A Community-Based Weatherization Initiative in Vermont

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ABSTRACT

The residential sector represents over one-fifth of the total energy consumed annually in the United States. A significant literature exists demonstrating the potential energy savings from simple home weatherization measures. Experience gained through the U.S. Department of Energy's Weatherization Assistance Program demonstrates that 30 percent or more of post-weatherization energy use for heating and cooling can be saved through cost-effective home weatherization measures.

The paper presents information on a community-based weatherization initiative in the rural community of Poultney, Vermont. The initiative is designed to address the key barriers to increased weatherization activities among homeowners not eligible for the federal Weatherization Assistance Program. This includes overcoming knowledge barriers through case studies and GIS mapping to identify neighborhoods with the oldest homes.

I. Introduction

According to data from the U.S. Department of Energy's Energy Information Administration (EIA), the U.S. residential sector accounted for 22% of total energy consumption in 2008. While residential energy use patterns differ depending on geographic location, energy use in a home can be broadly divided into electricity for use in numerous appliances serving a variety of end uses and primary fuels including natural gas, oil, LPG and biomass for space heating and use in a limited number of appliances such as clothes dryers, cooking stoves and hot water heaters. The EIA's Annual Energy Review 2008 states that primary fuel use in the U.S. residential sector in 2008 was 6,778 trillion Btu versus 14,858 trillion Btu equivalents for electricity, which includes the primary energy used in its production.

Nationwide space heating represents the second largest end use category of household energy expenditures behind appliances (see Figure 1), with 2005 expenditures of approximately $57 billion. Of the 110 million occupied housing units in 2007, as illustrated in Figure 2, over one-half of these units use natural gas for space heating (EIA, 2008).

Figure 1
Household Energy Expenditures 2005
(billion nominal dollars)

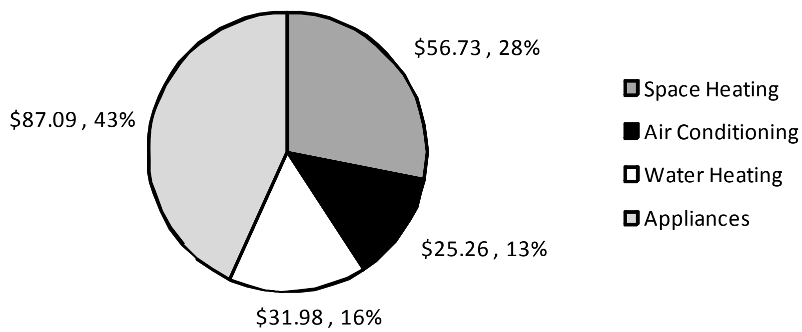
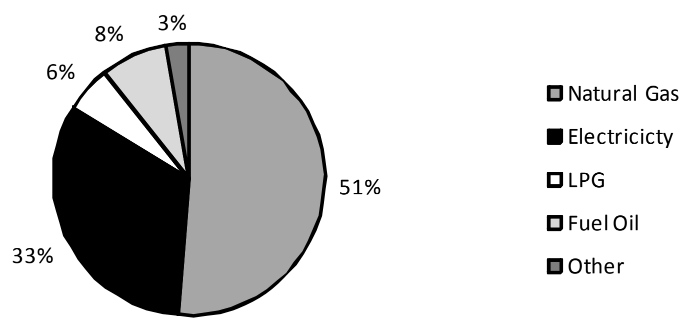


Figure 2
Percent of Total Occupied Housing Units
by Space Heating Type 2007



In certain geographic locations space heating represents the single largest home energy expense for many households, particularly for homes located in Climate Zones 1 and 2, which are characterized by over 5,000 or more heating degree days annually. Home weatherization measures, including sealing around doors and windows to reduce air infiltration into a home and increasing levels of insulation in attic spaces and wall cavities, can serve to dramatically reduce energy use for space heating and cooling. A meta-evaluation of the U.S. Department of Energy's Weatherization Assistance Program for natural gas heated homes by a researcher at the Oak Ridge National Laboratory utilized data from a total of 38 individual state-level evaluations covering 19 states. All of the studies used in the meta-evaluation were characterized as very high quality using actual pre- and post-metered data to determine energy savings from weatherization measures (Schweitzer, 2010). The study estimated the energy savings per household to be 32.3 percent of the natural gas used for space heating prior to the home weatherization work (Schweitzer, 2005).

Studies have shown that low-income home weatherization programs provide additional benefits to society and to homeowners, beyond energy bill savings (Mills & Rosenfeld 1994; Biewald et al. 1995; Hill et al.1998; Schweitzer & Tonn 2002). Schweitzer and Tonn (2002) divide the non-energy benefits from low-income weatherization programs into three main categories: (1) ratepayer benefits; (2) household benefits; and (3) societal benefits. As presented in Table 1, each of these categories is further divided into subcategories.

Table 1: Non-Energy Benefits of Home Weatherization Programs

Main Category	Subcategories	Description
Ratepayer benefits	Payment-related benefits	These are benefits that accrue to ratepayers due to the reduced expenses associated with serving low-income households.
	Service provision benefits	These are benefits associated with the utility's ability to provide improved service due to reduced resources allocated to the low-income customer class.
Household benefits	Affordable housing benefits	These are the non-energy benefits to households linked in some way to the affordability of low-income housing, and include property value increases and avoided shut-offs and reconnections among others.
	Safety benefits, health benefits, & comfort benefits	Weatherization crews often remedy safety and health concerns in a home leading to fewer damaging fires and occupant illnesses. In addition, weatherization improves comfort and related factors.
Societal benefits	Environmental benefits	The main environmental benefit associated with weatherization programs is linked to avoided air pollutants due to the reduction in the burning of fossil fuels.
	Social benefits	The main social benefit from weatherization activities is linked to avoided unemployment; this refers to the employment of people in the course of weatherizing homes who would have been unemployed otherwise.
	Economic benefits	This subcategory of non-energy benefits refers to the economic benefits associated with the purchase of materials, employment, and the local economy multiplier associated with this increased economic activity.

Source: Schweitzer and Tonn, 2002

Weatherization Assistance Programs are cost-effective in terms of standard economic benefit-cost analyses. Schweitzer's (2005) meta-evaluation of the U.S. Department of Energy's Weatherization Assistance Program estimated the discounted value of natural gas savings assuming a 20-year lifetime for the installed measures to be $3,917 in 2003 dollars per household. Furthermore, the non-energy benefits were valued at $3,466 per household. Weighted program costs, which were calculated to be $2,913 also in 2003 dollars, were based on costs reported by the states where the studies were conducted. These benefit and cost estimates lead to benefit-cost ratios for gas-heated houses served by the Weatherization Assistance Program of 1.34 from the program perspective and 2.53 using the societal approach (Schweitzer, 2005).

To date, the vast majority of weatherization efforts have focused on low-income populations. The U.S. Department of Energy's Weatherization Assistance Program (WAP) has funded state and local agencies throughout the United States to weatherize homes for low-income occupants since 1976. More recently, the Obama administration has increased its financial support for WAP with $5 billion in funding as part of the American Recovery and Reinvestment Act (ARRA) to improve the energy efficiency of nearly 590,000 residences of low income citizens, which was a dramatic increase over the $450 million appropriated for this Program in Fiscal Year 2009. ARRA increased the income eligibility limits from 150 percent of the federal poverty guidelines to 200 percent, and at the same time increased project average investment limits from $2,500 to $6,500 per unit. However, a recent report prepared by the Inspector General of the U.S. Department of Energy found that as of February 2010, the one-year anniversary of the Recovery Act, only a small percentage of Recovery Act weatherization funds had been spent and few homes had actually been weatherized. The report indicated that only $368.2 million (less than 8 percent) of the total award of $4.73 billion had been drawn by grantees for weatherization work and, corresponding to the low spending rates, grant recipients fell short of goals to weatherize homes.

ARRA also provides an incentive for homeowners to weatherize their homes that do not qualify for WAP funding. Homeowners are eligible for a Recovery Act expanded tax credits for energy efficiency upgrades. Homeowners that purchase and install certain energy-efficient windows, insulation, doors, roofs, or heating and cooling equipment, are eligible to receive a tax credit for 30% of the cost, up to $1,500.

While the benefits of home weatherization efforts are well understood and the current administration is pushing for greater efforts in this area, significant barriers persist to more widespread weatherization adoption by households across income levels. While federal funding for the WAP has dramatically increased these funds and state-level program staffing limitations limit the number of low-income homeowners being served annually. For homeowners that do not qualify for WAP funding, various barriers exist to weatherization adoption rates. These barriers include lack of knowledge, insufficient numbers of Building Performance Institute (BPI) certified contractors to do the weatherization work, and lack of financing. This paper discusses a community weatherization project underway in the small rural town of Poultney, Vermont designed to address some of the key barriers and lead to greater weatherization adoption by households. We begin with an introduction to home energy heating patterns in Vermont and Poultney using 2000 Census data. Next, the growing community energy phenomenon in Vermont is described, along with the specific elements of the Poultney Community Weatherization Initiative. Finally, we offer conclusions and next steps.

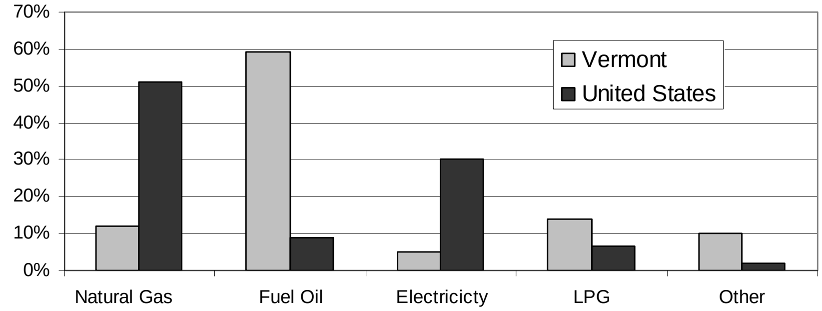
II. Home Heating Patterns in Vermont and Poultney

Vermont is a rural northeast state with a population of approximately 620,000 people with 241,000 households (U.S. Census, 2000). Median household income is equitable with national statistics at just over $52,000. Vermont has a land area of 9,250 square miles with a population density 65.8 people per square mile relative to the national average population density of 79.6. The largest city in Vermont is Burlington with a population of approximately 39,000 people.

Poultney is located in Rutland County in the central part of the state bordering New York on the western edge. Poultney is part of the historic Slate Valley, which extends approximately twenty-four miles along the New York/Vermont border and is about six miles wide. Based on 2000 Census data Poultney has a population of 3,633 people and 1,673 housing units.

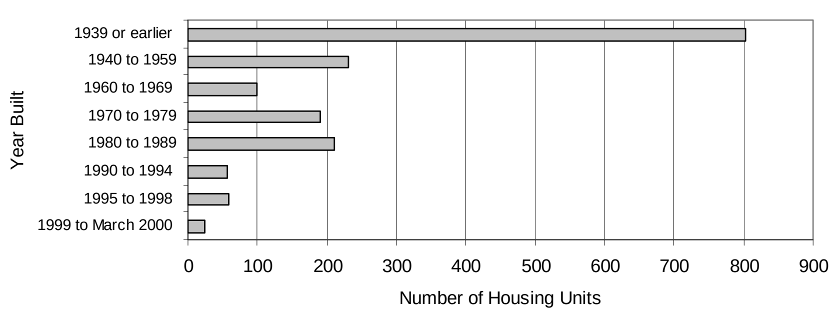
With average heating degree day over 7,000 annual, home heating in Vermont represents the single largest energy expense for homeowners. As illustrated in Figure 3, Vermont households disproportionately heat their homes with fuel oil relative to the nationwide average—59 percent versus 9 percent respectively. This is due primarily to the fact that the natural gas infrastructure in the New England region does not extend into Vermont, except for a small extension going south into the Burlington area from Quebec. Residents in Poultney rely more on oil for home heating relative to the state as a whole, with 70 percent of households heating their homes with oil (Census, 2000). Leading up to the 2008 heating season, fuel oil prices spiked to a high of $4.50 per gallon. Based on a limited survey of Poultney residents during the summer of 2008, many households began to supplement oil heat with cord wood and wood pellet stoves (Letendre and Van Hoesen, 2008).

Figure 3
Percent of Total Households by Fuel Type for Home Heating



Like most New England states the existing building stock in Vermont is old; with approximately 70% of all homes in Vermont built prior to 1980 (Census, 2000). Figure 4 illustrates the age distribution of the building stock in Poultney. The building stock in Poultney is slightly older than the state average with almost 80 percent of homes build in Poultney prior to 1980.

Figure 4
Age Distribution of Poultney Housing Unit



III. The Poultney Community Weatherization Initiative

The Poultney Community Weatherization Initiative (PCWI) is a partnership between Green Mountain College, NeighborWorks of Western Vermont, and the town of Poultney to address the barriers to widespread weatherization adoption by homeowners in the region. The PCWI is specifically addressing the knowledge barrier by using GIS analyses to characterize the age of the existing buildings and by developing case studies that demonstrate how homes in the region have achieved significant, lasting energy savings. In addition, NeighborWorks of

Western Vermont, a non-profit dedicated to sustainable home ownership in the region, is working to address financing barriers and is encouraging local contractors to integrate home performance work into their offerings.

A. Community Energy Planning

Vermont State Statute (V.S.A 24, Chapter 117) provides explicit authority to municipal governments to appoint an energy coordinator and establish advisory committees, such as a town energy committee. Based on this Vermont Statute an energy coordinator is authorized to "…coordinate existing energy resources in the town and cooperate with the municipal planning commission and with those federal, state and regional agencies of government which are responsible for energy matters." and "…study and evaluate sources of energy which are alternatives to those presently available with a view toward the more efficient and economical utilization of existing and potential energy resources." Furthermore, town energy committees can serve as valuable resources across many Vermont communities helping to draft the energy section of a town energy plan and coordinate a variety of different community energy initiatives. Approximately 75 towns across Vermont have formally developed town energy committees and are engaged in a variety of different activities to promote energy independence and strong local economies. A coalition of organizations in Vermont formed the Vermont Energy & Climate Action Network to help support and strengthen the growing network of grassroots energy efforts in Vermont and New England.

Town energy committees throughout Vermont have engaged in a variety of different activities (VECAN, 2007). Many town energy committees engage in education and outreach to provide residents with information about how they can use energy more efficiently and save money. Other Vermont energy committees have focused on making municipal buildings more energy efficient by helping arrange professional energy audits and plan projects to improve the performance of community-owned facilities. In addition, energy committees can play an important role in updating the energy portion of a town plan. A small, but growing literature suggests that community energy planning and local community energy management can be important strategies to address energy and environmental challenges (Cullingworth & Sparling, 1989 and Khan, et al., 2007).

Community energy projects often begin with an initial phase involving an analysis of current energy use patterns within the community and an assessment of local, renewable energy resources. During the summer of 2008 Green Mountain College researchers conducted an energy inventory for the town of Poultney. This included the use of a geographic information system (GIS) that used data to create visual maps and assess the renewable resource potential in the town of Poultney. Specific maps were created to determine where wind, solar, and biomass resources might be developed in the Town (Van Hoesen & Letendre 2010). The Poultney Community Weatherization Initiative Represents a second phase of this ongoing project.

B. Poultney Community Weatherization Initiative

As described above, approximately 80 percent of homes in Poultney Vermont were built before 1980. Construction techniques have greatly improved the energy performance of homes built since this time. Thus, it is likely that a large portion of the housing stock in Poultney could be greatly improved with basic weatherization techniques. Building energy efficiency specialists now have a great deal of knowledge about how buildings perform in Vermont's cold climate, along with an array of strategies to improve the energy performance of existing buildings.

Working in collaboration with NeighborWorks of Western Vermont and the Village of Poultney, the Poultney Community Weatherization Initiative (PCWI) involves a variety of strategies to overcome some key barriers to widespread home weatherization beyond low-income households. To address the knowledge barrier, pre- and post-weatherization performance data is being collected to document the long-term savings from homes that have undergone a professional home weatherized retrofit. This data is being used to produce case studies that document the significant, long-term energy savings from home weatherization measures. These case studies will be shared with community members to encourage greater weatherization adoption and organizations with the ability to finance homeowner investments in weatherization. Greater confidence in the savings from home weatherization investments could lead to increased availability of financing at more favorable terms.

In addition, a GIS system is being used to create maps that visually display the age of the housing stock to serve as a tool to target neighborhoods with older homes that would likely benefit most from home weatherization work. In addition, the financing and the lack of qualified contractors is being addressed in collaboration with NeighborWorks, a nonprofit organization in the region focused on sustainable home ownership. In recent years, NeighborWorks has been placing increasing emphasis on helping low- and middle-income families improve the energy performance of their homes, offering a number of financing options to homeowners that meet certain income requirements. The case studies for the PCWI were drawn from NeighborWorks' clients, which are described below.

Documenting home energy savings from weatherization. As discussed above, the energy savings from home weatherization efforts are well understood. Given that the majority of homes in the U.S. use natural gas for home heating, most evaluation studies focus on the weatherization impacts to reduce natural gas use in homes (Berry 1997; Berry and Schweitzer 2003; and Schweitzer 2005). Generally, these studies have found that weatherization efforts have improved the average savings per dwelling over time due to better analytical tools and weatherization techniques. Weatherization impact studies are difficult for programs serving homes that use bulk fuels like fuel oil as the primary energy source for heating. In fact Ternes et al. (2007) state:

"…their [fuel oil heated homes] heating energy savings cannot usually be estimated from delivery records routinely kept by the fuel suppliers because the records are often incomplete and/or inaccurate, only a few deliveries are made each year, and tanks are not topped off at each delivery. In addition, some occupants use their LIHEAP payment or other funds to fill their tank at the beginning of the winter, but resort to secondary heating sources when the tank runs out because they cannot afford to refill it during the winter."

Rigorous studies of home weatherization impacts for homes using fuel oil require additional measures to accurately measure the fuel use on a monthly basis. Levins and Ternes (1994) studied the impacts of home weatherization specifically on homes that utilize fuel oil as the primarily heating sources. Their study used 41 local weatherization agencies with 222 weatherized dwellings and 115 control houses from the nine northeastern states during 1991 and 1992 program years. The study relied on measured fuel oil consumption both pre- and post-weatherization for each home in the study. The study found that for the northeast region annual net fuel-oil savings averaged 160 gallons per house, or 17.7% of pre-weatherization consumption (Levins and Terns 1994).

A Report Prepared for the Vermont State Office of Economic Opportunity Weatherization Assistance Program (WAP) was published in 2001. The study covered the period between April 1, 1998 and March 31, 2000—the 1998-2000 program years. The Vermont Weatherization Assistance Program weatherized 2,467 housing units during this time period with average fuel savings estimated at 21.6 percent per household. The regional agencies that administer Vermont's WAP contacted energy suppliers in their areas and requested fuel consumption records for participants for both pre-weatherization and post-weatherization after a suitable interval.

The research discussed here demonstrate that weatherization delivers real energy savings to households, which have increased over time as new diagnostic tools are deployed and weatherization techniques have improved. These studies are concerned primarily with assessing the impacts of WAP, including an assessment of the benefits and costs of these low-income weatherization programs. These studies were never intended to educate the broader public about the opportunities that weatherization provides to homeowners to reduce their energy costs. The Poultney Community Weatherization Initiative seeks to present this information to community members, along with case studies from homes in the region that have benefited from weatherization efforts. The purpose is to reduce the knowledge barriers to greater home weatherization adoption across income levels.

- *Case Study 1*. The first case study for the PCWI is a one and one half story wood framed building constructed in 1780 with an addition added to the east end in the 1950s with total living area of 2,800 square feet. Improvements were made to the heat distribution system resulting in a projected 14 percent improvement. Air sealing in the home reduced the air infiltration rate by 3,624 CFM50, or a 49 percent improvement from the baseline. Attic insulation was increased from the existing R-9 to R-50. In addition, foam insulation in the basement was used to insulate the above grade and below grade walls from R-1 to R-25 and R-13 respectively. The total cost for the project was $16,366 with estimated annual energy savings of $1,586. This project has a projected simple payback of 10.3 years. The home was weatherized during the summer of 2009. Total fuel used in 2007/2008 heating season was 880 gallons of fuel oil and 4.5 cords of wood. Fuel used to date for the 2009/2010 heating season is recorded at 190 gallons of oil, 2 cords of wood, and 1 ton of wood pellets. A wood pellet stove was added post weatherization as a second source of supplemental heat for the home.

- *Case Study 2.* A second case study for the PCWI is a 1,840 square foot home built in 1910. The home's boiler was upgrade from a 78 percent efficient system to an 86 percent efficient system. Air sealing of the home reduced air infiltration by 3,150 CFM50, or a 48 percent improvement over the pre-weatherization blower door test. Insulation in the attic and a second floor storage room was upgraded from R-30 to R-49 and R-5 to R-20 respectively. The attic hatch was upgraded from R-5 to R-49. Finally, the basement walls that are above grade were treated with insulating foam creating a R-19 surface. Total cost of the weatherization retrofits was equal to $7,950. Energy savings were estimated to be $89 per month, leading to a simple payback of approximately 7.5years. This home received weatherization retrofit work during the summer of 2009. Purchased fuel oil for the months of pre-weatherization fuel oil purchased through February of the

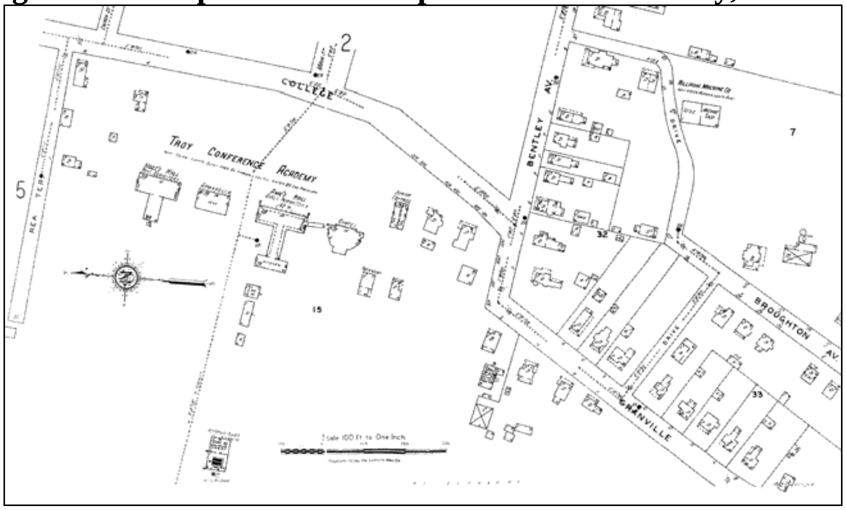
2008/2009 heating season was 723 gallons. For the 2009/2010 heating season, fuel purchases through February were 612 gallons.

- *Case Study 3.* A third case study is home with 1,500 square foot of living space. The home was built in the mid-1800s and is a wood framed two story structure in good condition and well maintained. Air sealing in the home achieved a 730 CFM50 reduction, which represents a 23 percent improvement from the pre-weatherization blower door test result. Insulation in the crawl space under the buildings was upgraded from R-5 to R-12 and the attic from R-10 to R-49. Foam insulation was used to upgrade the basement; above grade and below grade insulation levels were increase from R-1 to R-15. The total project costs were $4,325with estimated annual energy savings of $1,276 leading to a simple payback of 3.4 years. We are still currently gathering historic and current fuel use data for this case study.
    - The PCWI will continue to monitor fuel use in these homes and add additional case studies to the portfolio. These will be used in a variety of ways to increase awareness among residence about the significant, long-term energy savings from home weatherization projects.

Mapping the age of the building stock in Poultney. A geographic information system (GIS) is a tool for capturing, storing, checking, integrating, manipulating, analyzing and displaying data that are spatially referenced to the Earth. This system associates unique features and attributes to specific geographic locations and offers a unique methodology for analyzing and visualizing spatially related features that change over time. GIS has been used to address building efficiency, energy consumption, and housing characterization in numerous settings (Alexander et al. 2009; Heiple and Sailor, 2008; Tornberg and Lhuvander, 2005; Jones et al. 2001; Can, 1998; and Vogt et al. 1999) but this technology has not been used to assist in prioritizing weatherization efforts in rural communities. However, the U.S. Department of Energy Weatherization and Intergovernmental Program recently began providing geospatial data for use in its Weatherization Assistant Program.

We utilized ArcGIS 9.2 software to produce a visual representation of the temporal expansion of buildings within the village of Poultney. This analysis involved georeferencing historical Sanborn Fire Insurance Maps (Figure 5) to modern orthophotography and digitizing individual structures. Sanborn maps have been used for a variety of applications focused on reconstructing spatial variations in community infrastructure (Kolodziej et al. 2004; Merrick, 2003; Kellogg, 1999). Each Sanborn map sheet was rectified and digitized in a separate layer to identify whether individual structures persisted, were removed or experienced expansion (e.g., additions to existing structures). The resulting layers were merged into a single layer and symbolized based on the year each structure appeared on a Sanborn map.

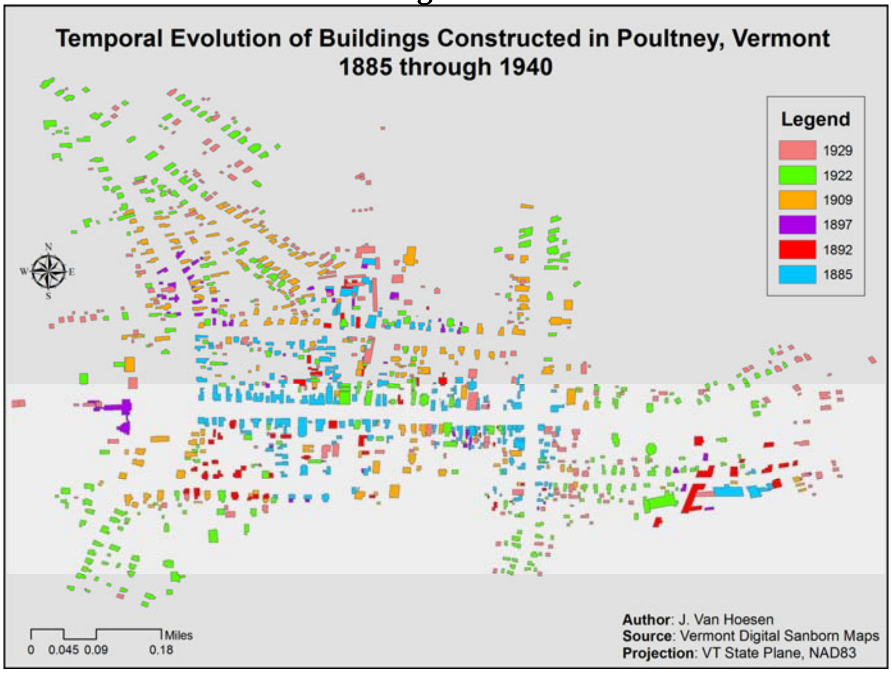
Figure 5: Example Sanborn Map: Downtown Poultney, VT 1929



This process required a number of assumptions: (1) the georeferencing process was accurate, (2) all of the buildings on the 1885 map were obviously built before its creation, (3) expansion of buildings were actually additions rather than entirely new construction, (4) the oldest houses and those with historical additions increase the potential need for weatherization efforts. It is also important to note that not all buildings identified on the Sanborn maps are homes.

The digitizing process identified 1,091 structures and/or additions over the years 1885 to 1940. This process produced a map that provides a visual explanation of construction and expansion within the town during the late nineteenth and early-twentieth centuries (Figure 6). This map indicates the oldest structures (built prior to 1885), and thus with the greatest potential need for weatherization, are clustered in the downtown district along Main Street and South York Street. Between the years 1885 and 1897, construction expanded to further north along York Street and to the south on Bentley Avenue. Expansion continued to the north along College Street and Route 30 between 1897-1909, further to the south, west and north between 1909-1929, and furthest north and west between 1929-1940.

Figure 6



Surprisingly, very few instances of renovation were identified during the mapping process and are primarily related to the oldest structures (already a top priority for weatherization). The construction trends radiate out from the downtown sector along major roads and follow a similar evolution to many rural New England towns (Lindgren, 1995). Weatherization efforts should focus on existing structures clustered near the downtown sector and follow the temporal trends depicted in Figure 6. However, as previously mentioned, it is important to recognize that not all structures were/are residential homes and that all inferences made using this data should be tempered by information gathered from individual homeowners.

Building capacity: financing and developing a qualified weatherization workforce. Once homeowners understand the real energy savings potential of weatherization, financing and the availability of qualified contractors to do the weatherization work are additional barriers that must be overcome for widespread weatherization adoption. NeighborWorks of Western Vermont (NWWVT), working with Green Mountain College, is attempting to overcome these barriers to greater weatherization adoption in Poultney and more broadly in Rutland County, VT.

NWWVT has developed innovative financing structures to allow homeowners not eligible for WAP assistance to benefit from a home weatherization retrofit. Through their Home Energy Saver Program qualifying households can receive funding to perform weatherization work on their homes. Households with income between 60 and 80 percent of the county-wide mean are eligible for a zero interest deferred payment loan from NWWVT of up to $20,000. Homeowners are only obligated to pay the loan if they sell the property. This is a very attractive financing solution for many homeowners, yet very few have taken advantage of this opportunity. Homeowners above 80 percent of the mean county-wide income but below 120 percent are eligible for low interest loans through the Home Energy Saver that Loans a revolving loan fund program. NeighborWorks is also working with local banks to serve households in Rutland County that do not currently qualify for their program.

Green Mountain College has initiated outreach in Poultney to solicit participation in NWWVT Home Energy Saver Loan Program. Presentations have been given to different community groups and other promotional literature has been produced and distributed within the community. Other marketing and outreach campaigns are also under development to expand home weatherization activities by Poultney residents.

NeighborWorks does not have home weatherization professionals on staff. They maintain a listing and provide referrals to homeowners considering participating in their loan program. However, NeighborWorks staff work closely with regional home performance contracts and uses the results from their home energy audits to develop the scope of a potential project and define the necessary financing. In essence, they are creating a market for home performance contractors and thus stimulating new job opportunities in the field creating a larger qualified pool of contractors trained to do this kind of work.

IV. Conclusions and Next Steps

Home weatherization has been proven to be an effective way to reduce energy costs for home heating. National studies suggest that energy use for home heating can be reduced by 30 percent or more using sophisticated diagnostic equipment and state-of-the art weatherization techniques. However, each home is different and the specific energy savings may vary from project to project. Historically, the federal government has focused on helping low-income households reduce their energy use through the large Weatherization Assistance Program administered through the U.S. Department of Energy. The current administration is committed to expanding home weatherization adoption nationwide. Quite literally, the opportunity to reduce energy use for home heating is endless.

Significant barriers exist to widespread home weatherization particularly among middle- and upper-income households, as the low-income sector is addressed through the long-standing Weatherization Assistance Program of the U.S. Department of Energy. Households often lack knowledge about the benefits of home weatherization or are uncertain about how much they could save given a certain weatherization investment. Furthermore, a lack of financing can also create a barrier given that a comprehensive weatherization project can cost several thousands of dollars. The Poultney Community Weatherization Initiative is a small project in Vermont to try and address these specific barriers. In addition, the projects seeks to demonstrate how GIS mapping can serve as a valuable planning tool to identify the age of a community's building stock by neighborhood to help target home weatherization outreach to those homeowners that could benefit the most. This initiative will continue for several years collecting additional data on fuel oil use for existing case studies, and developing a number of new case studies. In addition, community outreach and education initiatives will be developed to increase the number of middle- and upper weatherization adoption in Poultney and Rutland County.

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