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COLD CLIMATE HOUSING  
RESEARCH CENTER

# Home Energy Rebate Program IMPACTS REPORT

## ALASKA STATE INVESTMENT

**\$242.6** MILLION into the Home Energy Rebate Program has had the following effects:

### STIMULATED

**\$142.2**  
MILLION



in private  
investments for  
home retrofits

The creation of  
an estimated



**6,789**  
annual jobs

**\$912.5**  
MILLION



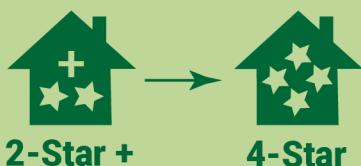
in Direct, Indirect,  
and Induced  
economic impacts

### IMPROVED

Energy efficiency of

**26,587**  
participating  
homes

Average energy rating of  
participating homes from



2-Star +

4-Star

Indoor air quality and  
comfort



leading to many reports  
of better health and  
quality of life

### REDUCED

Total residential  
energy costs\* by

**\$261**  
MILLION



Total residential  
energy use\* by



**115.4**  
MILLION  
gallons of oil  
(equivalent)

Alaska's greenhouse  
gas emissions\* by

**3.2**  
BILLION  
lbs of CO<sub>2</sub>

Average energy use of  
participating households by



\* These reductions are cumulative estimates for the period of 2008 to 2018.

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# Home Energy Rebate Program IMPACTS REPORT

Oil prices spiked in 2007 and 2008, peaking at \$145.31 per barrel on July 3, 2008.<sup>1</sup> While this meant significant additional revenue for the State of Alaska, it also put a large energy cost burden on households, especially in communities where oil is the primary heating fuel and electricity is produced by diesel-fired generators. Alaska's cold climate leads to significantly higher energy use for home heating, with the average single-family home using approximately twice the energy per year as the average home in other "cold" climate regions of the U.S.<sup>2</sup> This high energy consumption and reliance on fuel oil leads to a higher energy cost-burden for households throughout the state, particularly in rural regions where energy spending was as much as four times higher than the national average even with the relatively low oil prices of 2016.<sup>3</sup>

In response to this increased energy cost burden on households, the State of Alaska initially gave relief to Alaskans through a direct payment to everyone who was registered to receive a dividend in 2007. The Alaska Legislature provided longer-term relief to residents in 2008 by providing \$300 million in funding to expand Alaska Housing Finance Corporation's (AHFC) Weatherization Assistance program and establish the Home Energy Rebate program. Success of the programs led to additional funding for AHFC from the legislature, totaling \$579 million from fiscal years 2008 to 2018.<sup>4</sup>

Alaska Housing Finance Corporation was directed to use these funds to meet the legislative intent of the programs. During testimony, legislative sponsors indicated program intent for home energy efficiency

<sup>1</sup> Cushing, OK spot price from U.S. Energy Information Administration. Data available at: [https://www.eia.gov/dnav/pet/pet\\_pri\\_spt\\_s1\\_d.htm](https://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm)

<sup>2</sup> Madden, D., Wiltse, N. 2018 Alaska Housing Assessment. CCHRC for Alaska Housing Finance Corporation. 2018. Available at: <https://www.ahfc.us/efficiency/research-information-center/alaska-housing-assessment/2018-housing-assessment>

<sup>3</sup> Ibid.

<sup>4</sup> In nominal dollars

## KEY OBJECTIVES

- Reduce residential energy use
- Reduce energy costs
- Create jobs and stimulate the construction industry
- Improve home comfort and durability
- Reduce greenhouse gas and particulate matter emissions
- Improve quality of home life and alleviate home residents hardship

programs were to reduce home energy bills, create jobs, and increase affordability of home heating and electricity.<sup>5</sup> To that end, AHFC administrators outlined six primary program objectives including reduce residential energy use, reduce energy costs, create jobs and stimulate the construction industry, improve home comfort and durability, reduce greenhouse gas and particulate matter emissions, and improve quality of home life and alleviate home resident hardship.<sup>6</sup>

An additional objective for the Home Energy Rebate Program was to stimulate private investment in home retrofits.

This report evaluates the impacts of the Home Energy Rebate program on Alaskan residents, focusing on the progress made between 2008 and early 2018 in

<sup>5</sup> Alaska State Senate Finance Committee testimony (2008, March 12). Retrieved on January 25, 2019: [www.legis.state.ak.us/pdf/25/M/SFIN2008-03-121457.PDF](http://www.legis.state.ak.us/pdf/25/M/SFIN2008-03-121457.PDF)

<sup>6</sup> Personal communication with Research and Rural Development Staff, AHFC, 10/30/2018.



each objective outlined in the legislative intent.

## Program Description

The Home Energy Rebate program is an incentive program that targeted privately owned residential homes. The bulk of the program spending was for retrofitting existing homes, with a smaller part of the program devoted to incentivizing more efficient new construction. The smaller portion is referred to in this report as the New Home Rebate program.

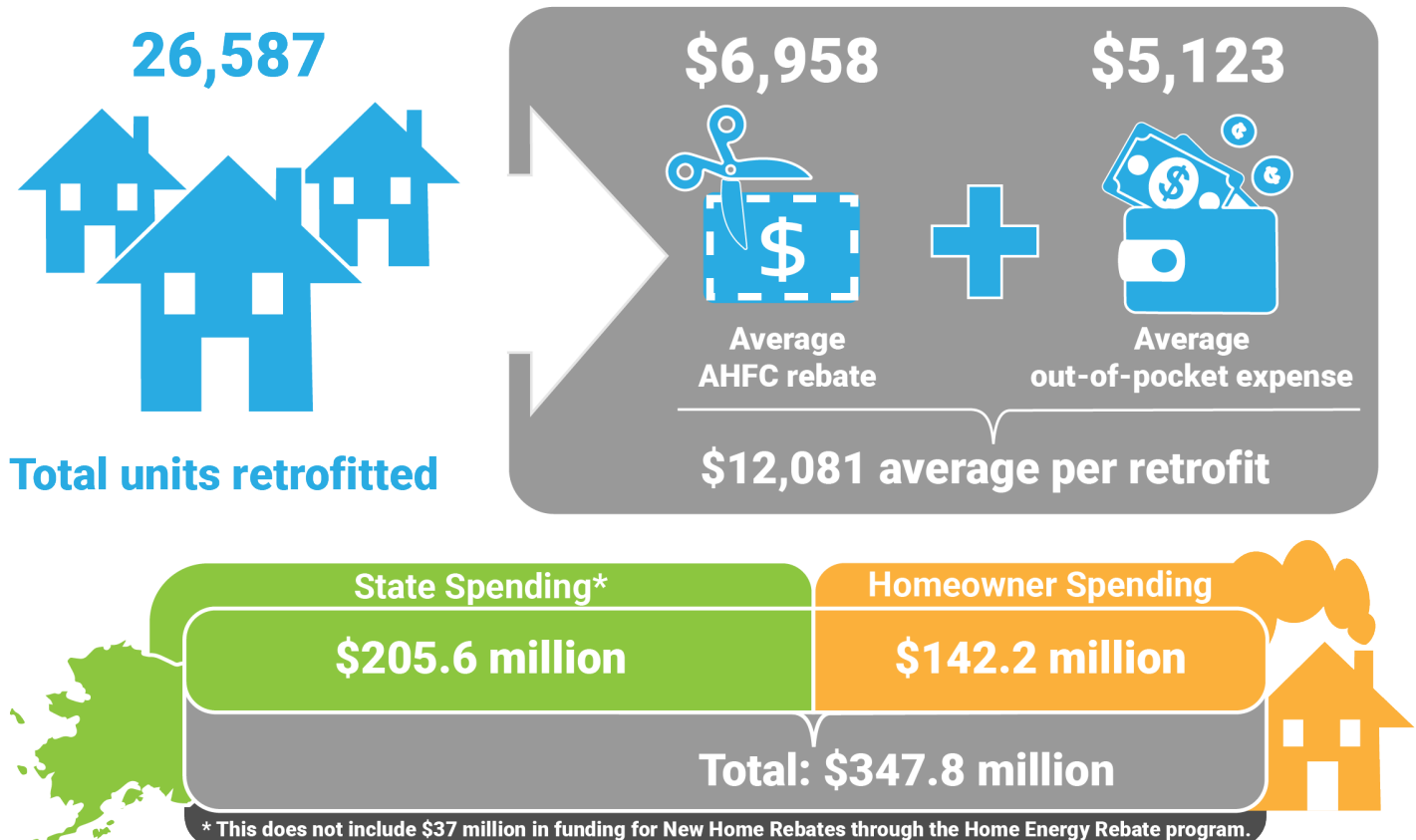
Homeowners who participated in the Home Energy Rebate program were eligible for up to \$10,000, depending on how much they improved the efficiency of their existing home. The rebate schedule is based on before (As-Is) testing and after (Post) results from energy audits conducted by AHFC-certified energy raters. The assessment by raters was standardized with the use of the AkWarm home energy rating

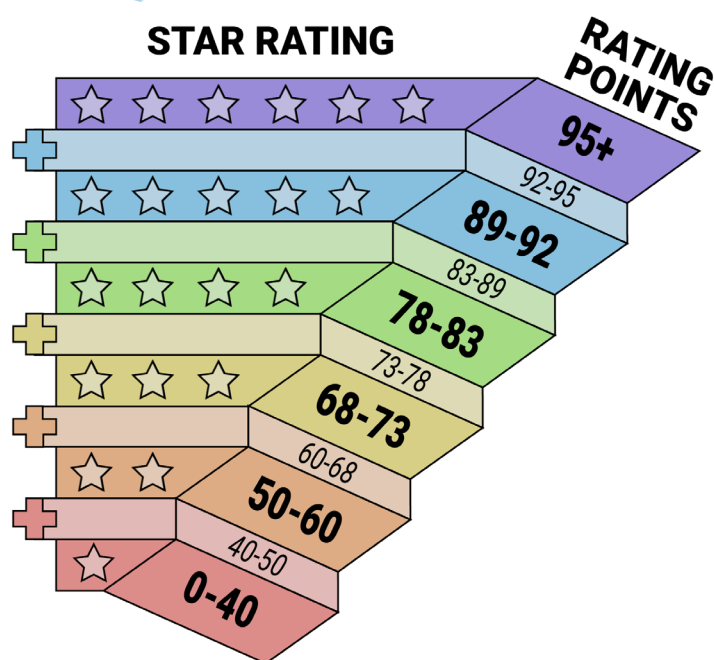
software that models residential energy efficiency. Improvements were targeted at reducing space heating and domestic hot water energy consumption.

The Home Energy Rebate program funded energy efficient retrofits on approximately 59 million square feet of residential space.

Using AkWarm, the star rating of a home is based on the number of points it receives, providing a consistent measure of the home's relative energy efficiency. Star ratings range from 1-star (0 to 40 points) to 6-star (95 to 100+ points), with half-star increments. Rebates were honored for improvements based on the number of half star levels improved, known as steps.

## How much has been invested in retrofits through the Home Energy Rebate Program between 2008 - 2018?





Builders were also incentivized to construct new homes to the greatest efficiency standards. Rebates between \$7,000 and \$10,000 were awarded to buyers for homes that were certified to meet the 5-star-plus and 6-star standards.

## Program Participation

The Home Energy Rebate program impacted a reported 45,967 homes as of 2018, or approximately 16 percent of occupied homes in Alaska. This number includes all homes with completed energy efficiency audits, both for retrofits and for new construction. The total completion rate of households participating in the retrofit program is approximately 63 percent. The majority completed an energy efficiency retrofit and homeowners received a rebate, with 26,587 documented completions. An additional 15,743 households received funding for an As-Is energy rating but did not complete the program and receive a rebate.

The average participant in the Home Energy Rebate program spent approximately \$12,081 on retrofitting their home to be more energy efficient, based on receipts submitted to AHFC. On average, these homeowners received a rebate of \$6,958.<sup>7</sup> This

<sup>7</sup> This figure includes the rebates for the As Is and Post energy ratings as well as the rebate for qualifying efficiency work

means that program participants paid an additional \$5,123 on average beyond the amount they were rebated.<sup>8</sup>

The remaining 3,637 households received a rebate for constructing a new home that met the 5-star-plus or 6-star energy rating as a part of the New Home Rebate program.

The Home Energy Rebate program had very high market penetration rate when one considers the number of households that qualified for the program and would be reasonably likely to participate. Our researchers estimate the total number of households that could reasonably be expected to participate to be approximately 89,800; this means that the 26,587 households that completed the program represent 30 percent of the population that could have taken part in the program. The 45,967 households that participated represent 51 percent of the population that could have taken part in the program.

<sup>8</sup> Based on receipts submitted to AHFC.

## Inflation-adjusted dollars

All dollar amounts reported in this document are adjusted to calendar-year 2018 values so that they can be compared to today's dollars. This was done using either the consumer-price index or the IMPLAN software.

Analysis of program participation assumed households that qualified for Weatherization would not participate in the Home Energy Rebate program and that only owner-occupied homes be considered eligible.<sup>9</sup>

## Energy Use Reduction

The Home Energy Rebate program has had a tremendous impact on residential energy consumption in Alaska. Our researchers estimate that annual residential energy usage has decreased by an estimated 2.6 trillion BTUs, equivalent to the

<sup>9</sup> Analysis used U.S. Census Bureau's Public Use Microdata Sample.



"The most common remark from homeowners was that they wish they had started doing these energy improvements years ago."

—Rich Owens,  
Energy Rater, Residential Energy Designs

energy in 19.2 million gallons of fuel oil, as a direct result of energy efficiency retrofits incentivized by the program. Figure 1 shows this energy savings over time. An estimated 15.7 trillion BTUs, equivalent to the energy in 115.4 million gallons of fuel oil, were saved over the 10 year life of the program.

With the implemented energy efficiency retrofit measures having a savings-weighted average life of approximately 21 years,<sup>10</sup> the lasting impact of the Home Energy Rebate Program would be the avoided consumption of a total of 54.8 trillion BTUs, or approximately 402.9 million gallons of fuel oil.

To put the energy savings in context of an individual, the average Alaska household consumed approximately 297 million BTUs or 2,184 gallons of heating oil equivalent identified by their As-Is rating. Households that participated in the Home Energy Rebate program and received a Post rating reduced their annual energy consumption to approximately 197 million BTUs, or 1,449 gallons of heating oil equivalent for a 99.9 million BTU / 735 gallon per year savings. This represents a 34 percent reduction in household energy consumption. The Southeast region had the largest percentage reduction with completing households realizing a 37 percent energy use reduction on average, and households in the Municipality of Anchorage had the largest absolute reduction, saving an average of 113 million BTUs, or 831 gallons of heating oil equivalent per year.

A home's energy efficiency is often reported using its Energy Use Intensity (EUI). EUI is a measure of total annual energy used in a building per square foot of living space. The EUI of a home in the Home Energy

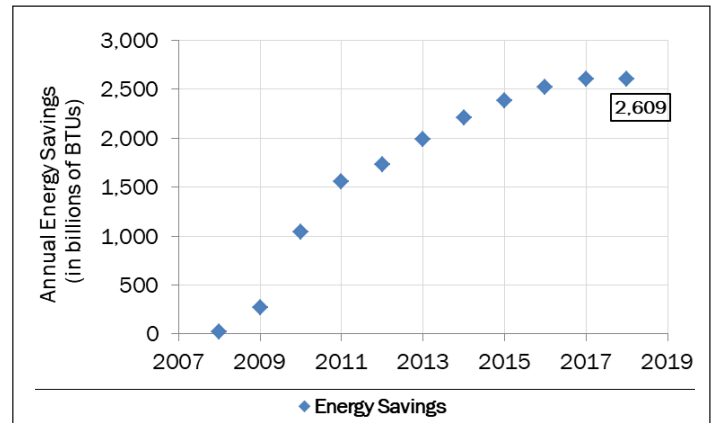


Figure 1: Annual energy savings from the Home Energy Rebate program

Rebate program has a generally linear relationship with the home's star rating. Figure 2 highlights the range with the average 1-star home in the program using nearly five times the annual energy as a 6-star home. Most homes that completed the program improved by an average of three steps, or 1 ½ stars.

## Energy Cost Savings

The Home Energy Rebate program has impacted residential energy cost savings in Alaska. Our researchers estimate that after accounting for annual price fluctuations, the annual homeowner energy costs have decreased by \$36.4 million as a direct result of energy efficiency measures incentivized by the program. An estimated \$261 million in energy costs were avoided since the program started in 2008.

The implemented energy efficiency retrofit measures were estimated to have an average life of approximately 21 years.<sup>11</sup> Using this metric, the lasting impact of the Home Energy Rebate program will have a net present value of \$632.5 million in avoided energy costs, or \$389.9 million more than the state has invested in today's dollars.

To put energy cost savings in the context of an individual, the average household at the start of

<sup>10</sup> The average life of energy efficiency retrofit measures was weighted by the energy savings of measures per home, and then averaged across records of all homes resulting in an average energy efficiency measure estimate life.

<sup>11</sup> The average life of energy efficiency retrofit measures was weighted by the energy savings of measures per home, and then averaged across records of all homes resulting in an average energy efficiency retrofit measure estimated life.



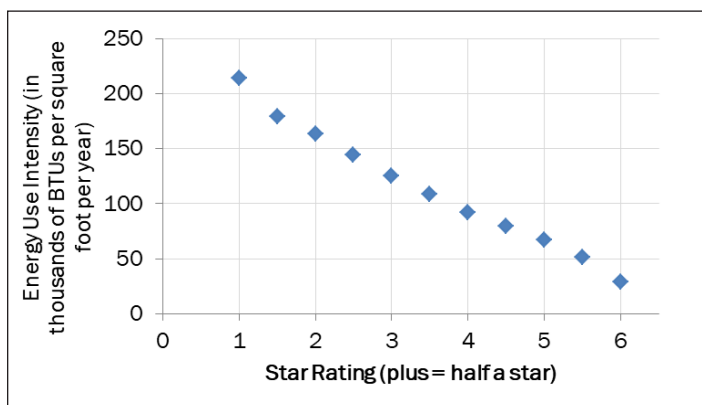


Figure 2: The Average energy use intensity (BTUs per square feet) of homes in the Home Energy Rebate program at different star ratings.

the program paid \$5,480 in energy costs annually. Homeowners that completed the Home Energy Rebate program reduced their annual energy costs to approximately \$4,091, a savings of \$1,389. This represents a 25 percent reduction in household energy costs. As different fuels have different costs, energy savings as a percent differs from energy cost savings. The Bering Straits and Southeast regions had the largest percentage reduction with completing households experiencing a 31 percent energy cost reduction on average. Households that were retrofit in the Bering Straits region had the largest absolute reduction saving an average of \$2,889 per year.

## Economic Impact

The Home Energy Rebate program had a demonstrable impact on the state economy. Our researchers estimate the total economic impact of the program between 2008 and 2018 to be \$912.5 million in 2018 dollars. This impact includes direct spending as well as indirect and induced effects.

Direct economic effects come from money spent both by the State of Alaska and by homeowners. From 2008 to 2018, \$242.6 million in state dollars were spent on the program. The vast majority of that was funneled to AHFC and then, upon proof of As-Is and Post ratings, rebates were paid directly to homeowners. This money was leveraged by the homeowner spending additionally on retrofits not reimbursed. A smaller portion of the state funding

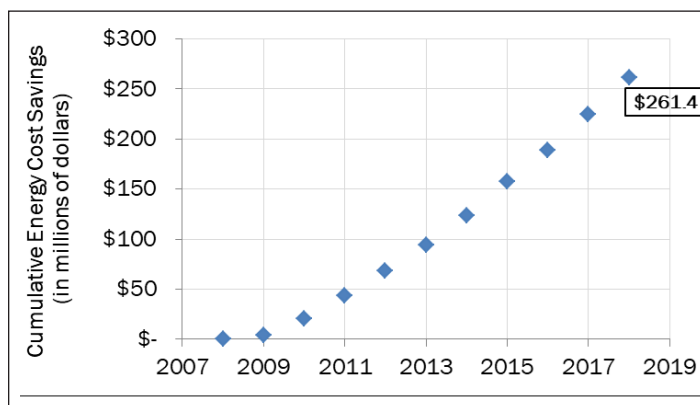


Figure 3: Cumulative energy cost savings from the Home Energy Rebate program

was paid to incentivize energy-efficient new homes.

Per reported receipts, homeowners spent an additional \$142.2 million beyond what they received in rebates. Altogether, this means that there was \$384.8 million directly spent on hiring contractors and energy raters as well as purchasing building materials, equipment, and tools.

The indirect effect on the economy from this direct spending is estimated at \$117.5 million. Indirect effects are those on industries that supply goods and services to the sector directly affected. In this case, it includes the impacts on businesses and people that supply materials to retrofit contractors, organizations that provide training to the retrofit industry, local insulation manufacturers, and other similar groups.

The induced effect from funds circulating through

"People appreciated that the program wasn't a give away. The state was using funds wisely; people had to put in their own effort to get the rebate, and they were happy that the raters gave them the tools to make the right choices."

—Rob Moss,  
Energy Rater, Wisdom and Associates, Inc.



## Home Energy Rebate Program Economic Impact (Millions)

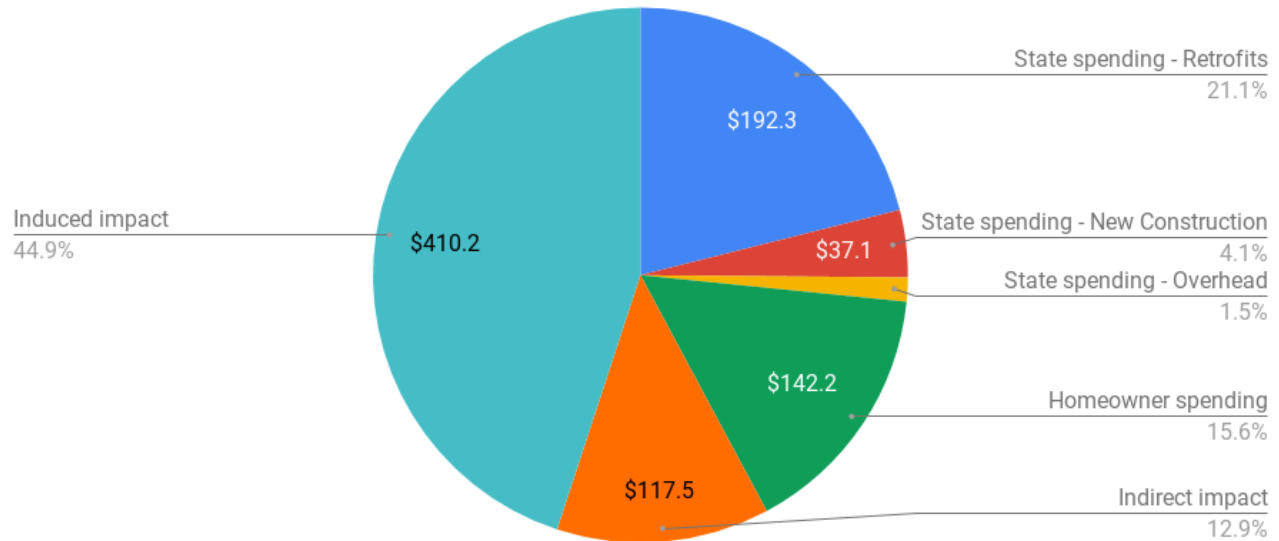


Figure 4: Total Economic Impact of the Home Energy Rebate Program

"It helped us to start a business overnight. There is no way we could have done that without that initial demand."

– Emmett Leffel  
Alaska Thermal Imaging, LLC

the economy is an additional estimated \$410.2 million. Induced effects are effects on the economy from income earned by affected industries. In this case, there are two main induced effects: increased income available to households because they are now spending less on energy each year, and increased income for those in the building industry from the retrofit spending.

The program impacted jobs in the state. Input-output modeling estimated that 6,789 annual jobs were created over the life of the program.<sup>12</sup> Many of these jobs are due to state spending and are thus temporary, but an estimated 192 permanent jobs were created due to the \$36.4 million in costs saved annually by households that participated. Induced job impacts are expected to continue over the life of the retrofit measures.

<sup>12</sup> An annual job is defined as one job for one year in the IMPLAN input/output economic model; thus if one person worked for five years doing retrofits it would be counted as five annual jobs. This is the same definition used by the U.S. Bureau of Labor Statistics and Bureau of Economic Analysis.

## Cost-effectiveness

The Home Energy Rebate program resulted in energy cost savings for homeowners. Total estimated energy cost savings from 2008 to 2018 for all 26,587 buildings retrofit is \$261.4 million, with an additional \$36.4 million saved annually. Cost-effectiveness from the homeowners' perspective was very high: on average homeowners are receiving an annual return of 26 percent on the money they invested beyond what was rebated to them. When considering both homeowner spending and state spending on energy efficiency retrofits, return on investment is estimated at 11 percent. Put another way, savings completely pay back the homeowners in approximately four years on average, and savings from the program's energy efficiency retrofit measures equal the money spent on them in approximately nine years.

Another way to consider the cost-effectiveness of the program is to compare costs for producing these energy savings to costs for using fossil fuels. This

Altogether, this means that there was \$384.8 million directly spent on hiring contractors and energy raters as well as purchasing building materials, equipment, and tools.



can be done by calculating the levelized cost of saved energy of the energy-efficiency program as a whole. “Levelized” in this case means that initial costs of the energy-efficiency programs are spread over the life of the energy savings.

Our researchers estimated average life of energy efficiency retrofit measures implemented in the Home Energy Rebate program at 21 years.<sup>13</sup> Using total annual energy savings and total costs of the program including participant spending, state fundings, and administrative overhead, the estimated levelized cost of saved energy is at \$8.65 per million BTUs. Thus the cost of saving energy through energy efficiency retrofits in the program instead of purchasing energy was equivalent to paying \$1.18 per gallon of fuel oil or \$0.87 per ccf of natural gas.

<sup>13</sup> The average life of energy efficiency retrofit measures was weighted by the energy savings of measures per home, and then averaged across records of all homes resulting in an average energy efficiency measure estimated life.

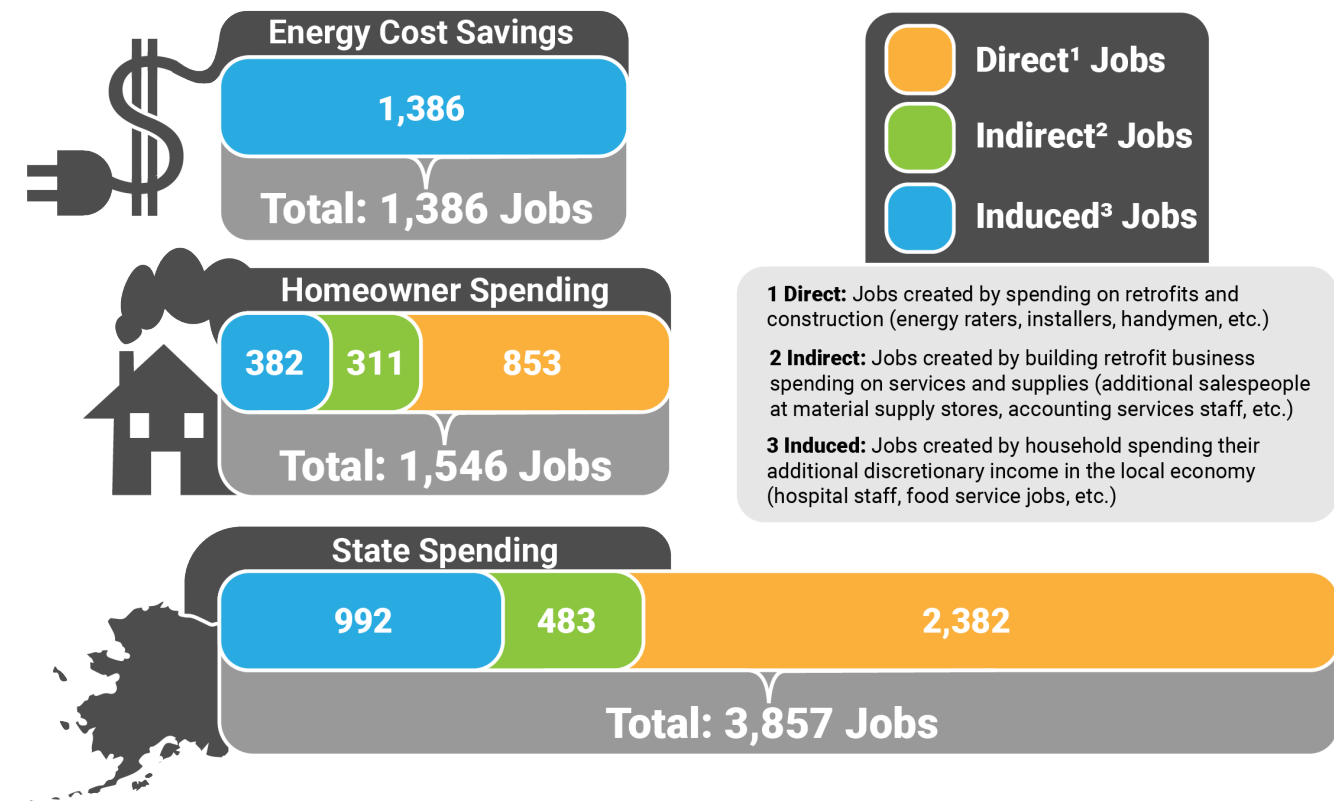
A life cycle cost analysis of the Home Energy Rebate program shows a savings-to-investment ratio of 1.8.<sup>14</sup> This means energy cost savings from the program will earn back nearly double the money spent on installing the efficiency retrofit measures over the course of their useful life.

## Home Efficiency

The Home Energy Rebate program had a positive impact on housing quality. The average home that received an As-Is rating was rated as 2-star-plus. Homes that were successfully retrofit through the program averaged a 4-star, an improvement of three steps. Average homes in some regions had higher starting and finishing points. For example the Calista and Cook Inlet regions (not including Anchorage), saw average improvements from 3-star to 4-star-plus.

<sup>14</sup> Using fuel escalation rates and a discount rate from “Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis. National Institute of Standards and Technology. U.S. Department of Commerce. Available at: <https://nvlpubs.nist.gov/nistpubs/jr/2018/NIST.IR.85-3273-33.pdf>

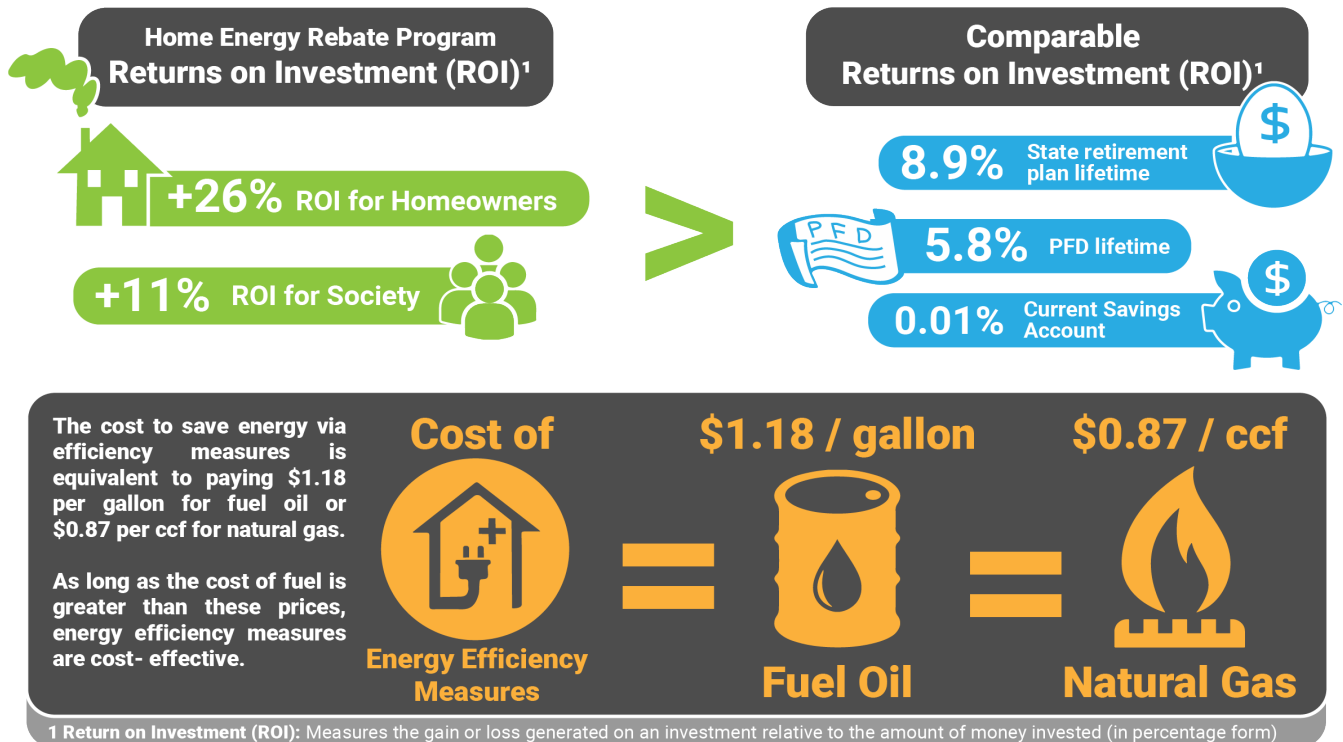
## 6,789 annual jobs have been created by the Home Energy Rebate Program between 2008 - 2018.







## What has been the cost-effectiveness of the Home Energy Rebate Program between 2008 - 2018?



### Time to Completion

Homeowners had 18 months to complete the Home Energy Rebate program once the As Is energy rating for their home was completed.<sup>15</sup> The average time from submitting the application to submitting paperwork requesting the rebate was 382 days, or a little less than 13 months. Distribution of completion times can be seen in Figure 5.

### Reducing Environmental Impact

The U.S. Energy Information Administration reports that the building sector is responsible for approximately 36 percent of the U.S. greenhouse gas emissions.<sup>16</sup> AkWarm energy rating software was used to calculate that the average home entering the Home Energy Rebate program produced 41,090 pounds of carbon dioxide (CO<sub>2</sub>), the most common greenhouse gas, per year. As a result of energy efficiency measures, homes that were retrofit through

the program reduced carbon dioxide emissions by an estimated 12,180 pounds per year, a 30 percent reduction.

Interior Alaska had homes with the greatest carbon dioxide emissions entering the program with an average of 62,060 pounds in the Fairbanks North Star Borough, and 54,170 pounds per home per year in the rest of the Doyon region. Participating households in the Fairbanks North Star Borough saw the largest absolute reduction with energy efficiency measures reducing 14,290 pounds of carbon dioxide per home per year on average. Southeast Alaska had the largest percentage carbon dioxide reduction at 44 percent.

Overall, the Home Energy Rebate program reduced residential carbon dioxide emissions by approximately 318 million pounds per year and is expected to avoid approximately 6.7 billion pounds of carbon dioxide emissions over the life of the energy efficiency measures.

<sup>15</sup> Time-limited extensions were granted for reasonable circumstances, including but not limited to: military deployments, seasonal work, pregnancy, or severe illness

<sup>16</sup> U.S. Energy-Related Carbon Dioxide Emissions, 2017. U.S. Energy Information Administration. Available at: <https://www.eia.gov/environment/emissions/carbon/>

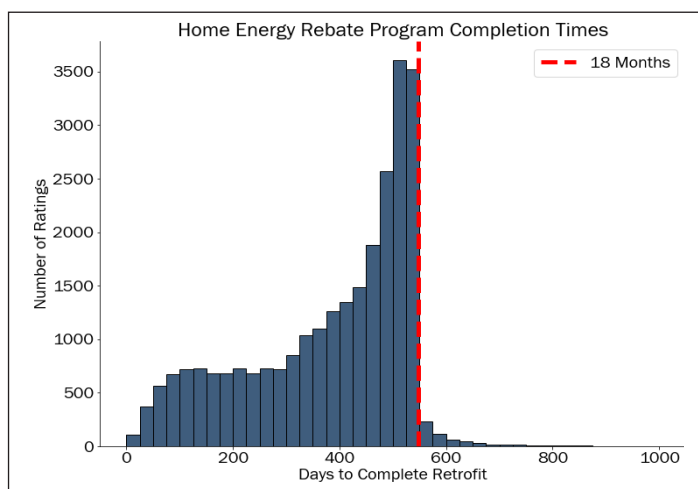


Figure 5: Frequency distribution of completion times for homes in the Home Energy Rebate program

### Improvements to Quality of Life

A desired outcome of the Home Energy Rebate program was to improve quality of home life and alleviate hardships. The Home Energy Rebate program demonstrably accomplished this with outcomes reported by improving participant health,

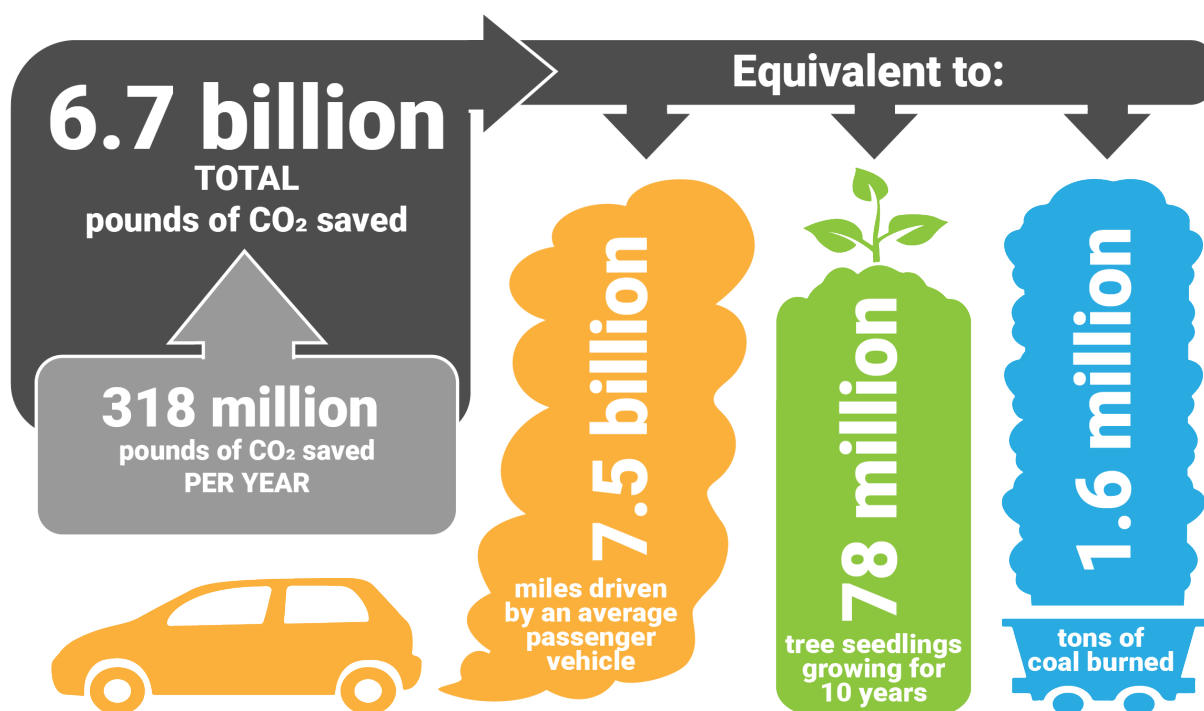
safety, and comfort. Interviews with home energy raters detailed many instances of significant comfort gains in homes, of health improvement from proper ventilation, and of lives saved from carbon monoxide poisoning. Key stakeholders report that people were overwhelmingly happy with the program.

### Health and safety benefits

A potential danger in homes is carbon monoxide. This colorless, odorless gas is produced during combustion of fuels and can enter homes through problems with heating and ventilation systems, or if vehicles are idling in attached garages. Energy raters are trained to identify and test for the presence of this gas. Carbon Monoxide can lead to significant health impacts at low levels and death at higher concentrations.

Energy raters related through interviews that many people improved their air quality by fixing moisture issues in crawl spaces, adding ventilation, and repairing heating systems. Raters also expressed that participants generally learned how to better

## How many pounds of CO<sub>2</sub> emissions have been saved by the Home Energy Rebate Program between 2008 - 2018?





## Key Stakeholder Interviews

Cold Climate Housing Research Center (CCHRC) conducted interviews with more than 50 key stakeholders to obtain qualitative data on the impacts of the Weatherization and Home Energy Rebate programs. Interviewees included Weatherization providers, energy raters, builders, suppliers, and others in the construction and retrofit industries. The following sections on Improvements to Quality of Life and Impact on Industries are largely based on this qualitative data, with quantitative data added where available.

maintain and operate their homes. Statewide, an estimated 56 percent of all occupied homes are at risk for moisture and air quality related issues due to inadequate ventilation.<sup>17</sup> Data from the Home Energy Rebate program shows nearly 4,300 of participating households installed new mechanical ventilation systems, which are expected to improve indoor air quality in those homes.

### Comfort and quality of life benefits

Interviews with energy raters highlighted improved comfort and quality of life for households participating in the Home Energy rebate program, particularly for those living in older homes. Increased insulation and heating system improvements often led to warmer, more comfortable homes.

Many participants increased air-tightness in their homes, which would make the houses less drafty. On average, homes that were retrofit in the program had their air-tightness increased by between two and three air changes per hour as measured by a blower door test.

### Impact on Industries

In interviews with private contractors, most report that they were able to support the Home Energy

"One particular home had an older lady that was on oxygen; after going through the Home Energy Rebate Program the indoor air quality was so improved that she actually was able to go off oxygen and she and her husband had a dramatically increased quality of life."

- Emmett Leffel,  
Alaska Thermal Imaging, LLC

Rebate program without needing to offer additional products or get additional training. Many did report taking part in AHFC's additional training opportunities and gaining benefit. From the perspective of those interviewed, most of the changes in their product and service offerings were driven by client demands. Those client demands were often attributable to homeowner education, training opportunities and the lure of a rebate.

### Heating Contractors and Suppliers

The Home Energy Rebate and Weatherization programs increased demand in the market for new

"I was doing an initial rating and when I arrived, the guy opened up the door and his complexion was bright, cherry red. I usually start off each rating with a twenty minute overview discussion; as we were sitting in the kitchen chatting, I noticed that I was starting to feel bad. I asked him where his carbon monoxide detectors were; he said, 'Oh those? I had to take them out because they kept going off.' It turns out his oil-fired boiler and water heater were exhausting their flue gases straight into the house. I fully believe he would have died within days if I hadn't been there to take immediate action and explain what needed to be done to fix it."

-Alex Twogood,  
Energy Rater, SkyFire Inspections

<sup>17</sup> Madden, D., Wiltse, N. 2018 Alaska Housing Assessment. CCHRC for Alaska Housing Finance Corporation. 2018. Available at: <https://www.ahfc.us/efficiency/research-information-center/alaska-housing-assessment/2018-housing-assessment>



heating and domestic hot water equipment, especially for higher efficiency appliances. In interviews with nine heating contractors and suppliers across Alaska, seven noted a significant increase in sales,

“The program absolutely had an impact. When I walked in for the post-rating I could tell if someone had done work on their crawlspace, as you could feel that the floor was warmer. There was a tremendous benefit comfort-wise for most clients.”

—Mark Houston

Energy Rater, The Comforts of Home, LLC

especially in Anchorage and Fairbanks. Ferguson Supply of Anchorage and Moore heating reported significant growth in their sales during the program. Scott’s Heating communicated that it was able to support five families on the additional work, where now there is only enough for two.

Contractors and suppliers report an industry shift to high efficiency and sealed combustion direct vent appliances, which was an impact to the building industry proffered by the program. Interviewees mentioned that homeowners are educated now and ask for high efficiency, properly sized equipment.

### Private Insulation and Retrofit Contractors

In interviews with private insulation and retrofit contractors, those who were already involved in insulation and weatherization work seemed to benefit most from Home Energy Rebate program business. Companies reported growing the size of their business and there were reports of retrofit contractors getting jobs in new construction and even big commercial contracts from happy customers because of Home Energy Rebate program jobs. General contractors and handy people who reported the most benefit also reported taking the greatest opportunity to participate in training programs offered by AHFC and other weatherization and building science agencies.

### Home Energy Raters

Home energy raters noted that the Home Energy Rebate program supported small businesses for energy raters, builders, and contractors. Many raters

### Air-Tightness, Ventilation & Indoor Air Quality

On average, people spend an estimated 87% of their time indoors, which makes fresh, clean air important for health and quality of life.<sup>1</sup> Indoor air pollutants are estimated to cause damage to human health that is in the range of damage caused by motor vehicle accidents and heart disease.<sup>2</sup>

Historically, air entered homes primarily through leaky construction. Air leaks not only cause homes to be drafty and uncomfortable, but they also increase energy costs and allow moisture to penetrate into the structure of the home, reducing building durability. Uncontrolled air leakage also allowed air from crawl spaces, garages, and other pollutant-rich areas to enter the home. Modern homes are built to be relatively air-tight and then have a controlled amount of fresh air introduced into the building using a mechanical ventilation system. Interviews with energy raters and other stakeholders highlighted the improvements to indoor air quality from retrofitting homes to be more air-tight and to add in mechanical ventilation systems.

1 Klepeis, NE, et al. (2001). The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants. <https://www.ncbi.nlm.nih.gov/pubmed/11477521>. 2001 May-Jun;11(3):231-52.

2 Logue, J. M., Price, P. N., Sherman, M. H., & Singer, B. C. (2012). A method to estimate the chronic health impact of air pollutants in U.S. residences. *Environmental Health Perspectives*, 120, 2, 216-22.



"It changed the whole market, even for new homes. We seldom now sell anything less than 95% efficient; 90% or more of our sales are high efficiency equipment. There is always a learning curve on controls, etc. for the contractor. With the old equipment, you could do anything wrong and it would still run. But this was good for contractors too – gives them work to keep it running efficiently."

–Drew Clay,  
Ferguson Supply Anchorage Branch

"The Home Energy Rebate program has pushed the housing industry forward in Alaska. When I go to conferences outside of Alaska, like the National Association of Homebuilders, I realize that the average Alaska builder is way more knowledgeable about energy and building science issues than the average builder from other states. We have the best trained builders in the nation, on average."

–Terry Duszynski,  
Energy Rater, Duszynski & Associates

were able to work half- to full-time for the duration of the program.

Energy raters also reported there was increased knowledge about how to build, operate, and maintain homes in Alaska. These raters spent time in thousands of homes. They saw firsthand what problems were most common with different types of construction and shared their insights with builders, inspectors, code officials, and homeowners. This hands-on experience combined with training offered in conjunction with the Home Energy Rebate program has led to a higher level of knowledge in the building industry in Alaska.

### Suppliers

Suppliers with established weatherization-related programs or organization partnerships experienced market changes.

Market changes were largely in the form of sales volume. Demand for existing products increased or decreased with program funding. Suppliers reported that they felt negligible market pressure to provide different products. Interviewees reported that the end of the program has resulted in sales losses, predominantly in terms of sales volume of weatherization-related products.

### Builders

Interviewees reported that the Home Energy Rebate program was very popular with builders and others in the construction industry. Marketing among builders ranged from including the Home Energy Rebate program in existing advertising to promoting the program specifically.

The New Home Rebate and Home Energy Rebate program had a positive effect on business finances. Some builders felt that the program raised the standard of new homes in Alaska, from 4-star-plus to 5-star without requiring huge changes to their practices.

Builders had to take continuing education credits to maintain contractor licenses, so they didn't have to do any new training, although two interviewees said the program caused them to look for classes with energy efficiency topics to meet the requirement for continuing education.

"We have never backtracked. We still build the majority of our homes as 5 Star Plus."

–Sam Goldman,  
Realtor for Robert Yundt General Homes





## Conclusions

Overall the Home Energy Rebate program demonstrated economic and environmental impacts to the State of Alaska that are expected to continue. The program increased efficiency of homes and quality of life for many households, and contributed to the evolution of Alaska's building industry.

These impacts will continue to benefit the state over the life of the energy efficiency measures. Education and updated industry standards will likely continue to positively impact homeowners and the construction industry into the future.

"I felt that the whole program was a great thing for the state. For me personally, it was nice to have the energy ratings to quantify my efforts in remodeling a home. For my customers, I found that people felt their homes were warmer and they had noticeable energy savings. It was a really cool program. It helped all around - energy savings for homeowners, more money for builders, a boost to the construction economy. There was a lot of work getting done. I'm a big advocate of the program."

—Victor Banaszak,  
CEO VRB Construction

## KEY ACCOMPLISHMENTS

Over the course of 10 years, the Home Energy Rebate program cumulatively:

- Reduced residential energy use by the energy equivalent of 115.4 million gallons of fuel oil
- Reduced Alaskans' residential energy costs by \$261 million
- Provided an economic stimulus to the economy of an estimated \$912.5 million including direct, indirect, and induced impacts
- Reduced greenhouse gas emissions throughout the state by 3.2 billion pounds of CO<sub>2</sub>
- Incentivized \$142.2 million in private investment for home retrofits
- Created an estimated 6,789 annual jobs
- Improved the indoor air quality and comfort for many homes, which led to reports of better health and quality of life
- Improved the energy efficiency of 26,587 homes, on average moving them from a 2-star-plus energy rating to a 4-star energy rating, representing a 34% reduction in energy use