

REPORT TO THE LEGISLATURE PURSUANT TO ACT 148 OF 2024, SECTION 33

Interim Analysis and Report on Sustainability Options; Transportation Emissions Reductions

November 2024

Submitted to

The Vermont House and Senate Committees on Transportation, the House Committee on Ways and Means, the House Committee on Environment and Energy, the Senate Committee on Finance, and the Senate Committee on Natural Resources and Energy

Submitted by

Vermont Agency of Transportation and Agency of Natural Resources

Assessment of a Cap-and-Invest Program for Vermont

Interim Report to the Vermont General Assembly

prepared for

Vermont Agency of Transportation and Agency of Natural Resources

prepared by

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November 2024

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Executive Summary

In 2024, the Vermont State Legislature passed Act 148 (the Transportation Bill) which required the Agency of Natural Resources (ANR) and Agency of Transportation (AOT), in coordination with the State Treasurer and the Vermont Climate Council, to undertake a study to evaluate the pros, cons, costs, and benefits of Vermont participating in a cap-and-invest program to reduce climate pollution, as well as possible other complementary emission reduction programs. This report provides a required interim update on the study to the General Assembly. The study will be completed in January 2025 and submitted to the State Treasurer who will make a recommendation of any viable approaches to the General Assembly by February 15, 2025.

Vermont's Act 153 (2020), the Global Warming Solutions Act (GWSA), requires that Vermont reduce its gross greenhouse gas (GHG) emissions by at least 26 percent below 2005 levels by 2025; 40 percent below 1990 levels by 2030; and 80 percent below 1990 levels by 2050. The 2021 Initial Vermont Climate Action Plan and 2023 Vermont Transportation Carbon Reduction Strategy identified strategies and policies to reduce emissions. Analysis completed as part of these efforts found while current strategies and policies being implemented by the State of Vermont, including the Advanced Clean Cars II and Advanced Clean Truck regulations, are making progress they will not be sufficient to meet the GWSA emission reduction requirements for 2030 assigned to the transportation sector and noted a cap-and-invest program and/or low-carbon/clean fuel standard as additional strategies that could be further evaluated to understand their potential to further reduce the state's emissions by 2030.

A cap-and-invest program would set a limit on the amount of greenhouse gas emissions that declines over time. The state auctions allowances up to the limit of the cap and then invests the revenue in measures and programs to increase the availability and reduce the cost of reducing emissions. The combination of a price on emissions and investment in emission reduction measures incentivizes consumers, businesses, and other entities to transition to lower-carbon alternatives. Revenue can also be used to invest in climate resilience measures or returned to disadvantaged consumers as dividend payments.

A low-carbon or clean fuel standard would set a declining limit on the rate of greenhouse gas emissions from a fuel. Fuel distributors or other regulated entities would be required to reduce the rate of emissions (carbon intensity) of the products they deliver by blending or substituting renewable fuels for conventional fuels or providing other low-emitting technologies to consumers. The increased demand for lower-emitting alternatives results in increased private sector investment in businesses supplying those alternatives at the lowest cost to fuel suppliers and ultimately consumers.

This study is evaluating cap-and-invest program options that include linking with other states' existing or proposed programs – either the Western Climate Initiative implemented in California, Quebec, and Washington State, or the New York Climate Initiative under development by New York State. This study is also evaluating the viability of a cap-and-invest program that covers only the transportation sector; an “all-fuels” cap-and-invest program that would cover not only transportation but thermal emissions from the residential, commercial, and industrial sector; as well as a program that covers transportation, thermal, and major stationary sources emissions.

This study is considering 1) the likelihood and timing of meeting legislatively required targets for reducing greenhouse gas emissions for 2030; 2) potential benefits to Vermont's households and businesses as measured through reinvestment in clean energy and efficiency, as well as possible dividend payments for qualifying households; 3) potential costs to Vermont's households and businesses resulting from increases in

fossil fuel prices; 4) other benefits including public health benefits and the social value of carbon pollution reduction; 5) the administrative cost and level of effort required to implement a cap-and-invest program; and 6) the potential benefits and implications of adopting a low-carbon fuel standard along with a cap-and-invest program.

The interim findings of this study are that:

- Vermont's participation in a cap-and-invest program would support additional progress towards meeting the 2030 emission reduction requirements established in the GWSA.
- Future allowance prices, which are a key determinant of both emissions reductions and economic and household cost impacts, are uncertain under both WCI and NYCI, but are likely to be higher under WCI..
- Covering sectors beyond transportation, most notably emissions from the residential, commercial, and industrial sectors, under a cap-and-invest program has the potential to improve administrative efficiency; this approach would be an alternative to the Clean Heat Standard currently under consideration by the Legislature. An all-fuels cap-and-invest program would increase the overall magnitude of emission reductions achieved by the program.
- A low-carbon fuel standard implemented alongside a cap-and-invest program would increase the likelihood of achieving the emission reduction requirements of the GWSA but would add administrative complexity. Currently no neighboring state is pursuing a low-carbon fuel standard. Absent a neighboring or regional partner to share the costs of program administration, establishment of a Vermont-only program would result in an increase in cost to compliance entities, and ultimately consumers, as compared to participation in a multi-jurisdictional program.

These are interim findings. A complete evaluation of program options and recommendations will be prepared as part of the final study report.

1.0 Study Overview

1.1 Study Objectives

In 2024, the Vermont State Legislature passed Act 148 (the Transportation Bill) which requires the Agency of Natural Resources and Agency of Transportation to study a cap-and-invest program as a strategy that could support meeting the State's requirements for cutting climate pollution. The Vermont Agency of Transportation (AOT) in coordination with the Vermont Agency of Natural Resources (ANR), Climate Action Office (CAO), has undertaken a study to understand and compare the costs and benefits of Vermont participating in a cap-and-invest program to reduce climate pollution, as well as possible other complementary emission reduction programs. This report provides a required interim update on the study to the General Assembly.¹ The study will be completed in January 2025 and submitted to the State Treasurer who will make a recommendation of any viable approaches to the General Assembly by February 15, 2025.

Vermont's Act 153 (2020), the Global Warming Solutions Act (GWSA), establishes greenhouse gas (GHG) emissions reduction targets and required the development of the Initial Vermont Climate Action Plan (CAP) which was adopted in December 2021. In November 2023, AOT published a Transportation Carbon Reduction Strategy pursuant to federal requirements and funding, which looked at emission reduction strategies and programs specific to the transportation sector. Analysis for these studies found that while Vermont is making progress in reducing emissions, 2030 targets set forth in the GWSA are unlikely to be met without further action. One recommendation of these studies was to further investigate a cap-and-invest program along with supportive policies such as a low-carbon fuel standard. A cap-and-invest program would: place an annual limit on the amount of fossil fuel greenhouse gas emissions that declines over time; auction allowances to industries emitting greenhouse gases; and invest the proceeds of the auctions in energy efficiency, renewable energy, climate resilience, and equitable dividend payments designed to minimize the financial impact on low-income Vermonters. A low-carbon fuel standard would set a declining emission rate (carbon intensity) standard for fuels and similarly allow fuel producers to buy and sell credits for emission-reducing fuels and measures. This study takes an in-depth look at these market-based program options for Vermont and how they could help the state meet its requirements for reducing climate pollution and at what cost.

1.2 Background

The GWSA requires that Vermont reduce its gross GHG emissions at least 26 percent below 2005 levels by 2025; 40 percent below 1990 levels by 2030; and 80 percent below 1990 levels by 2050. As of the latest Vermont Greenhouse Gas Inventory, the transportation sector made up approximately 39.2 percent of Vermont's climate pollution in 2021. Transportation costs also make up the largest share of the energy cost burden facing Vermonters (45 percent of total energy expenditures).

The 2021 Initial Vermont Climate Action Plan (CAP) as adopted by the Vermont Climate Council identifies specific initiatives, programs and strategies necessary to achieve the State's GHG emission reduction requirements, enhance carbon storage and sequestration, achieve net zero emissions by 2050, and build resilience and adaptation in our natural systems and built environment. The initial CAP primarily focuses on

¹ The Agencies of Natural Resources and of Transportation, in consultation with the State Treasurer, shall file a status update on the development of the written analysis required under subsection (b) of this section with the House and Senate Committees on Transportation, the House Committees on Environment and Energy and on Ways and Means, and the Senate Committees on Finance and on Natural Resources and Energy not later than November 15, 2024.

the initiatives, programs and strategies necessary to achieve the reductions required by 2025 and 2030. Many pathways and strategies laid out for the transportation sector align with programs that AOT is currently implementing. The CAP also recommended the adoption and implementation of the Advanced Clean Cars II (ACCII) and Advanced Clean Trucks (ACT) rules. Based on preliminary modeling, the Vermont Department of Environmental Conservation (DEC) estimates that ACCII and ACT will achieve 34 percent of the transportation sector GHG emissions reductions needed by 2030. The purpose of ACCII and ACT is to make electric vehicles available for sale in Vermont; however, the reductions estimated by DEC depend on the number of vehicles being purchased and replacing internal combustion engine vehicle miles traveled. AOT's current Capital Program, which includes expanded investments made possible by a significant amount of one-time federal funding, has included funding for several programs that incentivize the purchase of new and used electric vehicles, and for the deployment of electric vehicle charging stations. While these policies and investments are a strong start towards getting cleaner and more efficient vehicles on the road and reducing the GHG emissions from the transportation sector, additional complementary policies and actions are needed.

The 2021 CAP also includes a recommendation that Vermont participate in the Transportation & Climate Initiative Program (TCI-P) – a regional cap-and-invest program – as a lead policy and regulatory approach to reduce emissions from the transportation sector. Just weeks prior to the CAP adoption, TCI-P became unviable, and the Climate Council agreed to include a notice in the CAP that the Council would continue work on an alternative recommended policy or set of policies to make up for the lack of sufficient transportation emissions reduction policy recommendations – as well as pursue TCI-P if it again became viable.

The 2023 Vermont Transportation Carbon Reduction Strategy (CRS) developed pursuant to the Infrastructure Investment and Jobs Act Carbon Reduction Program, and its accompanying planning and public engagement process, provided Vermont a timely opportunity to undertake additional analysis to quantify the gap that exists between emissions reductions expected from current policies and the implementation of other potential strategies and the required reductions of the GWSA. The CRS analysis indicates that Vermont may meet its 2025 reduction requirement in the transportation sector. However, even with additional investments for programmatic, policy, and regulatory options, the modeling shows a gap between projected “business as usual” emissions in the transportation sector vs. the portion of GWSA emission reduction requirements for 2030 and 2050 that are attributable to the transportation sector. The CRS found that without adoption of additional policies this portion of the required emissions reductions in the GWSA will not be met and states that:

“Of the additional programs, a cap-and-invest and/or Clean Transportation Standard program are likely the two most promising options to close the gap in projected emissions vs. required emissions levels for the transportation sector.”

While the CRS provides considerations for actions towards those additional policy options, it does not include a detailed analysis of the design or potential outcomes for such options and thus does not recommend an approach.

Vermonters with lower incomes are disproportionately burdened by energy costs. While Vermont households with lower incomes typically use less energy than those with higher incomes, they spend a larger share of their income on energy. In the transportation sector, looking at the “all-in” costs, including vehicle purchase, fuel, and maintenance, there is a significant geographic disparity in transportation energy burden throughout the state, with higher burdens in the Northeast Kingdom and Southern Vermont. Averaged across Vermont,

households with lower incomes (80 percent of the area median income, or AMI) spend on average, 30 percent of their income on these “all-in” transportation costs, compared to 25 percent for Vermonters at the state median income. The scenarios explored in this study consider the degree and distribution of the transportation energy burden for Vermonters, and how a cap and invest program revenue could be allocated to address these disproportionate impacts.

1.3 Study Process

The study process includes two primary components: 1) research and analysis of program options; and 2) stakeholder engagement. The research and analysis is being conducted using a combination of original modeling and information available from other states and provinces that have implemented and/or studied cap-and-invest and low-carbon fuel standard programs. As of this writing, research and analysis is in progress and will be completed by December 2024. Analysis is being done to understand the effect of a cap-and-invest program on:

- The likelihood and timing of meeting the requirements established by the Legislature in the GWSA for reducing GHG emissions.
- Potential benefits to Vermont’s households and businesses as measured through reinvestment in clean energy, efficiency, and climate resilience, as well as consumer rebates.
- Potential costs to Vermont’s households and businesses resulting from increases in fossil fuel prices.
- Other benefits include public health benefits and the social value of carbon pollution reduction.

The study is also considering the administrative cost and level of effort required to implement a program, as well as the potential timeline for implementation. Finally, the study considers the potential benefits and implications of adopting a low-carbon fuel standard in addition to a cap-and-invest program.

The stakeholder engagement includes two rounds of public meetings as well as focus groups with representatives from key affected sectors. The first set of public meetings was held virtually on October 3, 2024 to inform the public about the program and gather initial input. The second set of meetings will be held in early 2025 to provide a clear understanding of and receive further input on the findings. Focus groups are also being conducted starting in November 2024 with representatives of the following groups:

- Potentially regulated entities (i.e., fuel suppliers and distributors and large stationary source emitters that could be subject to emissions limits under a cap-and-invest program).
- Vermont’s business community.
- Community-based organizations with a focus on equity.
- Environmental organizations.

A second round of focus groups will be held in early 2025 to gather feedback on the study findings. These findings will also be presented to the General Assembly.

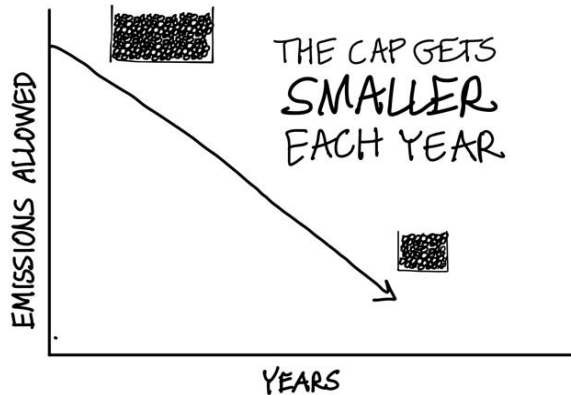
2.0 How the Programs Would Work

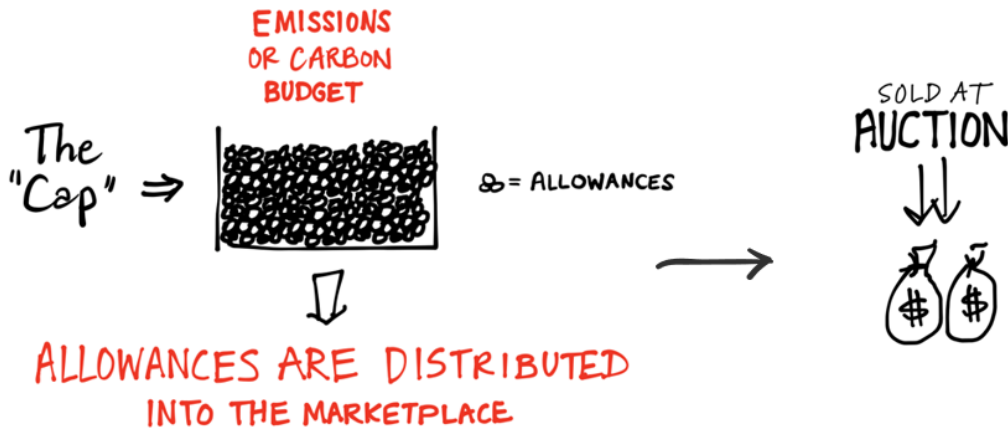
2.1 Cap-and-Invest Program

A traditional approach to regulating pollution sets a limit on emissions or emissions intensity – e.g., emissions per vehicle-mile from cars and trucks, or per megawatt-hour of power produced by electricity generation plants. The limits generally apply to every emitter within each source category. Examples include vehicle fuel economy and emissions standards such as Corporate Average Fuel Economy (CAFE), as well as powerplant and industrial source emissions regulations under the Clean Air Act. This approach can be effective, but may also be relatively costly, as some sources may find it harder or more costly to reduce emissions than others who can reduce emissions easily.

A cap-and-invest program is a complementary approach to reducing emissions. As illustrated in Figure 1, the state would set a declining cap on carbon emissions over time; this cap can reflect the state's requirements for reducing emissions under the Global Warming Solutions Act. The State would sell or distribute the rights to emit carbon, within that declining cap. Those rights are known as "allowances", where one allowance is the permission to emit one metric ton of carbon dioxide equivalent emissions. Companies that emit pollution can buy, sell, and trade allowances. Companies that can reduce emissions at a cost lower than the market allowance price will choose to reduce emissions; firms with higher costs will purchase allowances. Thus, the market determines who can reduce emissions at the lowest cost.

Figure 1 Cap-and-Invest Program





Graphics courtesy/adopted from Franz Litz

The state collects proceeds from auctioning the allowances. The state can then use the proceeds to invest in clean energy, energy efficiency, and other priorities to benefit Vermonters and further reduce pollution. The State can also choose to use proceeds for related purposes, such as climate resilience, or directly returning proceeds to Vermonters. The legislature must authorize the State to collect and distribute funds.

Vermont would have to choose which sources to cover. This study is investigating the options of:

1. Only covering fossil fuels for transportation (gasoline and diesel).
2. Also covering fossil fuels used for heating residential and commercial buildings (e.g., natural gas, home heating oil, propane).
3. Also covering large stationary sources.

The study is currently looking at the advantages and disadvantages of covering different sectors. Typically, about 75 to 80 percent of a state's emissions can be covered. Some emissions are from sources that are too small or difficult to include.

"Regulated entities" are the businesses that would be required to acquire and periodically submit allowances to the state equal to the greenhouse gas emissions of the fuels they provide, or the emissions produced by their operations. Individual households and businesses would not be directly regulated and would not have a compliance obligation. Instead, fuel distributors and suppliers would be responsible for compliance, along with any large industrial sources covered.

Cap-and-invest programs can be created with guardrails to limit potential cost impacts to Vermont's household and businesses. One of the most significant is a "price ceiling" that sets an upper limit on the price at which pollution allowances can be sold by the state at auction. If the price exceeds the ceiling, additional allowances are introduced into the marketplace until the price is reduced to or below the ceiling. Regulated entities may also be able to bank allowances from one year to the next to reduce volatility, or to purchase offsets to cover some portion of their emissions.

Economy-wide cap-and-invest programs have been implemented in California and Quebec for approximately a decade. Washington State established a program in 2023, and New York State is

currently developing a program with the goal of implementing it by 2026. Vermont has participated in a cap-and-invest program for electricity generation (the Regional Greenhouse Gas Initiative) since 2009.

Using EPA GHG Inventory Hub emission factors for gasoline and diesel, it is straightforward to calculate the theoretical effect of a dollar change in allowance price (determined by the market) on a gallon of fuel, assuming the full cost is passed on to consumers at the retail level. For gasoline (E10) there is approximately an \$0.0085 per \$1 change in allowance price: for diesel, \$0.0121 per \$1 change. The most recent (August 2024) CA-QC joint auction settlement price was \$30.24, which equates to \$0.26 per gallon gasoline and \$0.37 per gallon diesel. NYCI allowance prices are not currently available as the program has not been initiated and no auctions have taken place.

2.2 Low-Carbon Fuels Standard

A low-carbon fuels standard (LCFS) sets a limit on the rate of carbon emissions for fuel supplied (e.g., grams of CO₂ emissions per gallon of gasoline or diesel fuel and their respective substitutes) with the rate declining over time. This type of standard is also known as a “clean fuels standard”, or if applied to specific sectors, may be called a “clean transportation standard” (for transportation fuels) or a “clean heat standard” (for home heating fuels) as currently under discussion in Vermont. Standards for the emissions intensity of fuels are complementary to other standards that target the performance of vehicles and appliances.

Carbon intensity of a fuel can be reduced by blending or substituting conventional fuels with renewable fuels (such as ethanol, biodiesel, or renewable natural gas) with lower carbon emissions. While a cap-and-invest program typically regulates emissions occurring within a state, a low-carbon fuel standard is typically based on life-cycle carbon emissions, which may include out-of-state emissions associated with production and transport of the fuel as well as uptake of carbon in biomass grown for fuels. Some programs also establish credit systems so that different types of fuels or energy (such as electricity or green hydrogen) can be used to offset conventional fuel carbon intensities.

California’s Low Carbon Fuel Standard for transportation fuels began implementation in 2011. Its goal is to reduce the carbon intensity of the transportation fuel pool by 30 percent by 2030 and 90% by 2045. Under its program, each fuel is rated with a “carbon intensity” (CI) index that is a measure of its life-cycle carbon emissions (some of which may occur outside the state’s boundaries). Low-carbon fuels below the benchmark generate credits, while fuels above the CI benchmark generate deficits. Credits and deficits are denominated in metric tons of GHG emissions. Providers of transportation fuels must demonstrate that the mix of fuels they supply for use in California meets the LCFS carbon intensity standards for each annual compliance period. A deficit generator meets its compliance obligation by ensuring that the number of credits it earns or otherwise acquires from another party is equal to, or greater than, the deficits it has incurred.²

Similar to a cap-and-invest program, LCFS establishes a market through which fuel suppliers can buy and sell credits to achieve the overall lowest-cost means of meeting the state’s carbon intensity benchmark. However, this market is internally revenue-neutral (after accounting for administrative costs) and does not create a pool of funds for the state to invest in emission-reducing activities or

² <https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about>

other equity-focused consumer benefits like a cap-and invest program would. Instead, it relies on the increased demand for low emitting fuels and technologies to incentivize private sector investments in those businesses that can deliver them at the lowest cost. It also does not set a specific emissions cap – total emissions may still vary with changes in activity levels (e.g., vehicle-miles of travel, total households or business energy use).

California's standard has evolved over time, including adding new crediting opportunities to promote zero emission vehicle adoption and other advanced technologies for the transportation sector, as well as crediting for specific emissions-reducing projects and for carbon capture and storage. California views its transportation LCFS as complementary to its cap-and-invest program, with the two programs in combination providing greater assurance that the state's overall emission reduction goals will be achieved.

Oregon, Washington, British Columbia, and Quebec have also implemented low-carbon fuel standards that apply to fuels used in multiple sectors, with the West Coast states and provinces linking into a single credit market with California. Quebec's program sets volumetric fuel requirements for low-carbon gasoline and diesel for the 2023 – 2030 period, increasing from 10 percent in 2023 to 15 percent in 2030 for gasoline, and from 3 percent to 10 percent for diesel³.

The California Air Resources Board notes that data from third party commodities markets experts show the current low carbon fuel standard pass through to California consumers is \$0.10 per gallon of gasoline. However, they estimate that as consumers increase their use of low carbon intensity fuels and more efficient vehicles, fuel costs per mile will be reduced by 42 percent - translating to savings of over \$20 billion in fuel expenditure every year by 2045. For light-duty vehicles (cars, pickup trucks, sport utility vehicles, vans, and minivans) these fuel cost savings will be even more pronounced, cutting today's costs to Californians by more than 50 percent.

³ [P-30.01, r. 0.1 - Regulation respecting the integration of low-carbon-intensity fuel content into gasoline and diesel fuel](#)

3.0 Cap-and-Invest Options and Evaluation Criteria

3.1 Program Options

Vermont is a small state, and it would be a significant administrative burden to create its own, stand-alone program. There would also be cost efficiencies to regulated entities participating in a regional or multi-state program, since emissions allowances could be traded across a much larger marketplace making it easier to find the most cost-effective means of reducing emissions. Therefore, this study considers two options for linking with an existing or planned program. The two options potentially available in North America are:

1. **Western Climate Initiative (WCI)** – Current participating entities include California and Quebec; Washington State is using the WCI emissions trading platform and considering linking with the participating entities.⁴
2. **New York Climate Initiative (NYCI)** – Under development by New York State. Note that the state’s recommendations have not been finalized and New York could also seek to link with WCI.

Each program has different parameters which may affect the likelihood of Vermont achieving its required emission reductions and the magnitude of other benefits and costs experienced. WCI has established parameters and a history of over a decade of operation. The outlines of a NYCI program have been suggested but not codified yet, so the exact parameters of a NYCI program are subject to some uncertainty. A draft rule may be published by the end of 2024 or early 2025. The programs are compared in summary format in Table 1. Vermont’s population and emissions are also presented to compare with those of the climate initiative participating entities.

Table 1 Comparison of Western Climate Initiative and New York Climate Initiative

Program Parameter	Western Climate Initiative	New York Climate Initiative	Vermont
Program start year	2013 - 2015	2026 (earliest)	
Participating entities	CA + QC (linked) WA State (using platform)	NY State	
Total population of participating entities	47-55 million	20 million	0.7 million
Sectors Covered	Economy-Wide	Economy-wide not including electricity sector	Option to link one or all the sectors contemplated by the study to either program (transportation, thermal, or stationary sources)

⁴ “Linking” means that the allowance price would be the same for all covered entities in the program, regardless of the state or province in which they are based.

Emissions cap	CA: 294 MMT (2023); -32% by 2030; -77% by 2050 QC: 55 MMT (2021); -22% by 2030; carbon neutrality by 2050 WA: 68 MMT (2023); -45% by 2030; -95% by 2050	233 MMT (2025); -27% by 2030; -90% by 2050	Total emissions of 8 MMT in 2021 Transportation: 3.24 MMT Thermal: 2.57 MMT
Price ceiling	\$88 per ton in 2024 + (5% + inflation) / year	TBD but likely much lower than WCI	
Accounting	Direct emissions only; 100-year GWP	Some upstream & biogenic emissions; 20-year GWP	

MMT = million metric tons; GWP = global warming potential.

Observing from this comparison:

- The WCI is already established, and Vermont could link as soon as a program is authorized and ready – probably 2027 at the earliest. NYCI is not yet established and the ability and timeframe to link with the program is uncertain.
- In both programs, the total emissions and covered population of the participating entities would be many times greater than Vermont’s emissions and population. Therefore, Vermont’s participation would likely not have any meaningful effect on the allowance prices in either program.
- WCI has set a relatively high price ceiling over time (which has not been met yet) and NYCI is expected to set a much lower price ceiling. While a lower price ceiling, if reached, would generate less revenue and less certainty of meeting emission reduction requirements, it would limit any potential impacts of the program related to fossil fuel price increases. In linking with WCI, Vermont would not have the benefit of ramping up the price as California did and would need to come in at the current price of \$30 per allowance which could create significant financial challenges for Vermonters, particularly in the short-term.
- NYCI uses an accounting system that includes some upstream and biogenic emissions. If Vermont adopted a similar system, it would have a greater chance of reducing life-cycle emissions associated with activities in the state, but some of these reductions might occur outside of Vermont’s borders. Vermont would not be required to adopt their inventory methodology to link with NYCI but it is unclear at this time how it would affect linkage.

3.2 Sectoral Coverage Options

This study evaluates the following options for sectoral coverage:

1. Transportation fossil fuels only (gasoline and diesel).
2. Transportation fossil fuels + other fossil fuels used for residential and commercial heating and appliances (natural gas, heating oil, propane).
3. Transportation fossil fuels + other fossil fuels + large stationary sources.

NYCI and WCO cover all of these sectors, but Vermont would have the option to link to either program with one or more sector coverage. It would not be required to cover all the sectors being analyzed in the study. Limiting the program to transportation fuels only would maximize the likelihood of the transportation sector achieving the proportional emission reductions required under the GWSA. However, an expanded program would provide more options for finding cost-effective emission reduction opportunities across sectors. Emissions allocations could be traded across sectors to find the lowest-cost opportunities for reducing emissions. An expanded program would also apply the emission reducing benefits of cap-and-invest to a larger share of Vermont's emissions – thus increasing the likelihood of the state meeting its overall emission reduction targets. It would also provide additional revenues that could be invested in residential and commercial efficiency and renewable energy as well as clean transportation programs.

There are a small number of large stationary sources (over 25,000 tons CO₂ per year) that would potentially be included in the program. These sources could include:

- Global Foundries
- NEWSVT Landfill
- Omya, Inc.
- University of Vermont and State Agricultural College
- WestRock Converting LLC - Missisquoi Mill

To minimize the risk of industrial sources moving to a different state where costs are lower, a cap-and-invest program may be set up to provide free allowances to certain sources that are deemed to be a “flight risk”. This study is considering that option. The study also includes outreach to these potentially regulated emitters to better understand opportunities for emission reductions and potential concerns related to a cap-and-invest program.

3.3 Low-Carbon Fuel Standard

A low-carbon fuels program could be set up and implemented independently of a cap-and-invest program. Thus, the program could be implemented in tandem with cap-and-invest, or at a later time. This study is considering the potential interaction between the two programs and the degree to which the LCFS could increase the likelihood of Vermont reducing emissions to its statutory requirements in 2030 and beyond. The study will also consider how implementing an LCFS might affect other considerations such as job creation and household costs.

3.4 Evaluation Criteria

This study is evaluating the above program options based on 11 criteria:

1. Anticipated emission reductions in Vermont in covered sectors in 2030-2035 and 2050, and likelihood of achieving these reductions.
2. Revenue generation.

3. Household-level benefits and costs to Vermonters, including benefits and costs to different income groups.
4. Allowance price (cost/ton) over time.
5. Change in fuel/energy cost per gallon or unit of energy.
6. Social cost (value) of carbon reductions.
7. Macroeconomic effects, including job creation and effects on different industries.
8. Health benefits resulting from reduced air pollution and other program benefits.
9. Potential for “leakage” of emissions to other states.
10. Implementation costs including program administration.
11. Potential timeline for implementing the program and investing the proceeds in beneficial programs.

Most of these criteria are closely related to, and will scale from, two primary factors – 1) the allowance price trajectory, and 2) sectoral coverage. Since the allowance price trajectories under both WCI and NYCI are uncertain, the initial study analysis is instead looking at three price trajectories that could represent the range of impacts expected under NYCI or WCI. Vermont can then pick a preferred price trajectory. Once the NYCI program is finalized, the state can evaluate which program (NYCI or WCI) is more likely to be aligned with that trajectory. That along with other considerations such as implementation costs and timeframe will inform recommendations about which program to link with should Vermont choose to initiate a cap-and-invest program.

4.0 Discussion of Program Options

- Both the future WCI and NYCI price trajectories are uncertain. However, due to expected different price ceilings, linking with WCI is likely to result in a higher allowance price than NYCI, especially since the WCI has ramped up to their current price over almost two decades and if Vermont linked with WCI, Vermont would need to come in at their current price. Linking with NYCI would allow Vermont to align with a program as it comes online.
- Linking with WCI would provide a larger price signal to reduce emissions, resulting in higher household and business cost impacts, a greater likelihood of achieving overall emissions reduction requirements, and more money for reinvestment.
- Macroeconomic and health benefits would be proportionately larger linking with WCI.
- Many details of NYCI are not yet finalized; this study is therefore deferring a final recommendation on which program to link to until NYCI rules are released, which could be as early as the end of 2024, or later.
- The WCI market is larger than the NYCI market and could result in less likelihood of emission reductions occurring within Vermont. Still, both programs are large by comparison to Vermont.

New York State alone produces about 30 times the emissions of Vermont, and WCI entities produce over 50 times the emissions of Vermont.

- NYCI has the advantage of being implemented in another U.S. state that shares a long border with Vermont – reducing the potential for cross-border effects due to Vermont price differentials with its neighbors. While Quebec also borders Vermont, the international crossing makes border effects a lesser consideration.

4.1 Sectoral Coverage Options

- Modeling suggests that expanding coverage to the residential, commercial, and/or industrial sectors could yield at least twice the total emission reduction benefits of covering only the transportation sector. Expanding coverage, however, would not be pursued if the Legislature decides to implement a Clean Heat Standard.
- Broader coverage allows more opportunity for cost-effective emission reductions (those with the least economic impact/most benefit) but also less certainty on achieving transportation reductions.
- Broader coverage is consistent with the other programs that Vermont might link to – both WCI and NYCI would cover multiple sectors including transportation, residential, commercial, and industrial.
- Evidence is mixed on whether the transportation sector is more or less responsive to price and investment signals than thermal and stationary sources. If it were less responsive, a multi-sector program would likely result in greater emissions in residential, commercial, and industrial sectors compared to transportation. The study is currently exploring this issue in greater detail.
- Strong regulations in the transportation sector (Advanced Clean Cars & Trucks) may limit any additional emissions benefit from cap-and-invest for transportation, since manufacturers are already required to sell increasing numbers of zero-emission vehicles. However, investing cap-and-invest proceeds will also support attaining these clean vehicle regulations and building out infrastructure to support electric vehicles.

4.2 Relationship to a Low-Carbon Fuel Standard

- Emissions
 - Cap-and invest sets a limit on the amount of emissions the covered sectors can produce; for example, 3 million metric tons in a year from transportation fuels.
 - while a LCFS would set a limit on the rate of emissions from covered fuels; for example, 8 kilograms per gallon of gasoline (although the rate is expressed as the amount (mass) per unit of energy such as grams per megajoule)
- Investments

- Cap-and-invest generates revenue from the auction of allowances that the state invests in measures to accelerate emission reductions and to address disproportionate economic effects on consumers.
- A LCFS creates demand for lower-emitting fuels and technologies that increases over time. The private sector responds by investing in businesses that can deliver those fuels and technologies at the lowest cost to fuel suppliers and ultimately consumers.
- While consumers are initially exposed to increased fuel costs from both approaches, over time both provide more options to consumers to choose lower emitting fuels and technologies, and both provide resources to make those options more affordable.
- Regulators in California and Washington believe LCFS plays an important complementary role to cap-and-invest. LCFS would increase the likelihood of achieving transportation sector emission reductions.
- Adopting an LCFS would add policy and regulatory complexity, which could be a reason to defer further consideration until a cap-and-invest program is established and working.

5.0 Next Steps

Vermont's participation in a cap-and-invest program could support significant progress towards meeting emission reduction targets. Further, it is imperative to understand the changes in fuel costs that would occur because of participation in a cap-and-invest program, including household-level costs to Vermonters across different income groups. A technical analysis that fully addresses the anticipated costs and benefits will be completed in December and delivered to the Treasurer's Office by the end of the year to support the Treasurer in making a recommendation of any viable approaches to the General Assembly by February 15, 2025.

The additional work being completed under this study includes:

- Evaluation of household cost and cost savings impacts, including impacts across income groups.
- Development of draft and final reports documenting analysis findings.
- A second round of public meetings and focus groups to present and discuss findings with key stakeholders and with the public.
- Final updates to the General Assembly.

The analysis - report will be completed by the end of December 2024, with the report finalized and the second round of public engagement completed in January 2025 and recommendations by the Treasurer's Office for any viable approaches submitted to the General Assembly by February 15, 2025, as mentioned above. Additional presentations will be delivered in February and March 2025.

It is important to note that if the details of the NYCI are not finalized until the end of the year and therefore not included in the final technical report, it will make it difficult for the Treasurer to complete their review, as they will not be able to analyze/comment on a single recommendation, but rather would have to opine on an array of potential choices. This is a limitation of the timeline.