Studies Verify Approach to Energy Behavior Change

The inspiration behind the Heat Smart Study.

Heat Smart is an initiative of Northwest Woolen Mills, America's largest industrial woolen blanket manufacturer.

In 2005, a news story from the U.S. Department of Energy (DOE) reported that a household can save up to ten percent each year on heating and cooling bills by turning back the thermostat seven to ten degrees Fahrenheit for eight hours a day.[1]

Recommended action	Potential savings (as a percentage of utility bills)	Average annual savings in $ (based on EIA average end-use expenditures*; actual savings will vary)
Turn back your thermostat 7°-10°F for 8 hours a day	Up to 10% annually on heating and cooling bills	$83

At the same time, a dramatic spike in heating costs had everyone looking for answers. Many low-income households didn't have the warm blankets needed to feel comfortable sleeping in lower temperatures. Sam Brickle, Chairman of Hyman Brickle & Son, the parent company of Northwest Woolen Mills, had the idea to offer quality blankets at a low price to heat assistance programs for distribution to heat insecure families. Their blankets, made of a quality wool blend with a stronger, tighter weave, would keep families warm while empowering them to turn their thermostats down to reduce energy use. Thus Heat Smart was born, evolving into a full kit including weatherstripping and energy education.

It's a simple idea with a potentially huge impact. The DOE reports that heating your home uses more energy, and costs more money, than any other system in your home -- typically making up about 42% of your utility bill.[2]

That's quite an impact for a family stuck in energy poverty. Heat Smart set out to demonstrate how it could change energy-use behavior to achieve savings and help tight budgets go further. Heat Smart conducted two studies that both substantiated the hypothesis: people used the Heat Smart Kits to empower them to do what the DOE recommended, while saving energy and money.

[1] https://energy.gov/energysaver/articles/how-much-can-you-really-save-energy-efficient-improvements
[2] https://energy.gov/energysaver/home-heating-systems

Why Wool?

It keeps you warmer. Wool is a natural and unique material that helps people in need stay warm without over-spending on energy.

- **Warmth:** The secret is that each wool fiber has thousands of tiny air pockets which, like insulation in a house, act as a buffer against heat and cold. The fibers naturally regulate temperature, keeping people warm when it's cool and cool when it's hot. In winter, a wool blanket keeps a layer of dry, insulating air next to the skin.

- **Naturally Fire Retardant:** Since wool naturally contains moisture, it is resistant to flame. The fabric is self-extinguishing and will not support combustion.

- **Durability:** A single wool fiber can be bent back on itself more than 20,000 times, giving a wool blanket exceptional resistance to tearing. The outer skin of wool also acts as a film, reducing wear from abrasion. This means blankets can be used for many years to come - an average of 25 years.

- **Absorbent:** Wool can absorb up to 30 percent of its weight in moisture without feeling damp. By absorbing perspiration, wool allows the body to generate heat faster than it is lost to the atmosphere, important for staying warm in the winter.

- **Green:** Wool is a renewable, constantly growing natural fiber and is biodegradable. What's more, sheep naturally graze invasive vegetation and create healthier landscapes compatible with the environment.

Wool facts from the American Sheep Industry Association[3]
[3] http://www.sheepusa.org/ResearchEducation_Literature_AboutWool

Quality Counts.
As a part of Northwest Woolen Mills, Heat Smart can source a higher quality wool blend blanket more affordably, as well as capitalize on their logistics expertise. Heat Smart blankets keep people warmer than cheaper synthetics or cotton (see study participant feedback, page 9), so users are more empowered to turn the heat down at night, the behavior change needed to save energy.

Valerie G - Wilmington, NC: "The blankets were so warm I was able to turn the heat off completely some nights."

Behavior Change Case Study #1

With the DOE's 10% savings assertion top of mind, Heat Smart set out to illustrate that people would change their habits to save energy when they felt empowered to do so. The first case study ran from December 2014 - March 2015 in a mild climate region.

Challenge: Too many heat insecure households and not enough heat assistance funding, compounded by cheaper blankets that proved inadequate for overnight warmth.

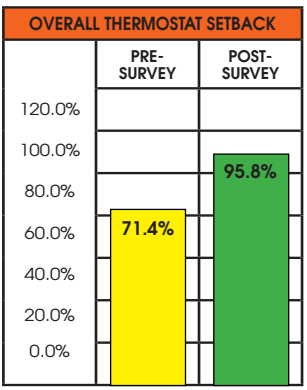
Solution: Empower low income families with the tools they need to change their energy behavior, stay warm and conserve energy. The cost-effective Heat Smart kit encompasses all those elements:

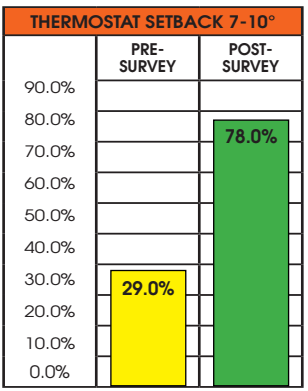
- Warmth – quality, low-cost woolen blankets so they can turn the heat down 7-8 degrees and save about 10% on their heating bill
- Conservation – weatherstripping to eliminate heat/cooling loss
- Education – energy tips for further savings.

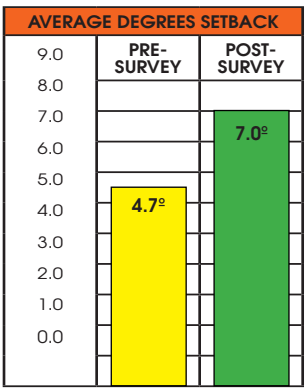
Methodology: Heat Smart worked in partnership with the North Carolina Community Action Association and I-Care, a community action agency in Statesville, NC, to identify 32 low-income households with electric heat to participate in the voluntary study. Participants signed a pledge to turn the heat down each night and use the blankets to stay warm. Heat Smart conducted pre- and post-study surveys to determine changes in energy behavior, attitudes, and awareness over the course of the case study. Two heat turn-down reminders were sent to participants intermittently.

Result: The behavioral surveys revealed Heat Smart was able to encourage positive energy-saving behavior changes, as reported by program participants.

- 95.8% of respondents reported turning their heat down at night, an increase of 24%, a big change in behavior over a 14-week case study.
- 49% more reported they turned the thermostat back 7 to 10 degrees (an increase from 29% to 78%)
- Respondents reported an average turndown of 7.9 degrees, compared to 4.7 degrees before the study.
- 91.7% of survey respondents reported saving on their energy bills, some as much as $20 per month, a large amount for a warm climate.
- 41% reported an increased knowledge of energy saving tactics.
- 87.5% of households reported using the weatherstripping provided as part of the Heat Smart kit.
- 96% indicated they would continue to use the kit and keep the heat down at night.
- Observed energy savings tracked with self-reported behavior changes.







Behavior Change Case Study #2

With Heat Smart's initially promising results, another study was conducted with a larger group for a full winter heating season, October 2015 - June 2016. With North Carolina community action partnerships in place, Heat Smart worked within the same mild climate area.

Challenge: To replicate the successful behavior change measured in the first case study with more rigorous study.

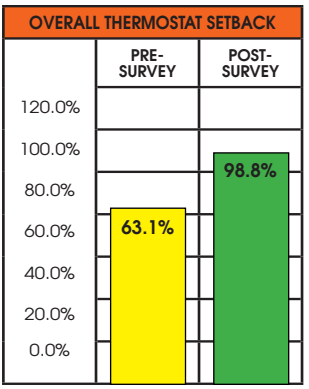
Solution: Solicit a larger pool of participants to create a larger sample size. Keep other program elements the same by providing:

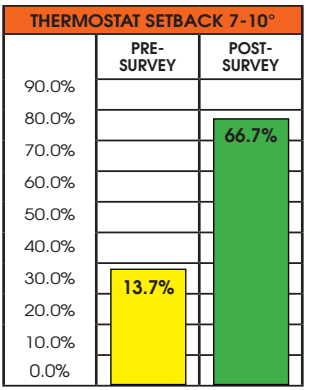
- Warmth – quality, low-cost woolen blankets so they can turn the heat down 7-8 degrees and save about 10% on their heating bill
- Conservation – weatherstripping to eliminate heat/cooling loss
- Education – energy tips for further savings.

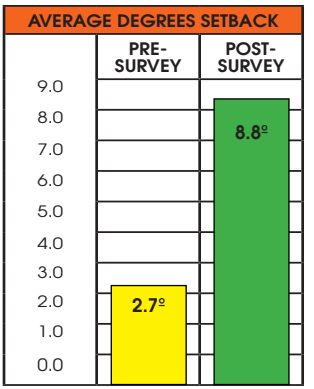
Methodology: Heat Smart again worked with the area's community action agencies to identify and recruit 130 low-income households using electric heat to participate in the voluntary study. To encourage and measure the behavior changes the study was looking for, Heat Smart sent two surveys: before the study to establish a baseline and end of study to determine degree of change. Three heat turn-down reminders were sent to participants intermittently.

Result: The behavioral surveys revealed the Heat Smart kits again encouraged positive energy-saving behavior changes, demonstrating real progress toward their end goal of helping low income households save money and reduce overall energy demand.

- After the study, 98.8% reported they now turn down their thermostats at night, an increase of 35.7% from Pre-Survey measurements.
- 53% more respondents indicated a thermostat set back of 7-10 degrees, an increase from 13.7% to 66.7%.
- Respondents reported they increased their thermostat setback an average of 8.8 degrees (an average setback of 6.1 more degrees each night).
- 95.2% of the families reported using the weatherstripping provided.
- Awareness of energy savings potential increased 55.7% - from 36.5% to 92.2%.
- At the end of the study, 98.8% of respondents reported saving on their energy bills.
- Observed energy savings once again tracked with the self-reported behavior changes.





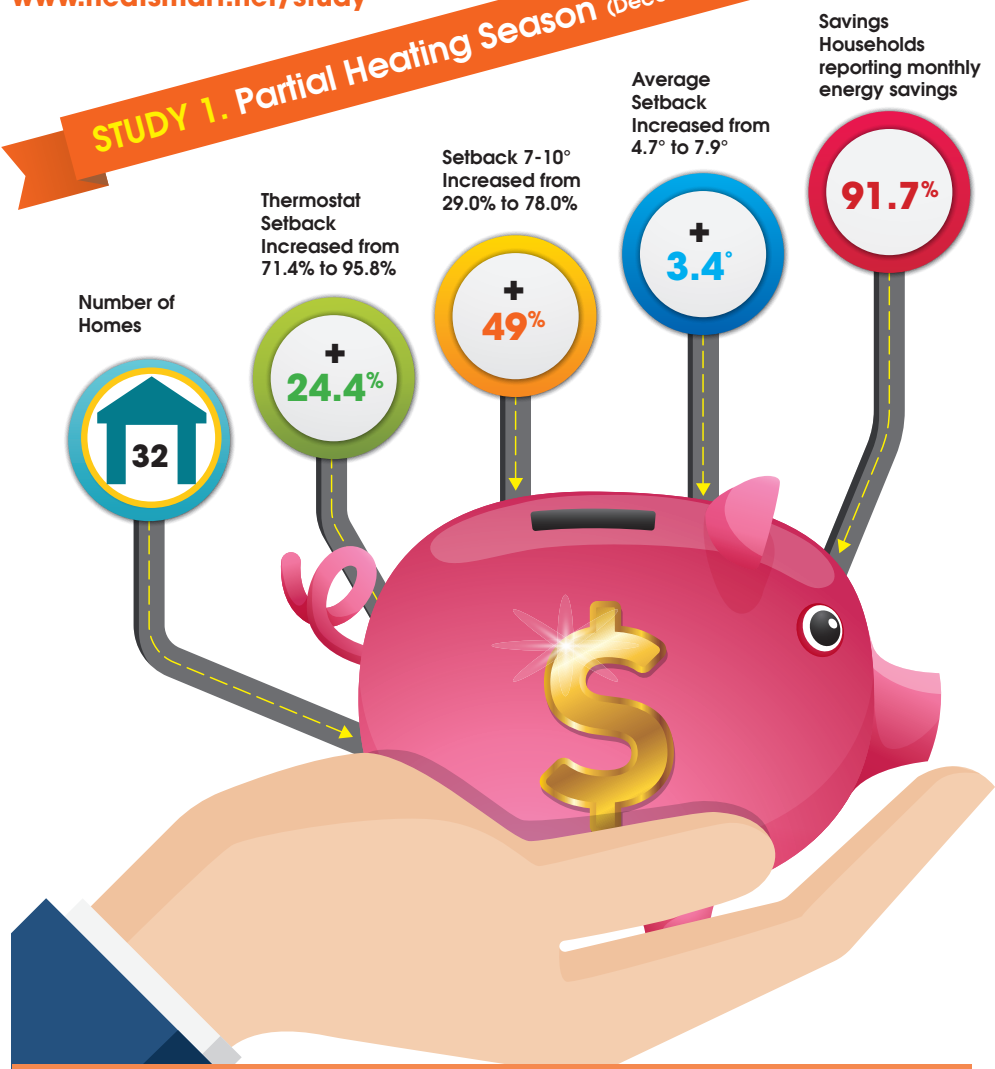


Behavior Study – Results At a Glance

The DOE reports a household can save up to 10% on heating and cooling energy bills by turning back the thermostat 7° to 10° F. Two behavior change studies demonstrated that Heat Smart Kits empower low-income households to turn the heat down and stay warm too, as reported by the participants.

For more copies, download at www.heatsmart.net/study

STUDY 1. Partial Heating Season (December 2014 - March 2015)



Roberta W - Mooresville, NC: "Because we had the blankets, we turned the heat down to 65, and saved probably $20 on the monthly electric bill. The weatherstripping helped tremendously. And I know more about energy savings than I did before."

Behavior Study – Results At a Glance

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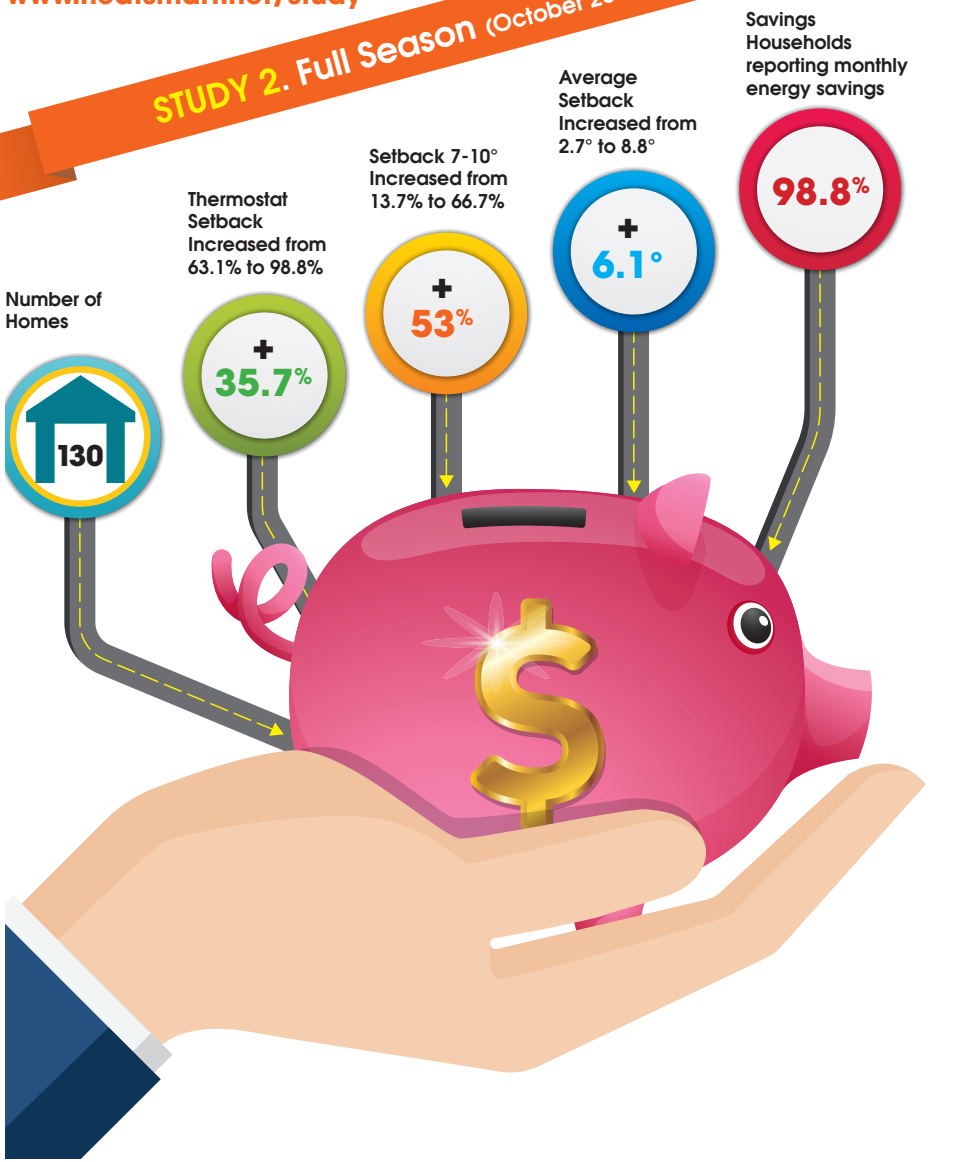
STUDY 2. Full Season (October 2015 - June 2016)



Behavior Study Conclusions

1. In both case studies, Heat Smart Kits proved to be an effective tool in empowering the behavior change needed for families to follow Department Of Energy recommendations.

2. Participants in both studies reported using the tools provided, turning down their thermostats at night, staying warm, and saving on their energy bills.

3. Increases were seen in both the number of households turning down their thermostats, and in the actual degree setback.

4. Actual energy use review showed increased savings that tracked with and supported the self-reported behavior change.

Additional Setback Studies

As Heat Smart discovered, many factors can influence how much energy is saved through thermostat setbacks, including:

- Climate
- Temperature difference between inside and out
- The home's thermal mass
- Electric resistance heat strip
- Efficiency of heating and cooling equipment

Fortunately, other groups have been studying the same basic questions: Do thermostat setbacks save energy? Many other scientific studies have reached the same conclusion.

Dr. Allison Bailes, III, Ph.D. who writes the Energy Vanguard blog, reported on a series of eight studies in the northeast U.S. (1998 through 2008).
The percent savings range from 5.0% to 8.2% - significant for any budget.[4]

Thermostat Setback Study Results			
Year	**# Homes**	**Savings**	**% Savings**
1998	603	81	5.0%
1999	689	71	5.9%
2001	1092	79	5.2%
2003	1081	81	6.2%
2005	576	137	6.9%
2006	387	162	8.2%
2008	189	145	7.2%
2007	415	–	6.8%

[4] http://www.energyvanguard.com/blog/50152/If-You-Think-Thermostat-Setbacks-Don-t-Save-Energy-You-re-Wrong

Real people, real savings.

How Heat Smart Helped - Here's what study participants said:

Annie B. - Iron Station, NC
"It helped lower my electric bill. Before I had thin cotton blankets. These blankets kept me warm. I used the weatherstripping around the air conditioner too, that helped."

What she liked most: "The warm, cuddly feel of the blankets."

Gladys K. – Crouse, NC
"I turned down my thermostat by 10 degrees and was able to really stay warm."

What she liked most: "Every month when they (the utility) sent my electric bill and showed the comparisons, my use was always way below my neighbors."

David H. -Fairmont, NC
"The blankets are warm and the weatherstripping helped with air around doors. We turned the heat down to 64 at night."

What he liked most: "Saving money, $10 to $20* each month."

Rosetta J. – Fairmont, NC
"The weatherstripping was real helpful. I had drafts all around my front door. The blankets were very comfortable too. I think I saved about 20% on my heating bills."

What she liked most: "Saving on my light bill. I will definitely do this again this winter."
What the savings meant to her: "I was able to pay other bills."

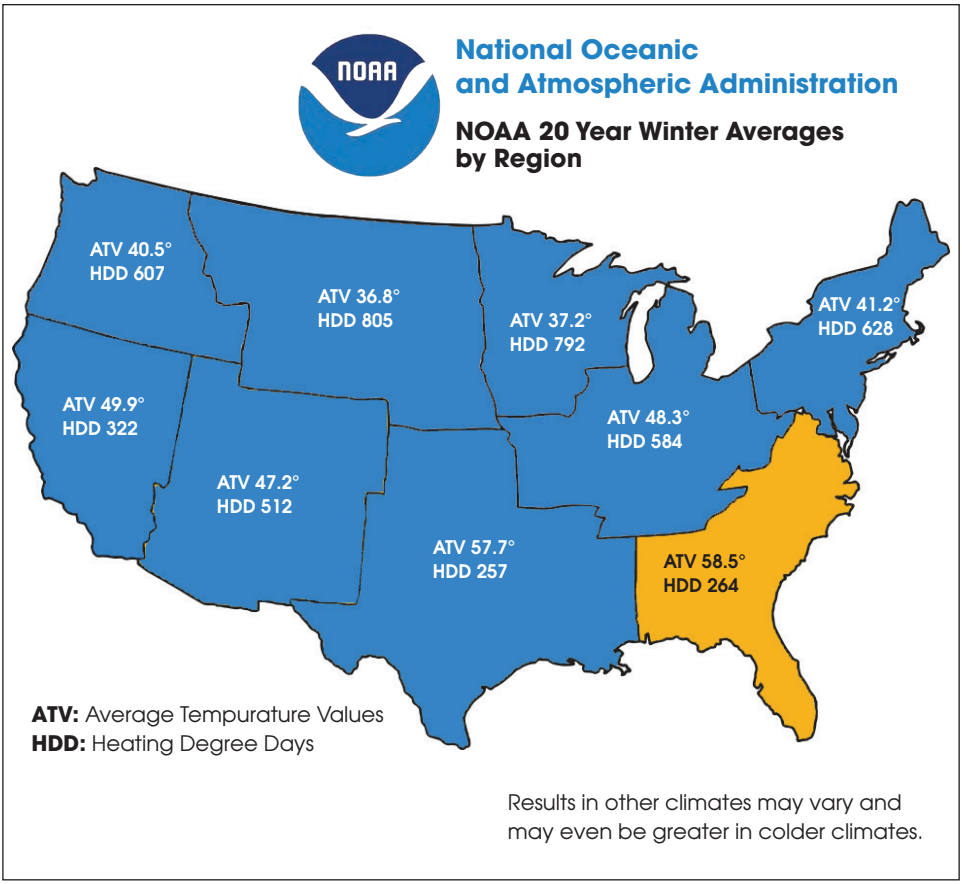
Valerie G. – Wilmington, NC
"The blankets were so warm I was able to turn the heat off completely some nights."

What she liked most: "Saving some money off my bill.
In all, I think I saved about $20 a month."
What the savings meant to her: "Now when my grandchildren need things, I can help them out. I have six grandchildren!"

Impact where you live.

Energy professionals rely on the National Oceanic and Atmospheric Administration's (NOAA) nine climate regions to help clarify their work. Because of Heat Smart's partnership with North Carolina based community action agencies, their studies were conducted in NOAA's Southeast region, the warmest region based on average temperatures, with the second fewest heating degree days.

Heating degree days are used to estimate energy requirements for heating. NOAA defines heating degree days as how much colder the mean temperature is than 65°F on any given day. For example, if a location experiences a mean temperature of 55°F on a certain day, there were 10 HDD (Heating Degree Days) that day because 65 - 55 = 10.



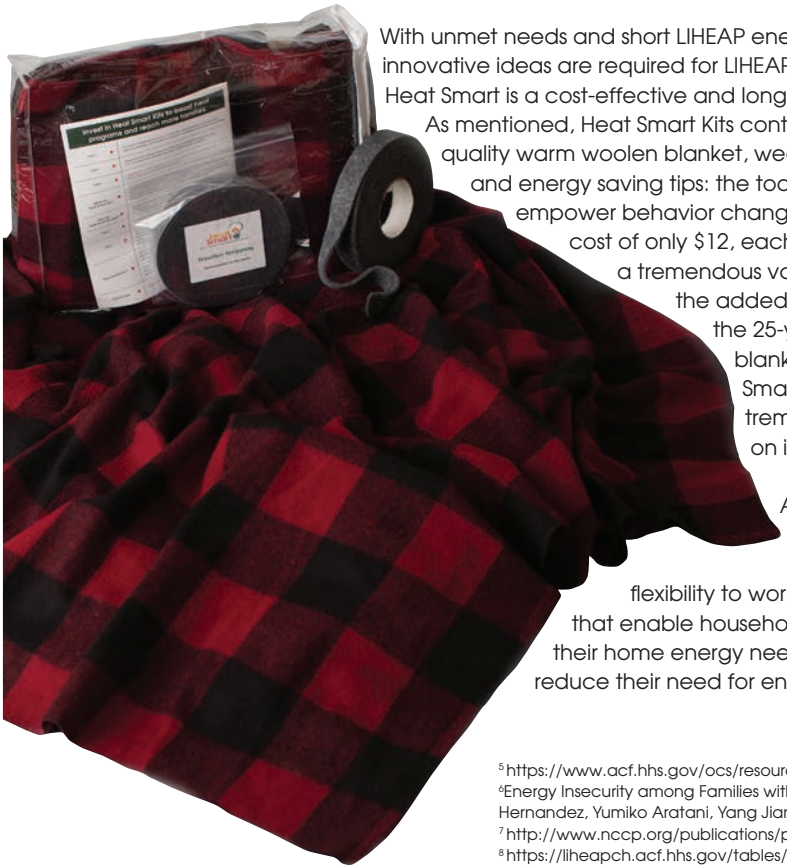
Gladys K - Crouse, NC: "I turned down my thermostat by 10 degrees and was able to stay really warm."

The need for heat assistance is large and growing.

Why is Heat Smart so passionate about this idea? Because only a fraction of low-income families who qualify for Low-Income Home Energy Assistance Program (LIHEAP) assistance actually receive it.

LIHEAP assistance is available for low-income households using electricity, natural gas, wood, or propane to heat their homes. The program begins in January each year, and assistance is given until the funds available are depleted. All 50 states, the District of Columbia, five U.S. territories, and over 150 tribes and tribal organizations receive LIHEAP grants each year. In FY 2015, an estimated 6.0 million households received assistance with heating costs through LIHEAP.[5]

Similarly, according to a brief from the National Center for Children in Poverty[6], of the estimated 10-15 million U.S. homes eligible for LIHEAP benefits in 2012, a mere 5.5 million were served. Many others never applied for benefits despite eligibility, due in large part to lack of awareness of the program, masking an even greater need. To compound matters, energy-related coping strategies could potentially compromise the quality of the home environment and have negative health consequences.[7]



With unmet needs and short LIHEAP energy funds, innovative ideas are required for LIHEAP families. Heat Smart is a cost-effective and long-term solution. As mentioned, Heat Smart Kits contain a high quality warm woolen blanket, weatherstripping and energy saving tips: the tools needed to empower behavior change. With a base cost of only $12, each kit presents a tremendous value. Consider the added savings over the 25-year life of the blanket and Heat Smart presents a tremendous return on investment.

Additionally, LIHEAP programs have flexibility to work with programs that enable households to reduce their home energy needs, and thereby reduce their need for energy assistance.[8]

[5] https://www.acf.hhs.gov/ocs/resource/liheap-fact-sheet-0
[6] Energy Insecurity among Families with Children," Diana Hernandez, Yumiko Aratani, Yang Jiang, January 2014.
[7] http://www.nccp.org/publications/pub_1086.html
[8] https://liheapch.acf.hhs.gov/tables/FY2016/A16.htm

The Conclusion:

The Heat Smart kit empowered more people to turn their heat down by more degrees while staying comfortably warm and saving energy, as the DOE recommended. Participants enthusiastically agreed (see page 9) with the basic premise-warmth doesn't have to come from electricity, gas, or oil. What's more, energy savings programs for low-income households don't need to be expensive and they don't require sophisticated technology or gizmos.

The warmth and comfort provided by the Heat Smart Kit inexpensively motivates behavior change to lower heating bills while helping more low-income families stay warm. The result: reduced energy demand, more cost-effective heat assistance programs and more easily achieved outreach goals.

Heat Smart

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