

The Impacts of Weatherization on the Vermont Economy

The Agency of Commerce and Community Development, in collaboration with the Public Service Department (“ACCD” and “PSD”, collectively “the Agencies”), has analyzed the broad economic impact to the Vermont economy of the State’s core Weatherization efforts.

The Agencies estimate that over the period from 2020-2030, the sustained investments in low-income and market rate programs increase personal income \$27 to \$39 million per year, increase GDP \$20 to \$21 million per year, and employ 390 to 440 people throughout the analysis period. These reported values represent the economic activity generated by the efficiency investment, including the direct economic activity associated with Weatherization as well as the indirect and induced activities.

Economic Modeling With REMI

To estimate these values, the Agencies utilized the PI+ Model developed by Regional Economic Models Inc. (“REMI”). The model is used across the country – including in Vermont – to capture direct and indirect structural changes in an economy that result from a policy or program impact. The PI+ model contains forecasts of economic activity, by sector, that are calibrated to Vermont. Policy changes affect the economy, and REMI estimates the difference between the baseline forecast of economic activity before and after policy changes.

Weatherization has two direct impacts on the economy. First, investments in Weatherization cause an increase in the economic activity of the construction sector that carries out the project. Second, the result of Weatherization is a reduction in fuel consumption for building occupants. These direct impacts also create indirect and induced impacts on the economy – such as spending on supporting goods and services by entities completing the direct activity, and re-spending by workers of their wages and by households from re-spending of disposable income from energy savings.

To model these impacts on the total Vermont economy, including indirect and induced activities, there are three inputs used:

- The investment in residential repairs and maintenance (the closest economic sector in the REMI model.)
- The reduction in the consumption of fuel oil and natural gas with the household savings re-allocated to other purchases.
- A reduction in overall consumption resulting from the necessary household cost for carrying out the weatherization.

This latter input addresses the need to consider opportunity costs for the money spent on weatherization that would have played some other role in the Vermont economy.

Weatherization Programs Key Assumptions and Impact

The Agencies modeled the impacts of low-income Weatherization as managed by the Vermont Office of Economic Opportunity, “market-rate” Weatherization as managed by the State’s

Energy Efficiency Utilities and 3E Thermal, and a combination of all programs. Assumptions on investment and savings levels were taken from reporting required to track progress toward 10.V.S.A. §581 targets. ¹

Table 1: Key Input Assumptions by Market Sector – based on 2018 data			
	Low income ²	Market ³	Combined
Weatherized Units/yr	806	971	1,777
Weatherization \$/yr total costs	\$10.06 million	\$8.76 million	\$18.8 million
Average Fuel Reduction per unit	29%	23.6%	26%

Both low-income and market-rate Weatherization programs require significant public resources to operate. Market-rate programs also require additional investment by building owners. As discussed above, the total expenditures (as represented in Table 1) induce economic activity in Vermont. REMI includes hundreds of categories in employment, income, and consumer spending, among others, that are affected by the expenditures, savings, and additional spending that is induced by the savings. Several outputs are highlighted in Table 2 showing incremental impacts of Weatherization programs to the economy.

Table 2: Selected Economic Outputs, Average Annual Impact by Market ⁴			
	Low income	Market	Combined
Employment (Jobs)	205-235	185-205	390-440
Personal Income	+\$14-20 million	+\$12-18 million	+\$27 - \$39 million
GDP (annual growth)	+10 million	+\$11 million	+ \$20 - 21 million

It is clear in that investments in weatherization have a positive impact on the Vermont economy. The most significant reason for this impact is that money used for weatherization is largely money spent in Vermont for labor, and some of the materials. This replaces spending by Vermonters on the wider range of consumption, much of which results in activity out of the state. A smaller, but additional positive economic impact is correlated with the fuel savings achieved

¹ After establishing interim goals, the Public Utility Commission established annual reporting mechanism, whereby the Public Service Department collects data from program administrators and submits to the Commission. The latest report can be found in case EEU 2013-03 on [ePUC](#).

² Low-income weatherization programs are funded mainly via an excise tax on fuels.

³ Market-rate programs are delivered by Energy Efficiency Utilities (Efficiency Vermont, Burlington Electric, and Vermont Gas Systems). Efficiency Vermont and Burlington Electric’s programs are funded via revenues associated with Vermont’s participation in the ISO-New England Forward Capacity Market and the Regional Greenhouse Gas Initiative. (3E thermal is administered and funded via a combination of Efficiency Vermont and OEO funding). 3E Thermal projects are reported here as market rate projects. Vermont Gas programs are funded through efficiency charges directly on customer bills.

⁴ This table represents incremental impact to the economy. For example, for the low-income market the average \$10.06m annual investment results in between \$12-16 million average annual increase to Personal Income, depending on the year. Generally, over time, the impact to Personal Income increases over time, as the cumulative effect of savings continues.

by customers – with those fuel savings again spent on the wider range of consumption, with slightly more of that spending happening in the state relative to spending on fuels.

Non-Energy Benefits

Non-Energy Benefits of weatherization are not included in the analysis. As is well understood, improved housing conditions as a result of weatherization – including thermal envelope, ventilation, and other health and safety measures improves health of occupants, particularly for lower income households.⁵ Moreover, improved health can lead to other positive outcomes, such as increased productivity. Modeling these impacts in REMI is outside the scope of this exercise.

Appendix – Additional Notes and Assumptions

REMI Model Timing

The model was run by providing inputs for a 13-year period from 2018 through 2030. The inputs were inflation adjusted to the 2018 figures included in Table 1. The REMI model takes a few years to equilibrate, and the impact figures are reported from Year three (2020). This is done because the impacts in Years One and Two are somewhat artificial – the model assumes that the activity goes from zero to the input values in 2018. That would require new hires, and other start-up costs that have already been established because the weatherization activities were already taking place prior to 2018.

After year three, the level of annual economic impacts as measured by Gross Domestic Product decline somewhat (although they remain positive). This is because construction activity stays relatively constant while the savings in fuel use continue to increase each year based on the accumulation of weatherized housing units. Fuel use savings have only a small net positive impact on the Vermont economy, because even though fuel purchases move some money out of the state, it moves only slightly more money out-of-state than the general purchases that replace the fuel savings.

Data Inputs – Low-Income and Market-Rate Weatherization Programs

As described above, the PSD collects data on progress toward meeting 10 V.S.A. 581 building goals. The full reported program activity in 2018 is included for reference in Table 3:

⁵ See, for example, the Vermont Department of Health's [Weatherization + Health](#) Report, December 2018.

Table 3: Reported Comprehensive Retrofit Data - 2018						
	BED	EVT	3E Thermal	VGS	Total Market-Rate	Low-Income OEO
Comprehensive retrofit projects (# units)	17	581	169	204	971	806
Average % fuel usage reduction	32%	17%	52%	18%	23.58%	29.20%
Incentive costs	\$17,691	\$878,226	\$439,297	\$330,415	\$1,665,629	\$10,060,546
Participant costs	\$77,298	\$3,992,382	\$2,549,068	\$509,227	\$7,127,975	\$0
Total project costs	\$59,607	\$4,870,608	\$2,988,365	\$839,642	\$8,758,222	\$10,060,546
Average total cost per project	\$3,506	\$8,383	\$17,683	\$4,116	\$9,020	\$12,482

Fuels Modeled in REMI

The REMI model does not specifically identify propane, kerosene, or biomass heat as sectors in the model nor does it provide price forecasts for these fuels. For the purposes of this analysis, the Agencies allocated all fuel savings to fuel oil and natural gas as a proxy, despite significant consumption from these other fuels in the state, particularly biomass (and thus reductions in the consumption of those fuels as a result of Weatherization efforts). Qualitatively, reductions in biomass consumption may reduce economic activity in Vermont more than reductions in oil or gas consumption, given the prevalence of the biomass industry within the Vermont economy.

Price Forecasts

The price forecast for delivered heating fuels consists of a weighted average of residential fuel oil (75%) and propane (25%) prices for the New England from the 2020 Annual Energy Outlook published by the US Energy Information Administration. The price forecast for natural gas is also drawn from the 2020 Annual Energy Outlook’s New England forecasts for residential customers. However, to reflect that Vermont natural gas prices are typically slightly lower than prices elsewhere in New England, the New England forecast prices are discounted by 10%.