

# Comfortable Homes and Energy Savings

## Weatherization and Beneficial Electrification for Vermont Households with Lower Incomes

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Shea Brams

EAN Summer Intern

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**ENERGY ACTION NETWORK**



# About Me

- Middlebury College
- Rising Junior
- Environmental Policy Major





# Project Purpose

- Research the status and trends of weatherization, other energy efficiency and home improvements, and beneficial electrification for Vermont households that are income-eligible for the federal Weatherization Assistance Program (WAP).
- Identify successes and challenges.
- Identify opportunities for enhancements in the future.



# Definitions

- **Energy Efficiency (EE):** Refers to a broad range of improvements that reduce energy consumption in a home.
- **Weatherization (WX):** Refers to the subset of energy efficiency improvements that are eligible for funding by the federal Weatherization Assistance Program (WAP).
- **Beneficial Electrification (BE):** Refers to the replacement of fossil fuel heating equipment with heat pumps powered by clean, renewable electricity to benefit customers through cost savings and increased comfort.



# Why WX, EE, and Beneficial Electrification?

- Lowers monthly energy bills
- Helps maintain warmth in the winter and cooling in the summer
- Improves physical and mental health
- Helps maintain heat (or cooling) during power outages
- Reduces building maintenance costs
- Improves housing affordability
- Improves home value
- Reduces greenhouse gas emissions
- Increases resilience to climate change impacts



# Why Study the Weatherization Assistance Program (WAP)?

- **WAP is a leading low-income federal energy assistance program since 1976**
- **U.S. DOE grants → States → Local agencies**
- **WAP Delivery in Vermont involves:**
  - Primary delivery: *5 Weatherization Agencies*
  - Funding and/or delivery partnerships with:
    - *Efficiency Vermont*
    - Electric and Gas Utilities
      - *Burlington Electric Department*
      - *Vermont Gas Systems*
      - *Vermont Electric Cooperative*
      - *Washington Electric Cooperative*
      - *Energy Co-op of Vermont*



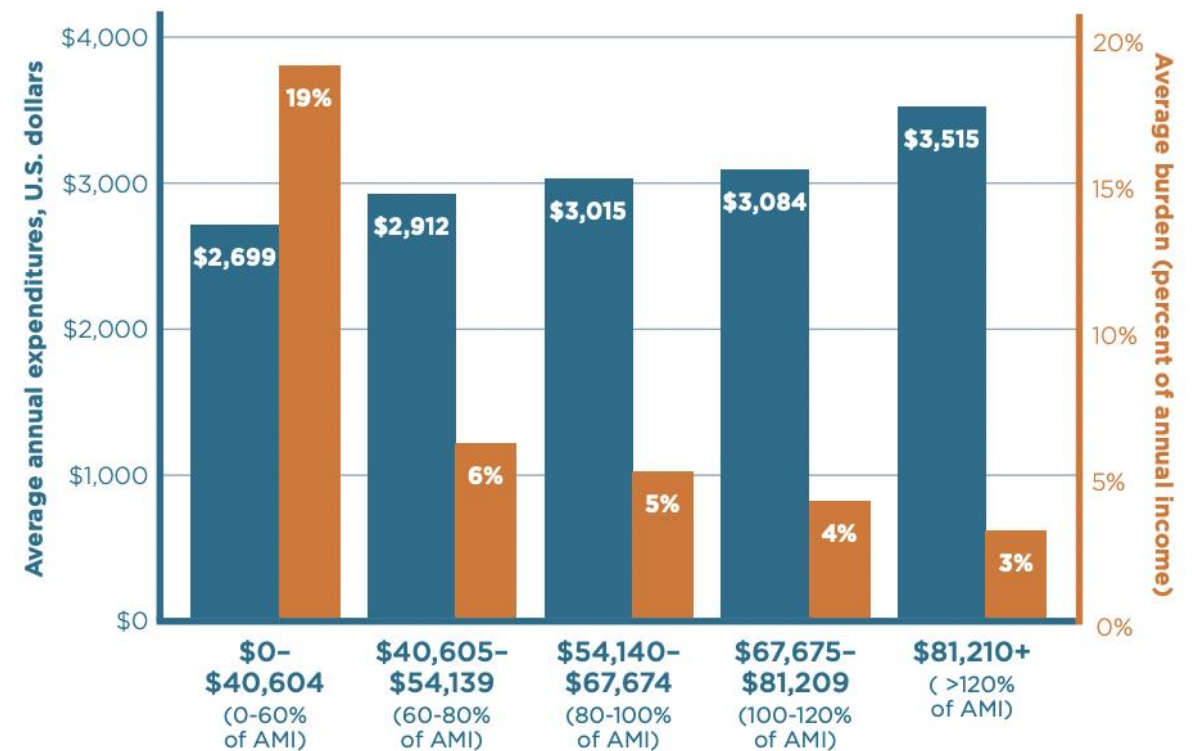


# Why Study WAP-Income Eligible Households?

Recent climate, renewable energy, and environmental justice laws in Vermont emphasize the need for an:

- **Equitable, just, and affordable** transition to a clean energy economy not reliant on greenhouse gas polluting fossil fuels.
- The lowest income households in Vermont have the **highest energy burden** and **spend 19% of their income on heating and electricity.**

## Vermont combined average household heating and electricity fuel costs and burden by income level, 2017-2021



**Source:** U.S. Census Bureau, 2017-2021 American Community Survey 5-year Public Use Microdata Samples. **Notes:** Income categories are based on 2018-2021 median household income in Vermont of \$67,674. Energy burden refers to the share of annual household income spent on energy. Costs include fuel only; they are not inclusive of equipment and maintenance costs.





# Key Questions

- What WAP and related assistance is offered in Vermont to help income-eligible households improve energy efficiency, affordability, and comfort in their homes?
- Is WAP or other assistance available to enable fuel switching from fossil fuels to electricity for heating and cooling (referred to as “beneficial electrification” – a strategy for reducing greenhouse gas emissions)?
- What is the uptake of existing programs?
- What is working well? What are key challenges to further progress?
- Are there opportunities for enhancement in the future?





# Research Methodology

- Literature search of **key national and Vermont reports** on weatherization assistance programs, beneficial electrification offerings, and related information.
- Personal **interviews and email correspondence with 17 Vermont weatherization and energy efficiency professionals** in state agencies; electric, gas, and energy efficiency utilities; community action agencies; and community organizations.



# WAP Eligibility

## WAP Income Eligibility Threshold in Vermont

Defined by the Vermont Office of Economic Opportunity (OEO)

80% Household Area Median Income (AMI)

< = **\$57,300-\$61,050** (exact amount varies based on location and household size)

105k households in Vermont meet the threshold (2022 American Community Survey)

## Other “Low Income” Eligibility Thresholds

Defined by the U.S. Department of Energy (DOE)

200% of the Federal Poverty Level

< = **\$30,120** (exact amount varies based on household size)

Defined by the Vermont Department for Children and Families (DCF)

60% Household Area Median Income (AMI)

< = **\$31,684** (exact amount varies based on location and household size)



# Typical Steps for Receiving WAP Services

1. Application

2. Prioritization of Applications – waitlists vary by region

3. Energy Coaching

4. Home Repairs – when needed

5. Energy Audit - Savings to Investment Ratio Test

6. Comprehensive Retrofits - and Beneficial Electrification when possible

7. Quality Control Inspection



# Typical Weatherization Services Provided to WAP Clients



**Health and Safety** - ventilation, moisture control



**Building Shell** - air sealing, insulation



**Electric Baseload** - energy efficient lights and appliances



**Mechanical** - space and water heating, cooling systems

Services paid for by WAP are based on a **233-page** WAP Technical Manual



## Additional Services *not funded by WAP*

- Additional **energy efficiency** measures and appliance upgrades
- Essential **health and safety repairs**
- **Electrical code** compliance
- **Electrical panel upgrades**
- **Heat pump** purchase and installation costs
- **Energy coaching** assistance



# Ongoing Funding for Low-Income WX, EE, and Beneficial Electrification

Source	Amount	Duration	Notes
<b>U.S. Department of Energy – Formula Funding</b>	\$1.5-\$1.7M	Yearly	The annual amount of funding provided is based on the percentage of Vermont’s income eligible population. Amount varies year to year.
<b>Vermont Home Weatherization Assistance Fund (HWAP)</b>	\$9.5-\$11M	Yearly	Established by law in 1990 as a \$0.02 per gallon fuel tax on all regulated and delivered fuels (except wood). Revenue has decreased over the years due to warmer winters and decreased reliance on fossil fuels.
<b>Efficiency Vermont</b>	\$20M	2024-2026	Required funding dedicated to LI households. Amount varies from year to year.
<b>Vermont Gas Systems</b>	\$874,494	2024-2026	Low-income spending requirement for 2024-2026 performance period. The majority will be invested in weatherization and other thermal envelope improvements.
<b>Vermont Low-Income Trust for Electricity</b>	\$900k	2013-2022	Grants vary from year to year. The example shown on the left was granted to OEO/WAP for essential home repairs prior to weatherization.



# One-Time Funding for Low-Income WX, EE, and Beneficial Electrification

<b>Source</b>	<b>Amount</b>	<b>Time Period</b>	<b>Notes</b>
<b>U.S. Department of Energy – Innovation Grants</b>	\$2 M	2024	Grants are awarded each year via competitive solicitation process. Vermont’s most recent grant is being used to establish a Weatherization Training Center.
<b>America Rescue Plan Act (2021)</b>	\$40 M	2022-2026	One-time funding being used for WAP income-eligible WX, heat pumps, remediation vermiculite insulation and home repairs, and other devices.
<b>Bipartisan Infrastructure Law (2021)</b>	\$14.7 M	2024-2027/2028	One-time funding being used to support WAP income-eligible WX and EE projects.
<b>Inflation Reduction Act (2022)</b>	\$58 M	2025-2032	One-time funding being used to support WAP income-eligible WX, EE, and heat pumps.





# Key Learnings of Recent WX in Vermont

- Estimated **119 person hours/home** for WAP projects (CVOEO)
- **Average cost per single-family housing unit = up to \$15,000-\$16,000** (OEO)
- **Average cost per multi-family housing unit = \$5,050** (OEO)
- **Average energy savings = 29.7%** (OEO)
- **Average cost savings from WAP-funded retrofits: \$1,026** per year for household heating with #2 oil (OEO, 2024)
- DOE Allowable Costs
  - Amount provided by US DOE **per single-family household = \$8,050** (DOE)
  - Amount provided by US DOE **per multi-family household = \$4,220** (DOE)
  - Supplemental funding is used to pay for costs not covered by DOE



# Weathering VT Homes Progress

## Number of Housing Units Served with Comprehensive Thermal Retrofits

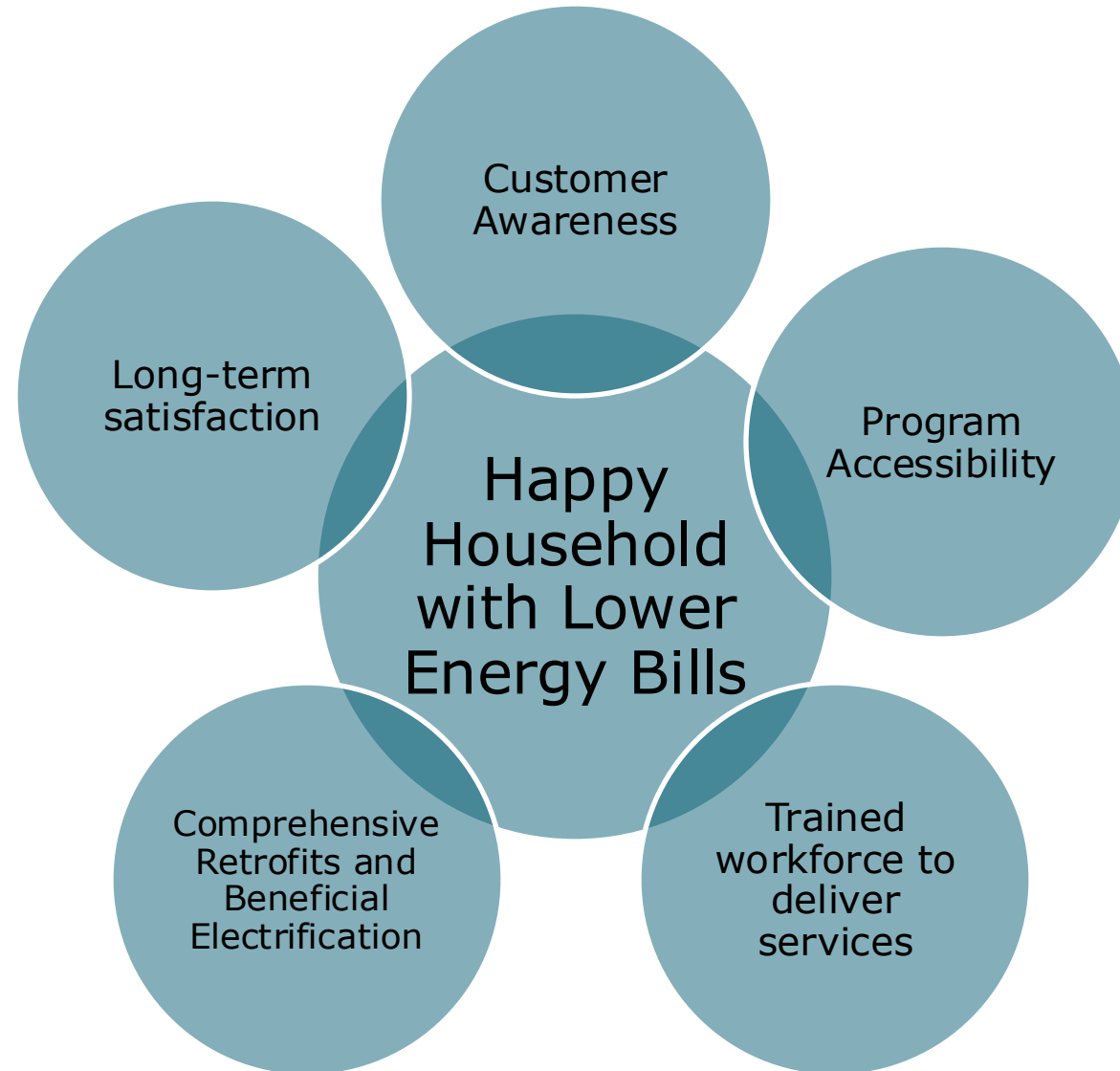
	<b>2008 - 2020</b>	<b>2021</b>	<b>2022</b>	<b>2023*</b>	<b>TOTAL</b>
<b>Efficiency Vermont</b>	10,762	950	637	800	<b>13,149</b>
<b>Burlington Electric Department</b>	93	1	4	10	<b>108</b>
<b>Vermont Gas Systems</b>	4,139	439	523	400	<b>5,501</b>
<b>Office of Economic Opportunity</b>	16,541	1,458	1,104	1,250	<b>20,353</b>
Weatherization Assistance Program (via Community Action Agencies)	13,716	1,116	899	1,000	16,731
3E Thermal	2,825	342	205	250	3,622
<b>Total (Annual)</b>		<b>2,848</b>	<b>2,268</b>	<b>2,460</b>	
<b>Total (Cumulative)</b>	<b>31,535</b>	<b>34,383</b>	<b>36,911</b>	<b>39,129</b>	<b>39,111</b>

Sources: Vermont Public Service Department (PSD), June 2024; Efficiency Vermont, July 2024. \*Per PSD, data for 2023 are preliminary.

***For some CAAs, an estimated 25-30% of WAP-income eligible retrofits include heat pumps (CAA interviews, 2024)***



# Advancing Equitable WX and Beneficial Electrification





# *Pathways Toward Advancement* **Customer Awareness**

## **Challenge**

Many WAP-income eligible households not signed up for WAP

## **Opportunities**

- New engagement strategies for underserved communities
- Customer prioritization
- Referral innovation

## **Progress**

Expanded Customer Awareness



# Pathways Toward Advancement Program Accessibility

## Challenge

WAP eligible households face competing challenges (i.e., waitlists, renters' split incentives, housing, food, transportation insecurity)

## Opportunities

- Minimum Housing Code
- “Wrap-around” services
- Expanded DU collaboration
- “Braided” funding streams

## Progress

Improved Program Accessibility



### **Challenge**

Workforce insufficient and competition for workers by non-WX contractors.

### **Opportunities**

- Weatherization Workforce Training Center
- Increased and tiered wages
- Additional leveraged training funds

### **Progress**

Expanded Trained Workforce



## Challenge

Old Housing Stock,  
mobile and  
manufactured  
homes, larger rental  
population.

## Opportunities

- Supplemental, long-term funding for home repairs and panel upgrades not funded by WAP.
- Prioritize heat pumps when effective for household.

## Progress

Effective  
Comprehensive  
Retrofits and  
Beneficial  
Electrification





# *Pathways Toward Advancement* **Long-Term Satisfaction**

## **Challenge**

WAP households  
face barriers to  
electrification  
success

## **Opportunities**

- Heat pump customer training
- Progressive electric rate design
- Fuel assistance \$ flexibility

## **Progress**

Long-term  
Satisfaction

***Workers are polite, friendly, very professional, prompt. Willing to answer any and all questions. Neat and clean. I feed them lunch everyday – coffee break snack and I did all cleanup of stuff when they were done to save them a trip here and time so that they could go on to next job to help someone else as much as they helped me. Felt like they were family by the time they left here. They are my 'EARTH ANGELS!'***

*Central Vermont Community Action Council  
WAP client*





# Thank you!

## Questions and Comments?

Shea Brams  
617-467-8076  
sheabrams3@gmail.com