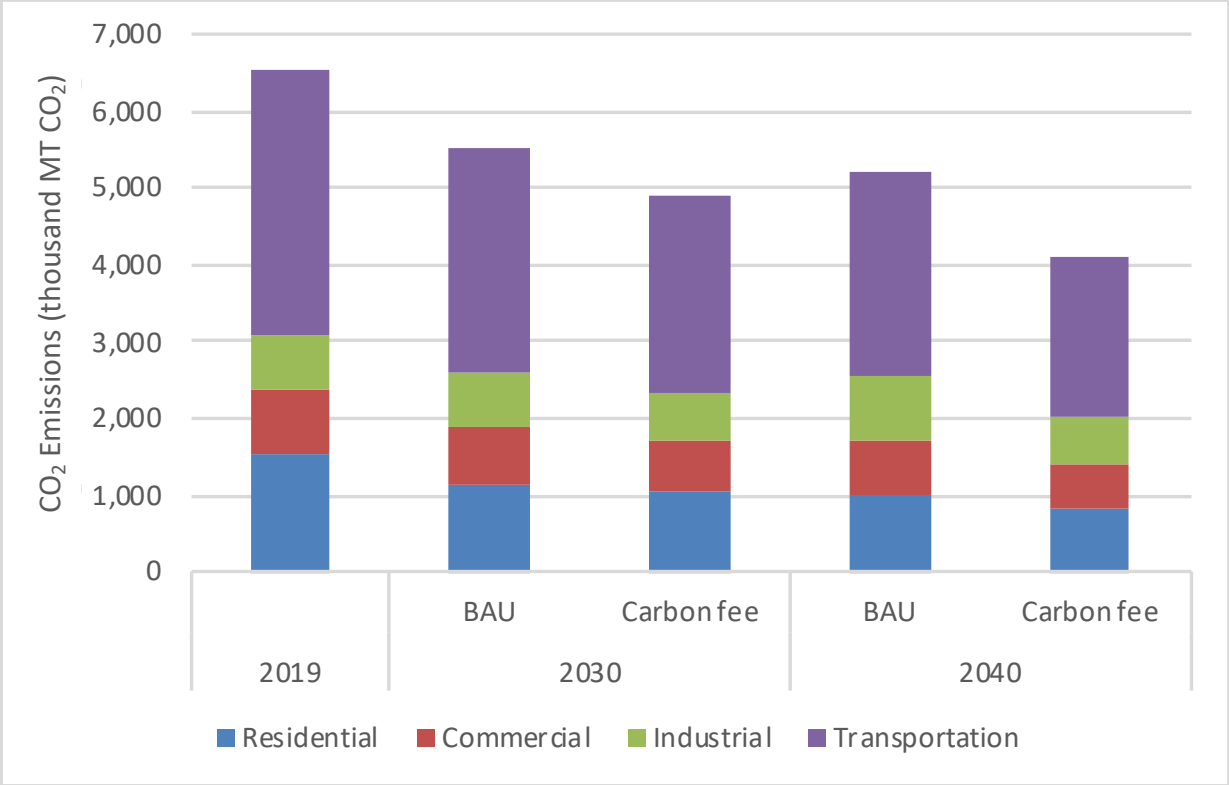
- The fee begins at $30 per ton and rises at 10% above inflation every year until 2034, after which it rises 5% above inflation each year



Emissions Impact

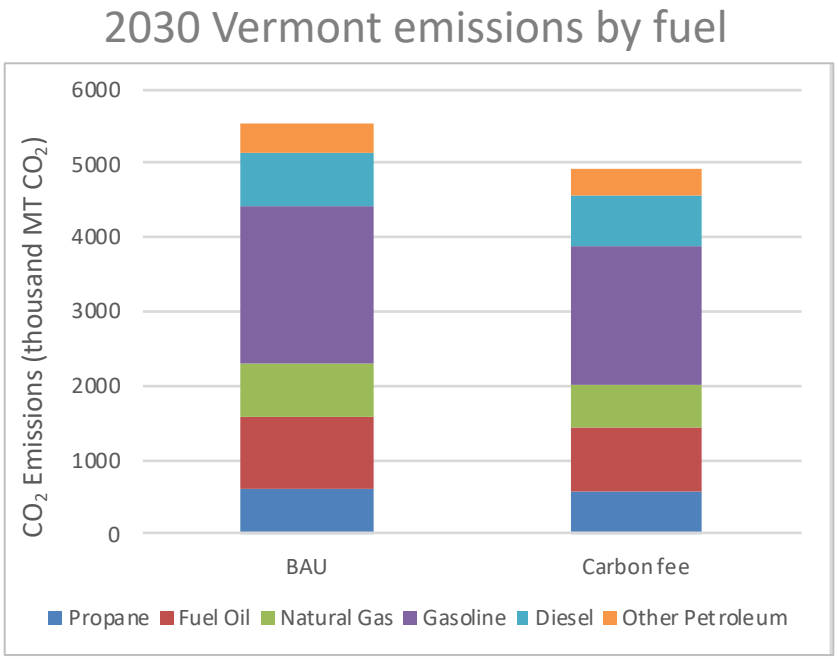
Vermont Emissions Reduction

- 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



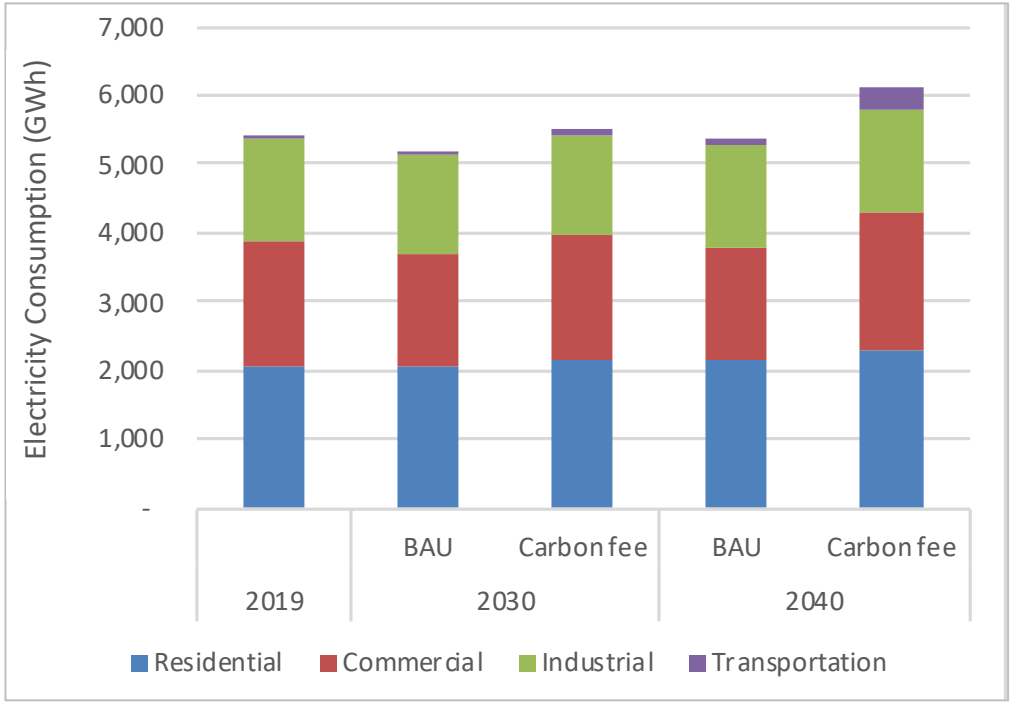
Impact on Fuels

- Largest fall in *tons of CO_2 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



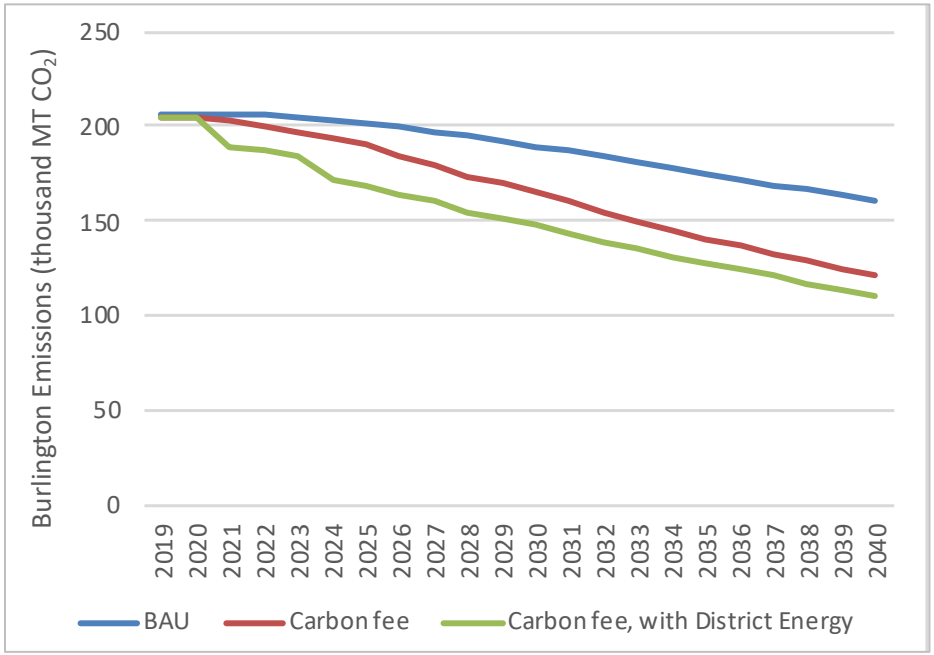
Impact from Electrification

- 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



	Relative to BAU		Relative to Today	
	2030	2040	2030	2040
Carbon fee	-13%	-25%	-20%	-41%
Carbon fee, with District Energy	-22%	-28%	-32%	-46%

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

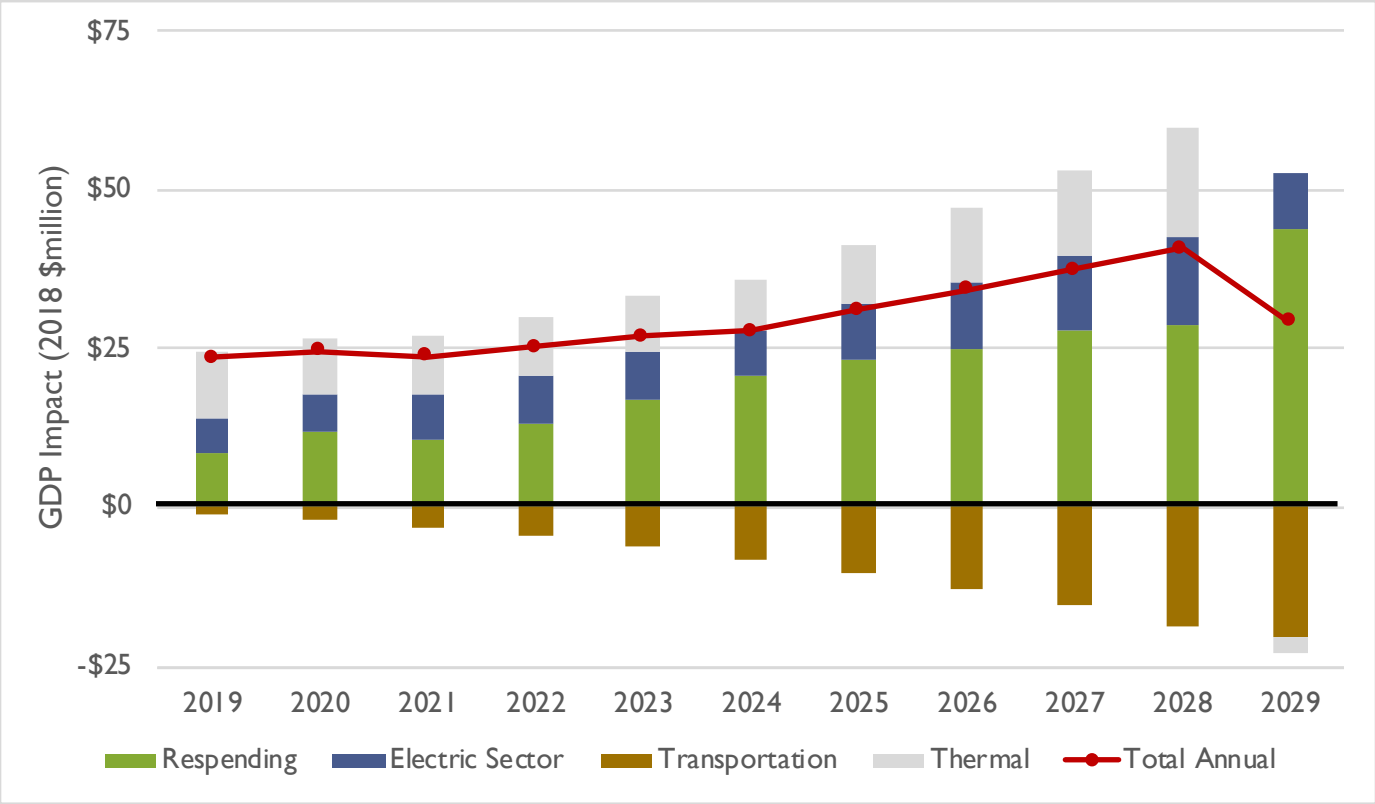
Fifteen percent of carbon fee revenue come from out-of-state sources (tourists), generating a small windfall for Vermont households and businesses

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)

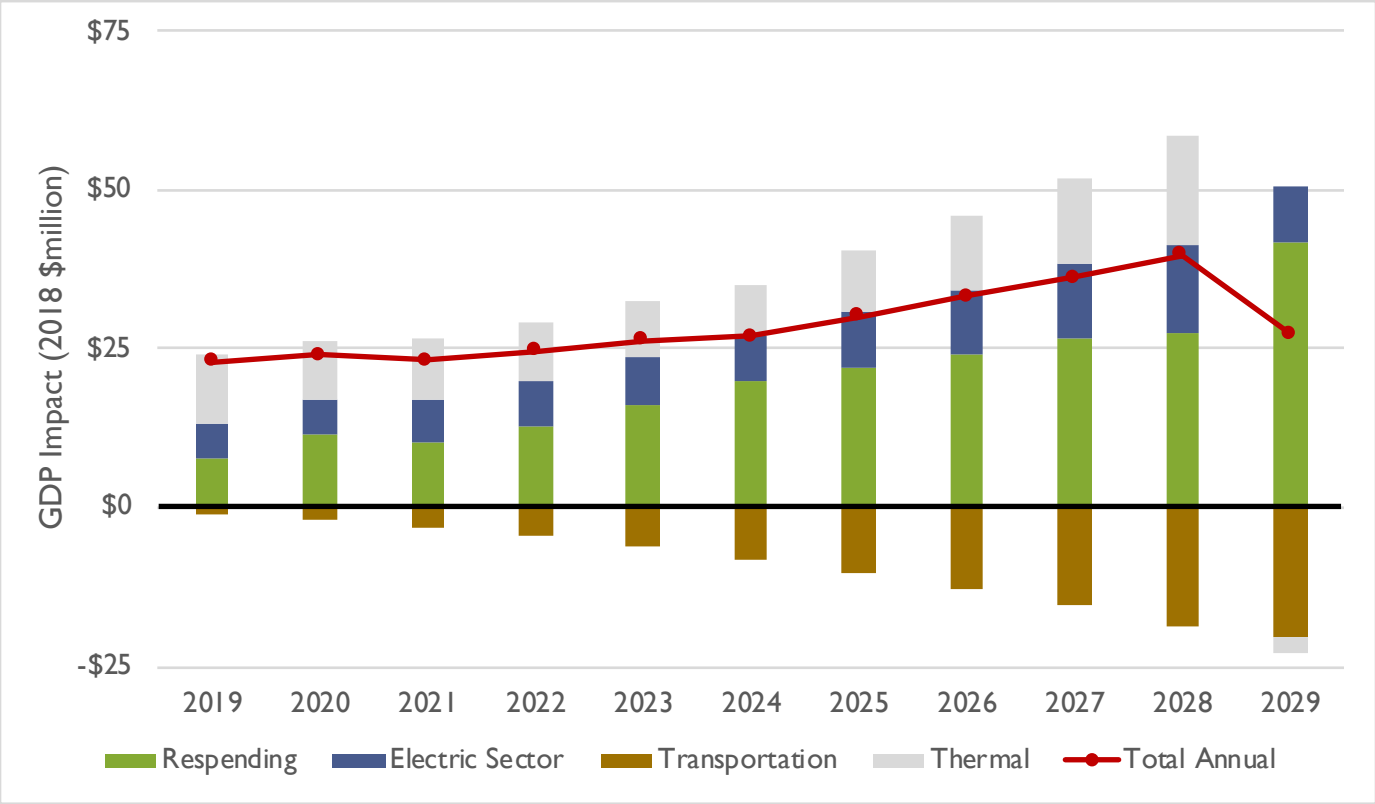
Overall GDP Impact: Jobs-Based Rebate



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.

Contact

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