

Memorandum

TO: Vermont Climate Council

FROM: Chris Porter & CS / Resources for the Future Project Team

DATE: February 13, 2025

RE: Responses to Questions Regarding Cap-and-Invest Program

This memorandum provides additional responses to questions raised the Council and other attendees at the Council's February 10, 2025 meeting discussing a proposed cap-and-invest program.

1. What costs were included in the household cost modeling? Were the costs of new equipment (e.g., heat pumps, electric vehicles) included? What about electrical panel upgrades for heat pumps?

In general, the underlying data accounts for capital expenditures. What is at issue is how to account for changes in expenditures that are motivated by the cap and invest program. The category "Efficiency" represents government subsidies for heat pumps distributed to households proportional to their historical spending on heating equipment and home efficiency improvements. The category "motor vehicles" represents government subsidies for electric vehicles distributed to households proportional to their historical spending on vehicle purchases. In both cases, if we assume households are replacing equipment at the end of life and the government is covering the full difference between the cost of the climate-friendly equipment and the equipment they otherwise would have bought, there are no other expenditures that need to be accounted for. If, however, the subsidies are inducing households to purchase equipment early or there is some cost share where the government isn't covering all the costs, there are some household expenditures that are not included in the figure.

Note that *any such costs are incurred voluntarily* – i.e., the cap-and-invest program is not requiring anyone to purchase new equipment. We assume that any household voluntarily purchasing new equipment, with or without the help of a rebate, is doing so because they are anticipating cost savings and/or other benefits such as improved performance.

The heat pump costs are *averages* reported by Energy Solutions for a variety of system configurations and upgrade requirements representative of households in the northeast U.S.. Those averages include some examples where electrical panel upgrades are required and some where they are not. Individual households may experience higher or lower costs than the average, depending on their existing electrical service, ductwork, size, etc.

2. How are biofuels accounted for?

Under Vermont's climate accounting system, biofuels such as ethanol, biodiesel, and renewable diesel are not assigned any emissions in the transportation sector. Allowances would not be required to be surrendered for emissions from these fuels under cap-and-invest. For example, gasoline with a 10 percent ethanol blend would only require 90 percent of the allowances as pure gasoline.

Under a low-carbon fuel standard, however, typically the life-cycle emissions associated with the fuel are regulated when evaluating emissions against the carbon intensity cap.

3. If Vermont links to another program, what is the likelihood of emission reductions occurring in Vermont? Would the State be likely to see more or less emission reductions under linking vs. its own program?

Under a Vermont-only program, all emission reductions would occur within the state. This certainty regarding where reductions occur comes at a price, since Vermont would need to establish its own reporting and tracking system and the opportunities for regulated entities to identify the lowest-cost reductions would be fewer. As noted in the meeting, an important benefit of linkage is greater price stability. Price stability could help to reduce emissions, especially if the price were kept below the program's price ceiling compared to bumping up against the ceiling. This is because once the price hits the ceiling, additional emissions are released until the price stabilizes at or below the price ceiling. A study by study team members (pending publication) looking at Washington State's program verified that linking with California would likely result in net emission reduction benefits because it would keep Washington from reaching its price ceiling and having to release more allowances. However, it cannot be said with certainty to what degree those emission reductions would occur in Vermont vs. other linked states.

4. How have other states or provinces financed up-front costs to establish the program? We heard that Quebec also fronted household dividends – how did they finance that?

Quebec implemented a carbon levy on GHG emissions in 2007. Revenues from that levy were strictly used to fight climate change measures. A small part of those revenues were used to launch their C&T program in 2013. In 2015 they transitioned the levy on fuels to the C&T program.

Québec never used the carbon levy or C&T revenues to give rebates to households, but has only used the revenues to put in place different programs, for example home improvement, energy efficiency, and electrification. It is the Canadian Federal Government that is returning part of the carbon tax to citizens at the beginning of each quarter. Quebec does not recommend this approach since the citizens never really understood they were receiving such a rebate upfront.

5. What are the existing or proposed reporting requirements for fuel distributors/emitters in Vermont? What are the requirements in other states? How could Vermont go about setting up a reporting requirement to support cap-and-invest?

Vermont already requires fuel distributors to [register and report annual fuel volumes sold](#) to the Public Utilities Commission (PUC), in preparation for the proposed Clean Heat Standard. This information has historically been reported to the Vermont Department of Taxes but is not made available at the entity level from that department. This is the same information that would be needed to establish obligations under a cap-and-invest program. The State is still working through issues related to registration as well as confidentiality concerns related to potential public disclosure of this information.

The California Air Resources Board (CARB) publishes entity-level [reports of emissions](#) for covered entities. Rather than reporting fuel sales, CARB requires entities to report emissions using fuel-specific emission factors provided by CARB. Reporting is done through a web portal and resources are provided on their website. While New York's program has not been finalized, the [2023 pre-proposal outline](#) also anticipates requiring reporting of emissions using state-supplied factors.

6. Please provide more detail on how the social cost of carbon/greenhouse gases is calculated.

At a high level, the social cost of carbon/greenhouse gases is an estimate the cost of additional future damages due to the emission of an additional unit (usually one metric ton) of a greenhouse gas. The critical components of this analysis are the warming potentials of the gases, the types of effects (both positive and negative) that are expected to occur by increasing global temperature, the geographic scope, how far into the future to look, and the discount rate or time value of money. Please see the [materials from the April 24, 2024 meeting of the Climate Council Science and Data Subcommittee](#) which focused on this topic.