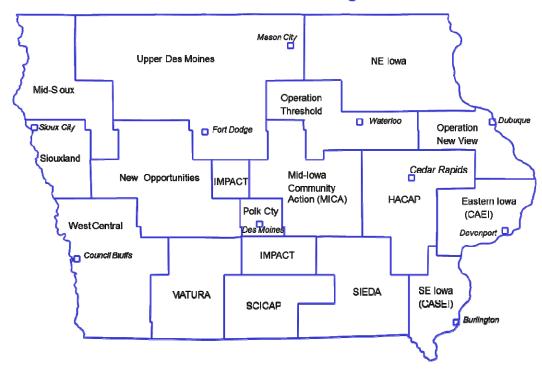
REPORT ON THE IMPACTS AND COSTS OF THE IOWA LOW-INCOME WEATHERIZATION PROGRAM -Calendar Year 2020

October 5, 2021

Iowa Local Weatherization Agencies



REPORT ON THE IMPACTS AND COSTS OF IOWA'S LOW-INCOME WEATHERIZATION PROGRAM Calendar Year 2020

October 5, 2021

Prepared for the

Iowa Statewide Low-Income Collaborative

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EXECUTIVE SUMMARY

This report summarizes the state and utility low-income weatherization program activity for low-income dwellings weatherized to completion in lowa during calendar year 2020 through the lowa Weatherization Assistance Program. The report includes state, utility, and agency summaries of spending and impacts by measure, end-use, and fuel type. The base data consists of statewide program tracking databases of spending and measure installations maintained by the lowa Division of Community Action Agencies. Fuel consumption histories were provided by the three co-funding utilities, including by Black Hills Energy, Interstate Power and Light Company, and MidAmerican Energy.

We estimated energy and coincident demand impacts for the program participants by using algorithms developed as part of the study of the calendar year 2007 program¹. The estimated impacts were adjusted using billing analysis of the program clients.

PROGRAM COSTS AND IMPACTS

The WAP program spent \$9,220,424 for materials, labor, and support while installing measures in 579 dwellings during calendar year (CY) 2020. Funding decreased by 37.7% from the prior year while completions declined by 47.0%. Federal and state funding accounted for 77.5% of overall expenditures while utilities funded the remaining 22.5%.

The major measures installed by the program were essentially unchanged from the previous year. The program expenditures for materials, labor, and support averaged \$15,925 compared to \$13,553 in the prior year (a 17.5% increase). The increased expenditures were largely attributed to new COVID 19 related expenditures -- costs would have increased by 5.6% absent the COVID 19 related expenditures.

First-year savings totaled 102,440 therms; 388,770 kWh electricity; 18,570 gallons of propane; and 292 gallons of fuel oil. First-year peak demand savings totaled 1,099 therms, 104 kW summer demand, and 118 kW winter demand.

Electricity savings averaged 671 kWh for 579 dwellings with electricity impacts. The program saved an average of 227 therms of natural gas for 452 dwellings with gas impacts. In addition, the program

¹ Dalhoff Associates, LLC. <u>Report on the Impacts and Costs of the Iowa Low-Income Weatherization Program – Calendar Year 2007, October 15, 2008.</u>

delivered first-year savings of 254 gallons of propane in 73 dwellings with propane impacts, and 146 gallons of fuel oil in 2 dwellings with fuel oil impacts.

First-year client energy cost savings totaled \$142,425, averaging \$246 per housing unit.

	Electr	icity (kWh and	lkW)	Natura	al Gas (the	rms)	Propane (gals)	Fuel Oil (gals)
	Overall	DCAA	Utility	Overall	DCAA	Utility	DCAA	DCAA
Energy	388,770	168,710	220,060	102,440	39,080	63,360	18,570	292
Summer Demand	104	43	60	NA	NA	NA	NA	NA
Winter Demand	118	51	67	1,099	412	687	NA	NA

Average Impacts¹ per Dwelling (for those receiving measures with a given fuel type)

	E	lectricity (kWh)	Natura	I Gas (the	erms)	Propane (gals)	Fuel Oil (gals)
	Overall	DCAA	Utility	Overall	DCAA	Utility	DCAA	DCAA
Energy	671	293	575	227	87	187	254	146
Summer Demand	0.179	0.075	0.157	NA	NA	NA	NA	NA
Winter Demand	0.204	0.089	0.174	2.4	0.9	2.0	NA	NA

Expenditures and First Year Client Fuel Bill Savings

Totals	Overall	DCAA	Utility	Averages	Overall	DCAA	Utility
Expenditures ²	\$9,220,424	\$7,145,395	\$2,075,029	Expenditures	\$15,925	\$12,341	\$4,738
Client Fuel Savings	\$142,425	\$73,451	\$68,974	Client Fuel Savings	\$246	\$127	\$157

Average impacts are for dwellings that received the measures, and so the averages of the Utility and DCAA will not total to the statewide average

UTILITY EXPENDITURES AND IMPACTS

Three major investor-owned gas and electric utilities co-fund the low-income weatherization program in lowa. These utilities, which include Alliant-IPL, MidAmerican Energy, and Black Hills Energy, contributed \$2,075,029, accounting for 22.5% of total program expenditures. The utility expenditures averaged \$4,738 for the 438 dwellings that received utility-funded measures.

Utility-funded measures saved a total of 220,060 kWh, averaging of 575 kWh of electricity for the 383 dwellings with utility-funded electricity measures. Utility funded measures also saved a total of 63,360 therms, averaging 187 therms for the 339 dwellings with utility-funded natural gas measures. Utility-funded measures reduced peak electricity demand by 60 kW in the summer and 67 kW in the winter, and provided 687 peak-day therms of gas savings. Utility-funded measures accounted for 57% of program electricity savings and 62% of program gas savings.

Utility-funded measures yielded first-year client bill savings of \$68,974, averaging \$157 per dwelling that received utility-funded efficiency measures. Electricity bill savings averaged \$66 per household for

² Measure expenditures, excludes utility admin expenses

utility-funded electricity measures. Gas bill savings averaged \$129 for those with utility-funded gas measures.

FUEL CONSUMPTION ANALYSIS RESULTS

Natural gas savings for single family site-built dwellings averaged 224 therms \pm 36 at 90% confidence. This represents a 22.7% savings \pm 3.2% at 90% confidence for natural gas measures. Mobile home savings averaged 189 therms \pm 107 at 90% confidence, equating to a 20.2% savings \pm 10.8%.

Electricity savings averaged 2,492 kWh \pm 3,639 for fifteen dwellings in our analysis with electric main heat (12.3% savings), and 617 kWh \pm 637 (6.4% savings) for 258 dwellings in our analysis that are heated with other fuels.

The observed impacts were used to adjust energy savings that had been previously estimated for each unit. The unit-specific energy savings for natural gas savings were estimated using measure-specific algorithms developed for the CY 2007 program, and then adjusted based upon a billing analysis of the weatherization clients. Electricity savings were estimated for all dwellings using measure-specific algorithms developed from savings of the 2005 and 2006 program. The algorithms were subsequently updated using a billing analysis of electricity impacts of the 2012 and 2013 programs. These measure-specific algorithms allow for custom estimates of impacts for each housing unit.

The observed unit-specific impacts from the billing analyses were compared to the unit-specific estimated impacts, providing a ratio of observed to estimated impacts. These ratios were used to adjust the estimated impacts of every unit.

CHANGES IN PROGRAM DELIVERY AND REPORTING

There were no significant changes in major shell and heating system measure delivery as compared to the previous year. Water heater replacements were funded by DCAA only during this period whereas in the past the utilities would fund some installations of this measure. Heat pump water heaters and ac replacements were added during the year though few were installed.

The COVID 19 pandemic triggered a pause in the program during the middle of 2020. Upon startup, additional costs for personal protective equipment (PPE) and support costs pertaining to the pandemic were added. Pandemic-related impacts to program implementation are discussed in a new sub-section entitled Program Impacts Related to COVID 19 at the end of Section 1 of the report.

The weatherization agency New View ceased operations on 10-1-2020.

Agency impact tables have been included in this report in Section 4 entitled Spending and Impact Profiles by Agency. Summary impacts and spending are provided for each weatherization agency.

Organization of the Report

Section 1: Summary of Program Impacts and Expenditures, provides the overall findings of the study, and relates these to prior year results. In addition, it provides broad summaries of impacts and costs for the agencies.

Section 2: Fuel Consumption Analysis and Assessment of Agency-Level Savings Adjustment Factors, details the methodology and results of the fuel consumption analysis. A standard comparison-adjusted pre/post weather-normalization methodology was used to assess impacts.

Section 3: Detailed Spending and Impact Profiles by Funding Entity provides detailed result tables for the overall program, state funding, and for each of the three funding utilities. These tables include counts of installations and totals and average energy savings, demand impacts, and program expenditures by measure.

Section 4: Spending and Impact Profiles by Agency provides aggregate totals of installations, spending, and energy and demand impacts.

Appendix A provides a characterization of households and dwellings weatherized during 2020.

Appendix B provides tabular data of selected charts in Section 1 of the report.

1. SUMMARY OF PROGRAM IMPACTS AND EXPENDITURES

This section begins with impacts and expenditures for the overall program, followed by results attributed to utility funding. Various agency-level results and measure-specific results are presented in the final part.

PROGRAM SAVINGS AND EXPENDITURES

A total of 579 dwelling units were weatherized to completion during calendar year (CY) 2020, compared to 1,092 in the prior program year. First-year savings totaled 102,439 therms; 388,770 kWh electricity; 18,570 gallons of propane; and 292 gallons of fuel oil. First-year peak demand savings totaled 1,099 peak-day therms, 104 kW summer demand, and 118 kW winter demand.

First year natural gas savings are shown for the past ten years, by major measure groups in Figure 1.1 (historical data is listed in Appendix B as Fig 1.1).

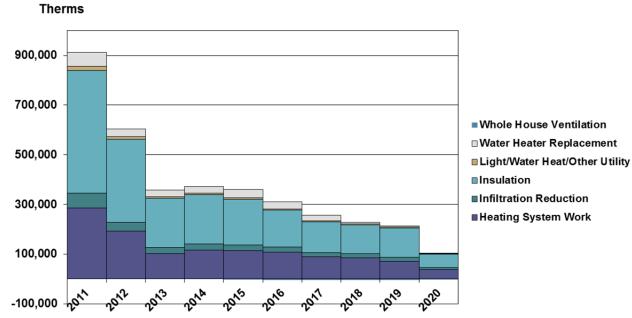


Figure 1.1 First Year Energy Savings (therms) - Program

Taken together, insulation, infiltration reduction, and heating system replacement work accounted for 98% of gas savings (Table 1.1). Note that the portion of infiltration reduction savings (7.0% of gas savings) shown here is attributed to weather-stripping and leak sealing -- the bulk of air leakage savings are allocated to dense packed wall and cavity insulation and are included in insulation savings shown for those measures.

Table 1.1 Gas Measure Savings by Major Measure Category

Measure Group	Savings (therms)	Percentage
Heating System Work	38,370	37.5%
Infiltration Reduction	7,148	7.0%
Insulation	54,818	53.5%
Light/Water Heat/Other Utility	1,605	1.6%
Water Heater Replacement	2,323	2.3%
Whole House Ventilation	-1,824	-1.8%

Electricity savings totaled 356,629 kWh for the program overall (Figure 1.2).

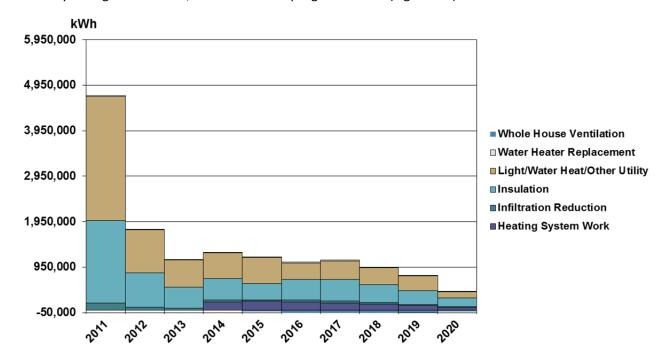


Figure 1.2 First Year Energy Savings (kWh) – Program

Insulation measures were credited with 50% of electricity savings (including all cooling savings and heating savings for homes with electric heat). Lighting, electric water heating measures, and refrigerator and freezer replacements and removals accounted for 35% (Table 1.2, historical data is listed in Appendix B as Fig 1.2).

Table 1.2 Electricity Savings by Major Measure Category

Measure Group	Savings (kWh)	Pct
Heating System Work	61,845	15.9%
Infiltration Reduction	22,005	5.7%
Insulation	192,872	49.6%
Light/Water Heat/Other Utility	127,057	32.7%
Water Heater Replacement	10,546	2.7%
Whole House Ventilation	-25,555	-6.6%

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Program expenditures for materials, labor, and support totaled \$9,220,424, decreasing by 37.7 percent from \$14,799,777 spent in the prior year's program (see Figure 1.3).

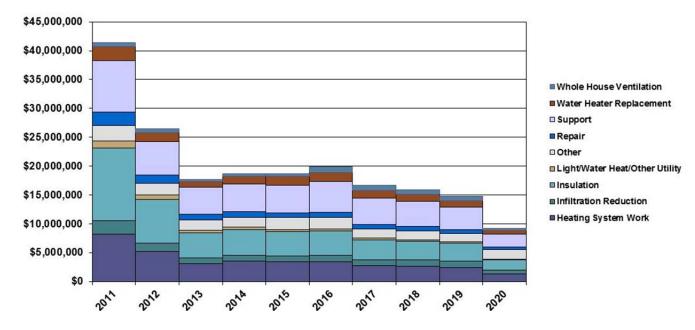


Figure 1.3 Overall Program Expenditures

Expenditures by major measure groups are shown in Table 1.3 (historical data is listed in Appendix B as Fig 1.3). Spending for efficiency measures, including infiltration reduction, insulation, lighting and water heater efficiency measures, accounts for 27.4% of expenditures. Heating system work (replacements, repairs, and tune-ups) and water heater replacements are installed for efficiency and/or health and safety; taken together these account for 21.3% of expenditures. Program support, which provides for agency overhead and administration, accounts for 24.5% of expenditures. The remainder of costs including repairs, whole house ventilation, and health and safety measures which together total 26.8%.

Table 1.3 Expenditures by Major Measure Category

Measure Group	Expenditures	Percentage
Heating System Work	\$1,343,847	14.6%
Infiltration Reduction	\$589,000	6.4%
Insulation	\$1,845,872	20.0%
Light/Water Heat/Other Utility	\$87,199	0.9%
Other	\$1,692,941	18.4%
Repair	\$370,264	4.0%
Support	\$2,261,937	24.5%
Water Heater Replacement	\$622,692	6.8%
Whole House Ventilation	\$406,672	4.4%

The nominal average household expenditures for materials, labor, and support across all dwellings weatherized in 2020 increased by 17.5% to \$15,925 (Figure 1.4, historical data is listed in Appendix B as Fig 1.4). The increased expenditures were largely attributed to new COVID 19 related expenditures --

costs would have increased by 5.6% absent the COVID 19 related expenditures: COVID 19 -related impacts are discussed more extensively in the subsection entitled <u>Program Impacts Related to COVID 19</u> at the end of this section of the report.

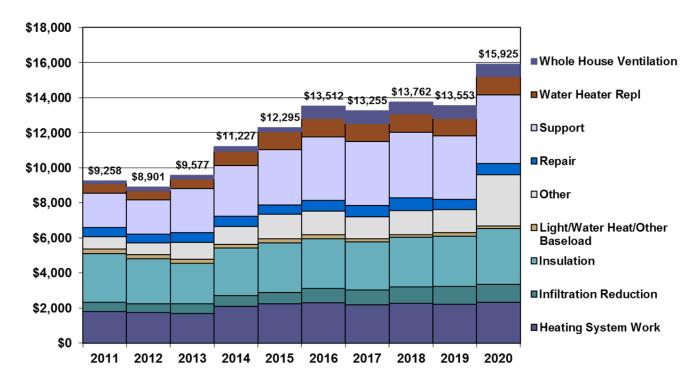


Figure 1.4 Average Program Expenditures per Housing Unit

CLIENT ENERGY BILL SAVINGS BY FUEL TYPE AND END-USE

Fuel prices were taken from the Department of Energy's Energy Information Agency (EIA) state monthly average prices for electricity and natural gas, and seasonal fuel costs for propane and fuel oil (Figure 1.5). The savings for each measure are allocated by month so that the estimated bill savings reflect the seasonal fluctuations in fuel prices. State taxes are included in the fuel costs. The prices of gas and electricity are restricted to the variable cost of an additional kWh or therm, i.e., the monthly fixed account costs are removed. Electricity prices declined by 3.2% and fuel oil prices declined by 5.6% year

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over year. Natural gas and propane prices increased by 8.5% and 5.3%, respectively.

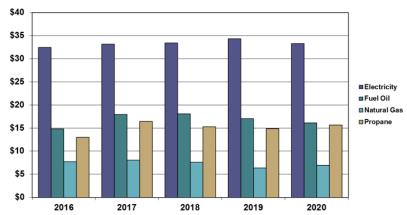


Figure 1.5 Average Fuel Cost per MBtu (Nominal Dollars)

The nominal first year client energy bill savings totaled \$142,400 (Figure 1.6, historical data is listed in Appendix B as Fig 1.6).

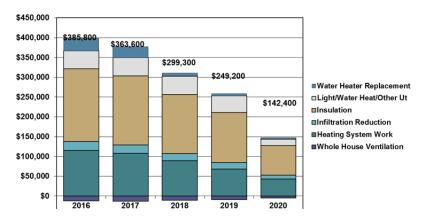


Figure 1.6 First Year Client Fuel Cost Savings (Nominal Dollars)

Excluding the additional costs from whole house ventilation, the savings for insulation, infiltration reduction, and heating system work accounted for 89% of client bill savings while lighting, water heating measures, and refrigeration measures accounted for 8% of client bill savings (Table 1.4, historical data is listed in Appendix B as Fig 1.6).

Table 1.4 First Year Client Fuel Cost Savings (Nominal Dollars)

Measure Group	Bill Savings	Pct
Whole House Ventilation	-\$5,077	-3.6%
Heating System Work	\$43,177	30.3%
Infiltration Reduction	\$9,303	6.5%
Insulation	\$75,201	52.8%
Light/Water Heat/Other Ut	\$16,230	11.4%
Water Heater Replacement	\$3,591	2.5%

First-year client fuel bill savings averaged \$246 (Figure 1.7), increasing 7.7% from \$228 in the previous year. The increase is driven largely by increases in gas and propane fuel prices.

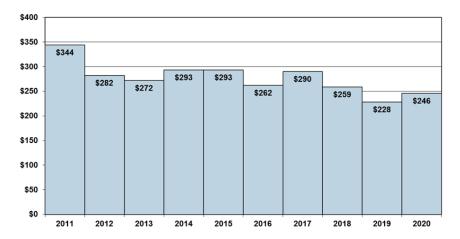


Figure 1.7 Average Annual Client Fuel Bill Savings per Housing Unit

Natural gas savings provided 50% of client bill savings, electricity accounted for 31%, propane accounted for 19%, and fuel oil provided less than 1%.

Approximately 51% of client bill savings are attributable to the heating impacts of shell measures (insulation and infiltration reduction), and 26% was due to heating system work. Taken together, heating impacts from shell improvements and heating system measures accounted for 77% of total client bill savings. Cooling savings accounted for another 9% of client bill savings, and lighting, refrigeration, and water heater measures accounted for 14%.

Table 1.5 provides a breakdown of first year energy and bill savings, and expenditures by housing type and main heat fuel. Expenditures for site built single family units averaged over \$16,386 over all fuel types, and provided \$256 in first-year bill savings per unit. Savings averaged \$220 for gas-heated units, \$457 for propane heated units, \$375 for fuel oil heated units (only 2 units), and \$267 for electrically-heated units.

Expenditures for mobile homes averaged \$12,954 overall and provided first-year client bill savings of \$178. Savings for gas-heated units averaged \$165, propane-heated mobile homes saved \$288 per unit (only 5 cases), and electrically-heated mobile homes save \$171 (only 2 cases).

Expenditures for multi-family units heated with gas averaged \$10,451 and had first-year client bill savings of \$151. Gas-heated multifamily units saved \$153 and electrically-heated multi-family unit saved \$143 (only four units).

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Table 1.5 First Year Energy and Bill Savings, and Expenditures by Housing Type and Main Heat Fuel

		Main H	eat	Elect	ricity		
	Number of	Savings	Bill Savings	Savings	Bill Savings	Expenditures	Total Bill
	Units	(therms, gals)	(\$)	(kWh)	(\$)		Savings
Site Built Single Family	512		\$176		\$80	\$16,386	\$256
Gas	396	233	\$161	499	\$58	\$16,782	\$220
Propane	68	260	\$374	716	\$83	\$15,618	\$457
Fuel Oil	2	146	\$326	432	\$50	\$12,944	\$375
Electricity	46	-	-	2,484	\$267	\$14,260	\$267
Mobile Home	48		\$140		\$38	\$12,954	\$178
Gas	41	194	\$134	274	\$31	\$13,284	\$165
Propane	5	173	\$249	342	\$39	\$13,230	\$288
Fuel Oil	-	-	-	-	-	-	\$0
Electricity	2	-	-	1,561	\$171	\$5,512	\$171
Multi-Family	20		\$84		\$67	\$10,451	\$151
Gas	16	151	\$105	410	\$48	\$11,536	\$153
Propane	-	-	-	-	-	-	\$0
Fuel Oil	-	-	-	-	-	-	\$0
Electricity	4	-	-	1,339	\$143	\$6,110	\$143

UTILITY SAVINGS AND EXPENDITURES

The utilities funded measures in 438 dwelling units, which was 55.4% of the previous year. First year savings totaled 63,360 therms and 220,060 kWh. These measures reached 76% of all units weatherized by the program, and accounted for 57% of electricity savings and 62% of gas savings.

Figure 1.8 provides a ten year history of gas savings attained by utility-funded measures (Figure 1.8, historical data in Appendix B listed as Fig 1.8).

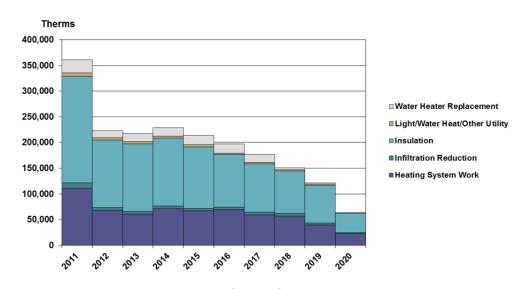


Figure 1.8 First Year Energy Savings (therms) – Utility only

Utility expenditures on gas measures (Table 1.6) were largely directed at insulation (59% of savings) and heating system work (36%).

Table 1.6 First Year Energy Savings (therms) by Measure Group – Utility only

Measure Group	Savings (therms)	Percentage
Heating System Work	23,032	36.4%
Infiltration Reduction	1,783	2.8%
Insulation	37,505	59.2%
Light/Water Heat/Other Utility	1,035	1.6%

The ten year history of electricity measure savings are shown in Figure 1.9 (historical data is provided in Appendix B listed as Fig 1.9).

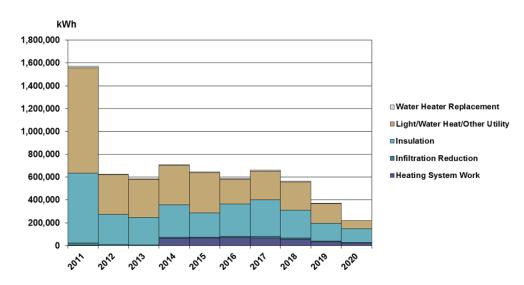


Figure 1.9 First Year Energy Savings (kWh) - Utility only

The electricity savings attributed to insulation include cooling savings and heating savings in units with electric main heat; these accounted for 54% of electricity savings. Another 34% of electricity savings were due to lighting, refrigerator replacements or removals (Table 1.7).

Table 1.7 First Year Energy Savings (kWh) by Measure Group – Utility only

Measure Group	Savings (kWh))	Pct
Heating System Work	22,538	10.2%
Infiltration Reduction	4,910	2.2%
Insulation	118,784	54.0%
Light/Water Heat/Other Utility	73,832	33.6%
Water Heater Replacement	0	0.0%

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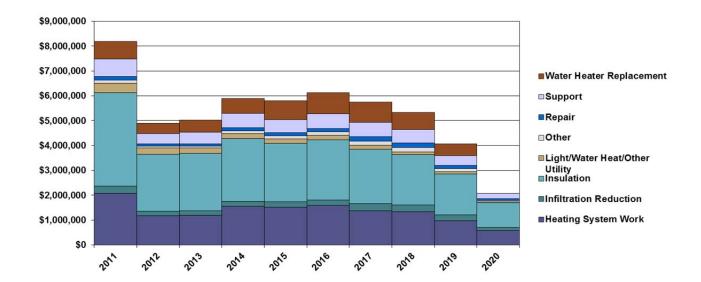


Figure 1.10 Utility Expenditures

The utilities spent \$2,075,029 for program measures, labor, and support. This was 51% of the previous year (Figure 1.10, Table 1.8, historical data in Appendix B listed as Fig 1.10). Utility expenditures accounted for 22.5% of the total low-income program expenditures.

Table 1.8 Expenditures by Measure Group – Utility only

Measure Group	Expenditures	Percentage
Heating System Work	\$580,579	28.0%
Infiltration Reduction	\$118,461	5.7%
Insulation	\$992,074	47.8%
Light/Water Heat/Other Utility	\$48,313	2.3%
Other	\$52,738	2.5%
Repair	\$74,552	3.6%
Support	\$208,312	10.0%

In addition, the utilities spent \$67,546 on program administration. Utility expenditures totaled \$2,142,575 including spending on program measures, labor, support, and administration.

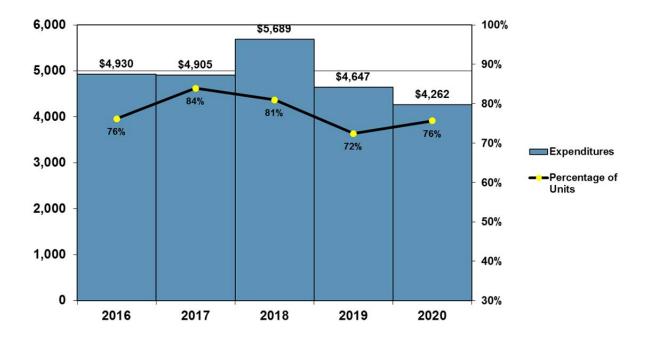


Figure 1.11 Average Utility Spending on Efficiency Measures (excludes Support and Administration), and Percentage of Homes Receiving Utility-Funded Measures with Impacts

Figure 1.11 provides the average utility funding for efficiency measures (excludes support and administration) and percentages of dwellings with utility funding for the past five years. The utilities installed measures in 76% of units. The utilities expenditures averaged \$4,262 on units that received utility-funded efficiency measures.

Table 1.9 provides details of utility expenditures and the percentage of units weatherized by the program for each utility.

Table 1.9 Utility Expenditures for Measures, Labor, and Support, and Counts of Units with Impacts

	Total Expenditures			Counts of Dwellings With Energy Impacts				
		Excluding	W	ith Program	Electric			
Utility	Prog	ram Support		Support	Impacts	Pct of Prg	Gas Impacts	Pct of Prg
Alliant IPL	\$	872,900	\$	966,300	216	37.3%	134	29.6%
Black Hills Corp	\$	128,900	\$	141,100			31	6.9%
MidAmerican	\$	864,900	\$	967,600	167	28.8%	174	38.5%
Total Utilities	\$	1,866,700	\$	2,075,000	383	66.1%	339	75.0%

The savings and client bill savings for utility-funded measures are summarized by utility in Table 1.10.

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Table 1.10 First Year Fuel and Client Bill Savings Impacts from Utility-Funded Measures

Utility	First Yr Fuel Savings	Pct of Prg	Summer Demand Savings	Pct of Prg	Winter Demand Savings	Pct of Prg	F	irst Year uel Cost Savings	Pct of Prg
Electricity	(kWh)		(kW)		(kW)				
Alliant IPL	130,340	33.5%	30	33.2%	42	35.6%	\$	14,840	33.6%
MidAmerican	89,570	23.0%	30	24.9%	25	20.8%	\$	10,280	23.3%
Total Electric Utilities	220,060	56.6%	60	58.1%	67	56.4%	\$	25,140	56.9%
					Peak Day				
Gas	Therms				Therms				
Alliant IPL	25,670	25.1%			280	25.5%	\$	17,750	25.0%
Black Hills Corp	5,830	5.7%			63	5.7%	\$	4,040	5.7%
MidAmerican	31,850	31.1%			344	31.3%	\$	22,050	31.1%
Total Gas Utilities	63,360	61.8%			687	62.5%	\$	43,840	61.8%

Utility-funded measures yielded first-year client bill savings of \$68,974, averaging \$157 per dwelling that received utility-funded measures. Electricity bill savings from utility-funded measures averaged \$66 per household that received utility-funded electricity measures. Gas bill savings from utility-funded measures averaged \$129 for households with utility-funded gas measures.

Table 1.11 provides the cost of energy savings for utility-funded measures with energy impacts. The first year cost of conserved energy over all housing types ranged from \$19.31 to \$20.81 per therm and \$1.47-\$2.22 per kWh (we ignored groups with fewer than 30 units for both gas and electricity).

Table 1.11 Costs of First-Year Energy Savings from Utility-Funded Measures

	Cost of Gas Savings	Number of Units	Cost of Elec Savings	Number of Units
Alliant-IPL				51110
Overall	\$19.31	134	\$2.22	216
Site-Built	\$19.06	125	\$2.26	195
Mobile Home	\$20.64	5	\$1.21	15
Multi-family	\$24.38	4	\$1.45	6
Black Hills Corp				
Overall	\$20.60	31	-	
Site-Built	\$20.60	30	-	
Mobile Home	\$20.82	1	-	
Multi-family	\$0.00	0	-	
MidAmerican				
Overall	\$20.81	174	\$1.47	168
Site-Built	\$20.91	150	\$1.53	145
Mobile Home	\$20.48	19	\$1.29	16
Multi-family	\$16.86	5	\$0.94	7

Table 1.12 provides the percentages of total expenditures for measures that were funded by the utilities, and demonstrates the high funding percentage provided by the utilities for efficiency measures. The utilities funded the majority of all measures except infiltration reduction, freezer exchanges, electric heating systems (including heat pumps), repairs, heating system ventilation and tune and cleans, water heater replacements and ventilation, and support.

Table 1.12 Utility Funding Percentages by Measure

	Expenditures				
	_	Utility			
Measure	Total	Utility	Percentage		
Wall Insulation	\$619,685	\$343,659	55.5%		
Attic Insulation	\$736,216	\$446,031	60.6%		
Kneewall Insulation	\$63,530	\$40,082	63.1%		
Floor/Crawlspace Insulation	\$157,711	\$94,194	59.7%		
Bandjoist Insulation	\$80,639	\$40,792	50.6%		
Infiltration Reduction	\$589,000	\$118,461	20.1%		
High Efficiency Htg Sys Repl.	\$1,076,292	\$539,659	50.1%		
Electric Htg Sy/Ht Pump Repl.	\$102,122	\$29,745	29.1%		
Pipe Wrap	\$7,964	\$4,792	60.2%		
Faucet Aerator	\$473	\$295	62.3%		
Shower Head	\$491	\$305	62.1%		
Water Heater Replacement - Hi Eff	\$622,692	\$0	0.0%		
Lighting	\$26,580	\$17,096	64.3%		
Exchange Refrigerator	\$43,413	\$25,096	57.8%		
Exchange Freezer	\$5,977	\$529	8.9%		
Repairs	\$370,264	\$74,552	20.1%		
Programmable Thermostat	\$1,400	\$1,300	92.9%		
Htg Sys Tune/Clean	\$55,319	\$9,876	17.9%		
Htg Sys Ventilation	\$76,911	\$37,045	48.2%		
Water Heater Ventilation	\$43,511	\$421	1.0%		
Support	\$2,261,937	\$208,312	9.2%		

EXPENDITURES AND SAVINGS BY AGENCY AND MEASURE

This section provides breakouts of expenditures and savings by agency. Each agency receives funding from the utilities and DCAA (Table 1.13). Section 3 of this report, Detailed Spending and Impact Profiles by Funding Entity provides detailed result tables for the overall program, state funding, and for each of the three funding utilities. Those tables include counts of installations and totals and average energy savings, demand impacts, and program expenditures by measure.

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Table 1.13 Counts of Completed Units by Agency and Funding Entity

	Units With Funding						
Agency	State	DCAA	Alliant-IPL	Black Hills	MidAmerican		
NewOpp	27	27	9	2	10		
HACAP	64	64	52	4	32		
CAEI	25	25	16	0	9		
Matura	10	10	1	0	2		
MICA	24	24	21	1	0		
Mid-Sioux	25	25	4	0	6		
NE Iowa	40	40	17	8	3		
New View	16	16	8	3	0		
Threshold	43	43	1	1	30		
IMPACT	19	19	9	1	8		
SCICAP	17	17	12	0	1		
CASEI	41	41	39	0	3		
SIEDA	30	30	19	0	10		
Upper Des Moines	67	67	34	4	16		
West Central	26	26	1	7	14		
CASiouxland	12	12	0	0	9		
Polk County	93	93	0	0	64		
Total	579	579	243	31	217		

Figure 1.12 provides the first-year client bill savings by agency. The series are arranged from left to right in the chart according to left to right and top to bottom and in the legend, e.g., Bldg Shell Cooling, then Bldg Shell Heating, then Heating system, etc.

Savings attained by each agency were adjusted according to results of the natural gas and electricity fuel consumption analyses, detailed in Section 2 of this report. The estimated impacts for propane and fuel oil were adjusted using the same factors as those used for natural gas.

The statewide average client bill savings was \$246 per dwelling. The average first-year client bill savings varied across agencies, from a low of \$100 per dwelling for MATURA to a high of \$365 for NE lowa. The wide variation in results across agencies is typical of what we've observed in past years. Bear in mind that various factors affect the values shown in this chart, factors beyond quality or intensity of weatherization treatment (an example is climate variations within the state). Consequently, these results should not be used as a basis for comparing the quality, attention to detail, dedication, or other factors of agency performance.

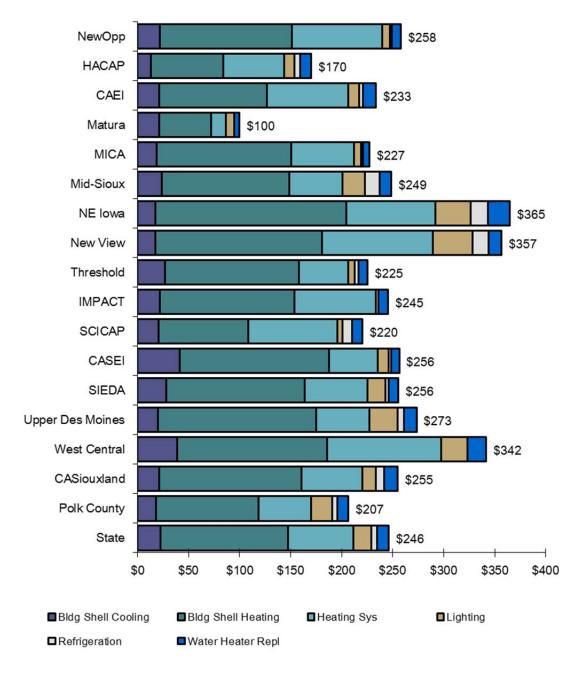


Figure 1.12 Average Annual Fuel Bill Savings per Housing Unit by Agency

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Figure 1.13 shows the average expenditures for all households with impacts, ranging from a low of \$8,057 for Northeast Iowa to \$24,697 for West Central. The statewide average expenditure was \$15,925 per dwelling unit.

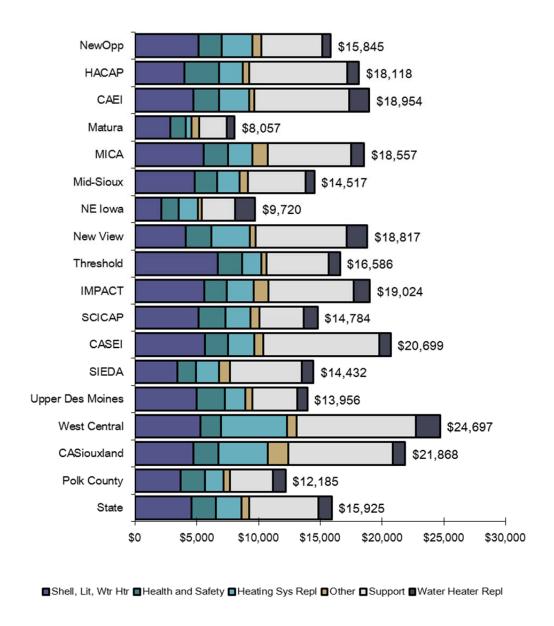


Figure 1.13 Average Expenditures per Housing Unit by Agency

The average installation rates, costs, and savings for energy efficiency and heating and water heating system replacement measures are shown in Figures 1.14a and 1.14b for most recent three years of the program.

The installation rate of wall and floor/crawlspace insulation has trended downward slightly over the three year period, but the rate for other shell insulation measures has tended to fluctuate around the same level. (see Figure 1.14a, left chart).

The condensing heating system replacement rate is in the same range as the prior two years. The replacement rate for non-condensing heating system replacements is declining over the three year period.

The installation rates of water heater efficiency measures are all within the same range over the three year period. Many of these are lower cost measures, however the installation rates of the higher cost high-efficiency water heater replacements declined by 6.5 percentage points to nearly the same rate as in 2018. Refrigerator replacement rates increased slightly from declined to 9.5%.

Figure 1.14a, right chart, shows that the average measure costs. Wall insulation costs decreased slightly but costs for other shell insulation measures have increased.

The cost of mechanical system replacements have all increased. The cost for condensing heating systems is within a range for the three year period and is currently at \$3,058. The cost of non-condensing heating system replacements is almost the same at \$3,050. The cost of high efficiency water heater replacements increased was \$1,711, about the same as the previous year. The cost of refrigerator replacements was \$789 and within a range for the three year period while the cost of freezer replacements increased to \$598.

The average first-year energy gas and electricity savings for each major measure is shown in Figures 1.14b.

The average natural gas savings for insulation measures were all within a range for the three year period.

Gas savings for condensing heating systems increased slightly to 125 therms. Non-condensing heating system savings increased significantly but large fluctuations can be expected due to small numbers of installations (only 2 units in 2020). Non-condensing heating systems are installed for health and safety reasons in cases where condensing heating systems cannot be installed due to ventilation issues or other atypical situations.

The average electricity savings were higher for ceiling/attic insulation (199 kWh versus an average of 157 the prior year). Electricity savings were within a few kWh all other insulation measures.

Lighting measure savings averaged 208 kWh per unit. Savings for all refrigerator appliance measures were within the prior year range.

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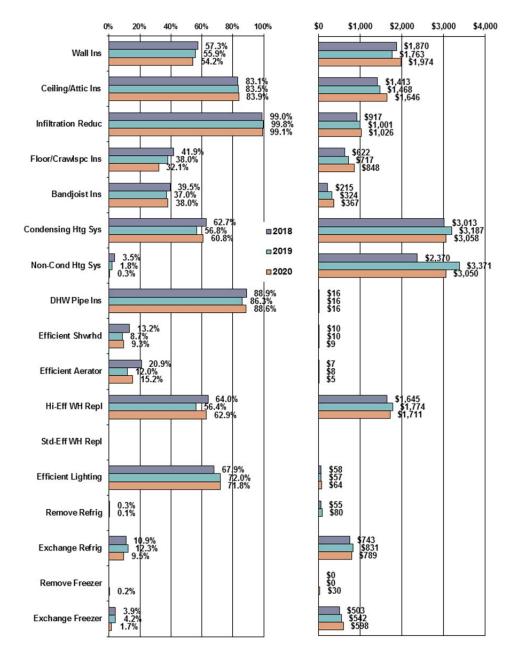


Figure 1.14a Average Installation Rates and Measure Costs of Efficiency Measures, Heating System and Water Heating Replacements

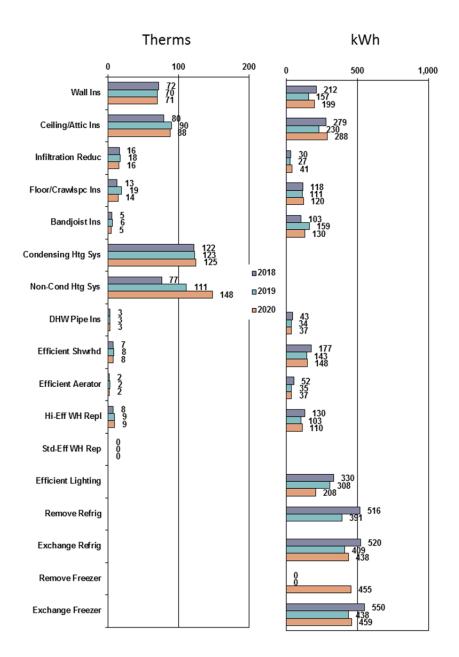


Figure 1.14b Average Gas and Electricity Savings of Efficiency Measures, Heating System and Water Heater Replacements

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Tables 1.14 and 1.15 provide tabular data corresponding to data shown in Figures 1.14a and 1.14b but over a five year period. Table 1.14 provides a listing of the percentage of households receiving measures. Small percentage changes from the previous year are to be expected, and typically correct for lower or higher installation rates of the prior year. The year over year (recent year) change tends to be greatest for measures with very low installation rates and/or savings which are not indicative of major changes in the installation protocols for these measures or program impacts.

Table 1.14 Installation Rates of Measures (% of units receiving measures)

					1	
						Recent Year
Measure	2016	2017	2018	2019	2020	Change (%)
Insulation and Infiltration Reduction	Measure:	S				
Wall Insulation	55.1	58.9	57.3	55.9	54.2	-2.9%
Ceiling/Attic Insulation	84.7	84.7	83.1	83.5	83.9	0.5%
Floor/Crawlspace Insulation	39.4	40.5	41.9	38.0	32.1	-15.5%
Bandjoist Insulation	43.1	39.1	39.5	37.0	38.0	2.7%
Infiltration Reduction	98.1	99.1	99.0	99.8	99.1	-0.7%
Heating System Measures						
Htg. Sys. Replacement	70.3	68.1	66.3	58.6	61.1	4.3%
High Eff Htg Sys Repl	66.8	60.2	62.7	56.8	60.8	7.1%
Std/Unspec Eff Htg Sys Repl	3.4	7.9	3.5	1.8	0.3	-81.1%
Htg. Sys. Tune and Clean	26.3	30.0	30.9	37.8	39.2	3.7%
Heating System Safety Check	9.3	0.1	0.0	2.5	2.4	-2.2%
Heating System Ventilation	52.9	59.1	63.9	53.8	54.4	1.2%
Water Heater Measures	•	Ī		•	- 1	
Pipe Wrap	86.9	89.7	88.9	86.3	88.6	2.7%
Shower Head	14.9	14.7	13.2	8.7	9.3	7.2%
Faucet Aerator	27.7	24.9	20.9	12.0	15.2	26.7%
Water Heater Replacement	69.2	65.9	64.0	56.4	62.9	11.4%
Hi-Eff Wtr Htr Repl.	69.2	65.9	64.0	56.4	62.9	11.4%
Std-Eff Wtr Htr Repl.	-	-	-	-	-	-
Water Heater Ventilation	39.8	50.9	51.5	48.1	42.1	-12.3%
Water Heater Repair	6.5	9.4	9.5	13.4	10.5	-21.2%
Lighting Measures						
Efficient Lighting	75.6	70.4	68.0	72.0	71.8	-0.2%
Refrigeration Measures	22.4	18.8	14.0	15.7	10.9	-30.5%
Refrigerator Removal	0.1	0.3	0.3	0.1	-	-
Refrigerator Exchange	19.0	15.7	10.9	12.3	9.5	-22.6%
Freezer Removal	0.2	0.2	0.0	-	0.2	-
Freezer Exchange	5.3	4.2	3.9	4.2	1.7	-59.0%
Health and Safety (other than heat	ng & wate	r heating i	measures I	isted abov	e)	
CO Detector	90.9	93.9	91.9	95.9	95.3	-0.6%
Smoke Detector	65.3	68.4	61.5	66.8	69.6	4.1%
Exhaust Ventilation	89.3	89.8	87.9	86.6	86.4	-0.3%
Fuses	0.7	0.8	0.4	0.3	-	-
Repairs	87.9	92.3	93.3	91.4	91.5	0.2%

Table 1.15 shows details of the average installed costs for each measure over the past 5 years. As with the installation rates, the greatest changes tend to occur for measures with few installations and/or small costs.

Table 1.15 Average Measure Costs (\$)

Measure	2016	2017	2018	2019	2020	Recent Year Change (%)
Insulation and Infiltration Reduction N	1easures					
Wall Insulation	1,904	1,827	1,870	1,763	1,974	11.9%
Ceiling/Attic Insulation	1,352	1,287	1,413	1,468	1,646	12.1%
Infiltration Reduction	824	840	917	1,001	1,026	2.5%
Floor/Crawlspace Insulation	759	643	622	717	848	18.2%
Bandjoist Insulation	238	208	215	324	367	13.0%
Heating System Measures						
Htg. Sys. Replacement						
Condensing Htg Sys Repl	2,957	2,868	3,013	3,187	3,058	-4.1%
Non-Cond Htg Sys Repl	2,611	1,830	2,370	3,371	3,050	-9.5%
Htg. Sys. Tune and Clean	214	201	238	242	244	0.6%
Heating System Safety Check	149	85	0	78	69	-12.1%
Heating System Ventilation	232	209	234	234	244	4.1%
Water Heater Measures						
Pipe Wrap	15	14	16	16	16	-1.9%
Shower Head	9	9	10	10	9	-10.1%
Faucet Aerator	6	6	7	8	5	-30.9%
Water Heater Replacement						
Hi-Eff Wtr Htr Repl.	1,561	1,559	1,645	1,774	1,711	-3.6%
Std-Eff Wtr Htr Repl.	-	-	-	-	-	-
Water Heater Ventilation	175	157	178	190	178	-6.2%
Water Heater Repair	130	120	89	116	110	-5.8%
Lighting Measures						
Efficient Lighting (avg spent per home)	53	53	57	57	64	11.5%
Refrigeration Measures						
Refrigerator Removal	58	25	55	80	#N/A	-
Refrigerator Exchange	759	760	743	831	789	-5.1%
Freezer Removal	30	27	-	-	30	-
Freezer Exchange	453	468	503	542	598	10.2%
Health and Safety (other than heating	& water	heating n	neasures l	isted abov	ve)	
CO Detector	66	72	75	98	106	8.8%
Smoke Detector	54	58	60	68	80	16.9%
Exhaust Ventilation	881	887	894	956	950	-0.7%
Fuses	128	113	134	145	#N/A	-
Repairs	723	715	780	658	699	6.2%
Support	3,755	3,677	3,932	3,757	3,948	5.1%
Note: Kneewall insulation was reported with	wall insula	ition prior t	o 2007, it i	s now bund	lled with C	eiling./Attic Ins

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SAVINGS OF WATER HEATER, LIGHTING, AND REFRIGERATION MEASURES

Table 1.16 shows the installation rates for energy efficiency measures other than space heating or cooling. These measures include water heater efficiency measures, lighting, and refrigeration measures. Statewide, client bill savings averaged \$28 for these measures. The highest average bill savings were attained by NE Iowa (\$62 per unit). MICA and IMPACT each averaged less than \$10 per unit.

Table 1.16 Installation Rates and Savings of Baseload Measures

	Water Heating			Lighting	Lighting Refrigeration				Average First Year
	1	Eff Shower-	Eff Faucet	Efficient	Exchange	Exchange	Remove	Remove	Bill
Agency	Pipe Wrap	head	Aerator	Lighting	Refrig	Freezer	Refrig	Freezer	Savings
New Opp	59%	22%	33%	63%	4%	0%	4%	0%	\$14.67
HACAP	92%	6%	0%	81%	6%	5%	19%	0%	\$21.25
Eastern IA	88%	0%	28%	40%	8%	0%	4%	0%	\$19.30
Matura	80%	0%	0%	80%	0%	0%	0%	0%	\$10.69
MICA	4%	0%	0%	21%	4%	0%	0%	0%	\$8.86
Mid-Sioux	96%	0%	0%	88%	20%	8%	0%	0%	\$40.54
NE Iowa	93%	0%	65%	95%	30%	3%	33%	0%	\$62.21
New View	94%	0%	0%	100%	25%	6%	0%	0%	\$58.69
Threshold	100%	0%	5%	74%	5%	2%	9%	0%	\$14.18
IMPACT	84%	0%	0%	0%	5%	0%	0%	0%	\$5.29
SCICAP	53%	0%	0%	29%	6%	6%	24%	6%	\$19.24
SE Iowa	100%	0%	0%	51%	2%	2%	0%	0%	\$15.99
SIEDA	93%	0%	0%	77%	7%	0%	3%	0%	\$24.34
Upper Des Moines	99%	10%	0%	94%	12%	0%	0%	0%	\$40.81
West Central	96%	0%	54%	100%	0%	0%	31%	0%	\$35.27
CAA Siouxland	100%	0%	8%	92%	17%	0%	8%	0%	\$28.07
Polk County	98%	0%	31%	72%	10%	0%	10%	0%	\$30.33
State	89%	3%	15%	72%	9%	2%	9%	0%	\$28.03

TRENDS IN THE INSTALLATION RATES OF LIGHTING, REFRIGERATION, AND HEATING SYSTEM REPLACEMENTS

This section focuses on trends in the installation rates of several efficiency measures phased into the joint utility/WAP program, including efficient lighting, heating system replacements, and refrigeration measures. These are shown in Figures 1.15 through 1.18.

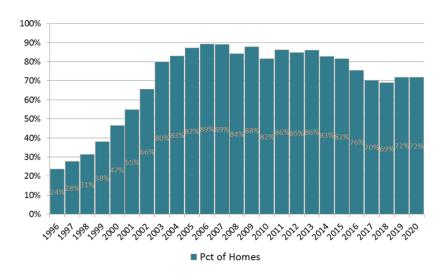


Figure 1.15 Percentage of Housing Units Receiving Lighting Measures

Figure 1.15 shows the percentage of dwellings receiving at least one lighting measure for each year, beginning in 1996. Lighting measures were installed in 38% of dwellings in 1996 and peaked in 2006 and 2007 at 89%. The installation rates for lighting have generally trended downward since 2006 as more units already have efficient lighting installed. The percentage of dwellings receiving efficient lighting remained unchanged from 2019 at 72%.

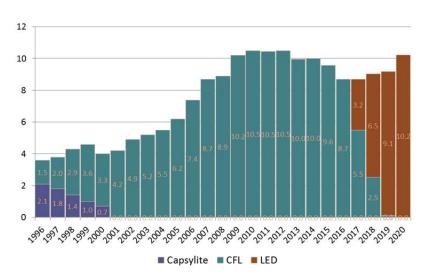


Figure 1.16 Average Number of Bulbs Installed for Housing Units Receiving Lighting Measures

The average number of bulbs installed in dwellings that received at least one lighting measure averaged 10.2 bulbs per house. Agencies began installing LEDs in 2017 and effectively all lighting measures installed in the current year were LEDs (Figure 1.16).

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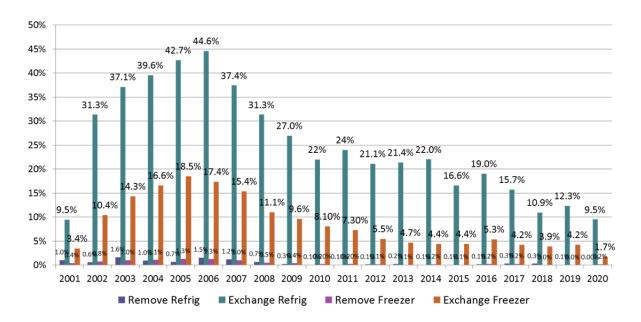


Figure 1.17 Installation Rates of Refrigeration Measures

Figure 1.17 shows the initial ramp up of refrigeration measure installation rates as well as declines in recent years as the efficiency of in-place units have increased in the client population. The refrigerator replacement rate decreased to 9.5% from the prior year (12.3%).

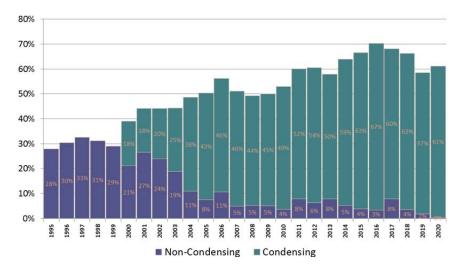


Figure 1.18 Installation Rates of Natural Gas Heating System Replacements

Figure 1.18 shows the transition to condensing (90+ efficiency) furnaces from non-condensing (80% efficiency) heating systems. Overall, 61% of dwellings with natural gas heating received a heating system replacement. All were condensing systems except for two units.

Thirty-three percent of the heating systems that were replaced were done so for health and safety; the remaining units were replaced for efficiency.

AVERAGE COSTS OF MAJOR MEASURES BY AGENCY

Figures 1.19-1.23 show the agency-specific average costs for ceiling, wall, and floor/crawlspace insulation and furnace replacements for the overall program and for utility-funded measures only. These costs represent the total expenditures for these measures averaged over the number of households that received the measure (as opposed to an average across all households that were treated by the agency).

CEILING AND ATTIC INSULATION EXPENDITURES

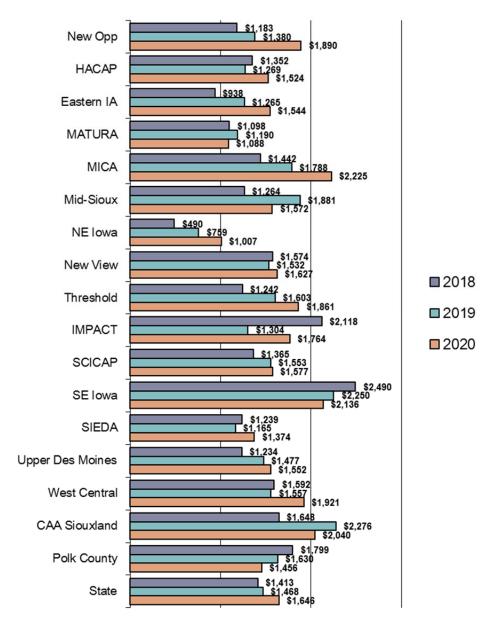


Figure 1.19a Average Program Expenditures on Ceiling Insulation by Agency

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Figures 1.19a shows the average installed costs for ceiling and attic insulation (including cavity-fill blown attic insulation) for all expenditures. The statewide average cost for ceiling insulation was \$1,646.

MICA, CAA Siouxland and SE Iowa averaged more than \$2,000 per dwelling unit that received ceiling and attic insulation. The lowest average spending was reported by Northeast Iowa, averaging \$1,007.

Figure 1.19b shows that for units receiving utility funding for this measure, the statewide average expenditure of utility funds on ceiling and attic insulation was \$1,442. CAA Siouxland and MICA spent over \$2,000 in utility funding. NE Iowa spent the least utility funds (\$554) for ceiling and attic insulation.

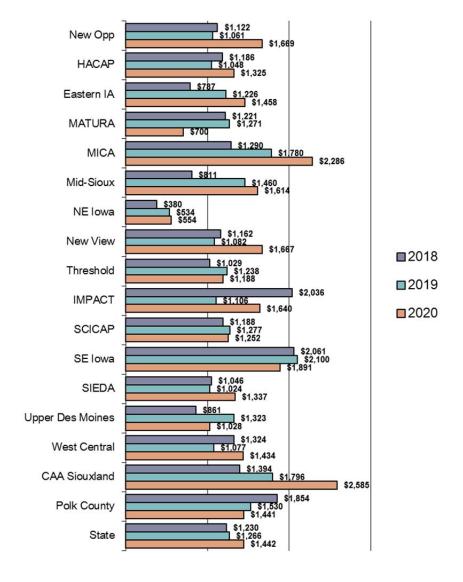


Figure 1.19b Average Utility Expenditures on Ceiling Insulation by Agency

WALL INSULATION EXPENDITURES

Figures 1.20a shows the average installed costs for wall insulation for all funding. The state average expenditure for wall insulation was \$1,974. West Central and Threshold each averaged more than \$2,500. New View spent the least, averaging \$363 per dwelling unit.

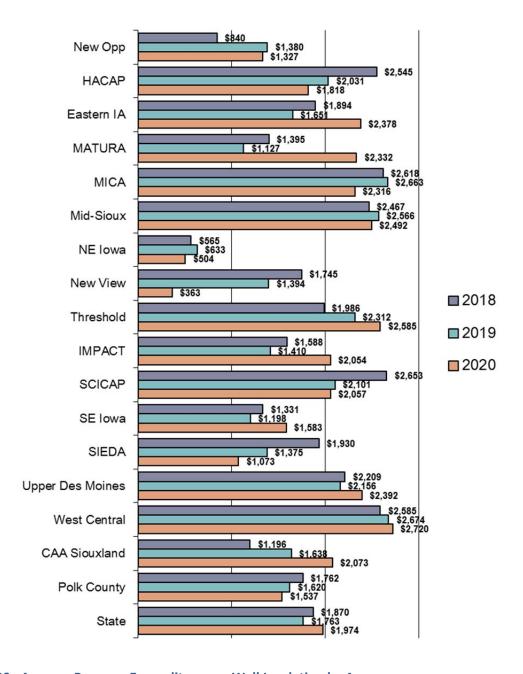


Figure 1.20a Average Program Expenditures on Wall Insulation by Agency

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Figure 1.20b provides agency expenditures for utility-funded wall insulation. Statewide, the average expenditures for utility-funded wall insulation averaged \$1,606. MATURA spent the most at \$3,920 utility funds, with MICA, Siouxland, Eastern Iowa, and West Central averaging over \$2,000. Northeast Iowa spent \$498 while New View spend no utility funds.

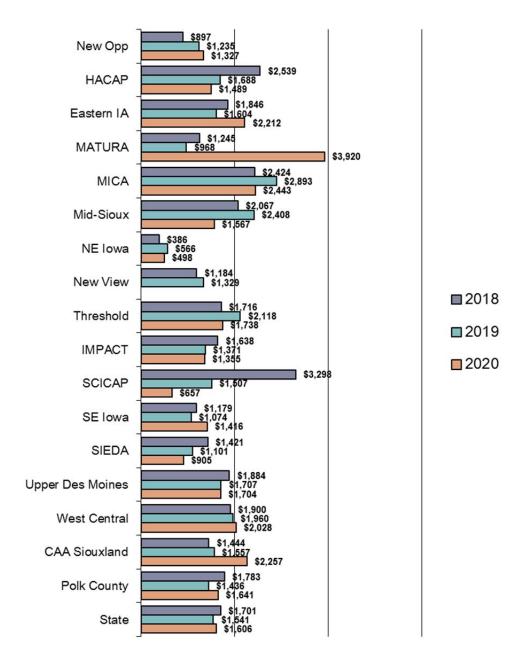


Figure 1.20b Average Utility Expenditures on Wall Insulation by Agency

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FLOOR/CRAWLSPACE INSULATION

Figures 1.21a shows the average expenditures for floor/crawlspace insulation from all funding sources. Statewide, the cost for floor/crawlspace insulation averaged \$689. SCICAP spent the most at \$1,267 per unit, while MICA spent the least, at \$243.

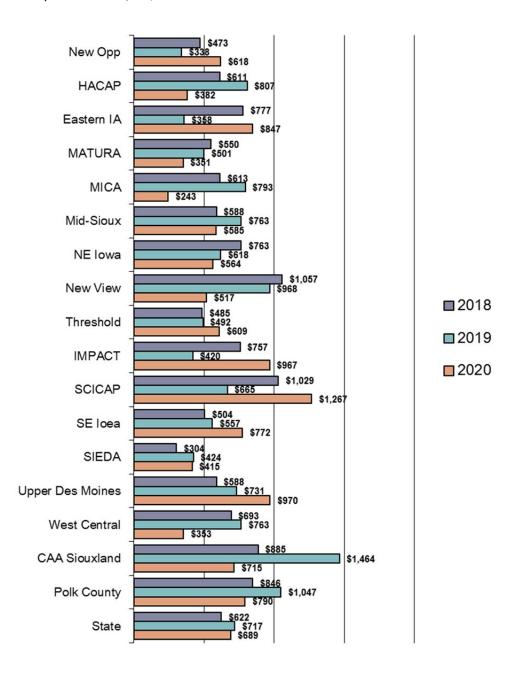


Figure 1.21a Average Program Expenditures on Floor/Crawlspace Insulation by Agency

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The average expenditure of utility funds for floor/crawlspace insulation (Figure 1.21b) was \$604. Polk County spent the most at \$860 while new View spent \$101. MATURA had no utility expenditures for this measure.

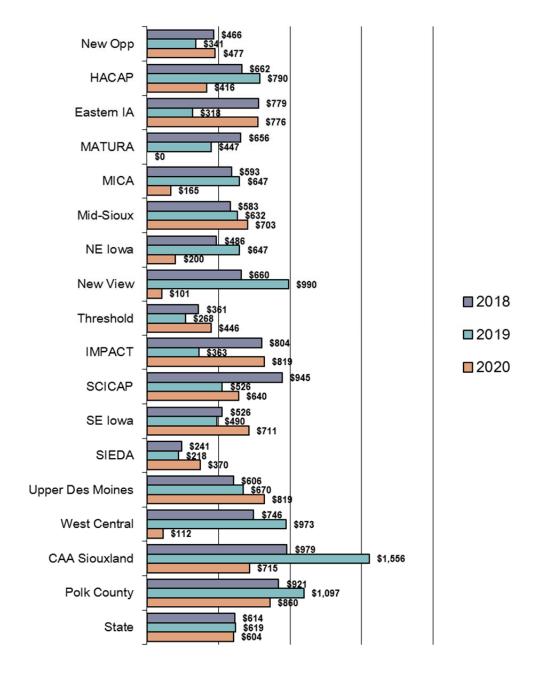


Figure 1.21b Average Utility Expenditures on Floor/Crawlspace Insulation by Agency

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NON-ELECTRIC HEATING SYSTEM REPLACEMENT EXPENDITURES

Figures 1.22a shows the average expenditures for all non-electric heating system replacements from all funding sources. Statewide average heating system replacement costs were \$3,159. West Central spent the most at \$5,581, and three other agencies reported average expenditures exceeding \$4,000, including CAA Siouxland (\$4,744), New View (\$4,501), and New Opportunities (\$4,203). Three agencies averaged less than \$2,500, including Polk County (\$2,402), MATURA (\$2,363), and Threshold (\$2,233).

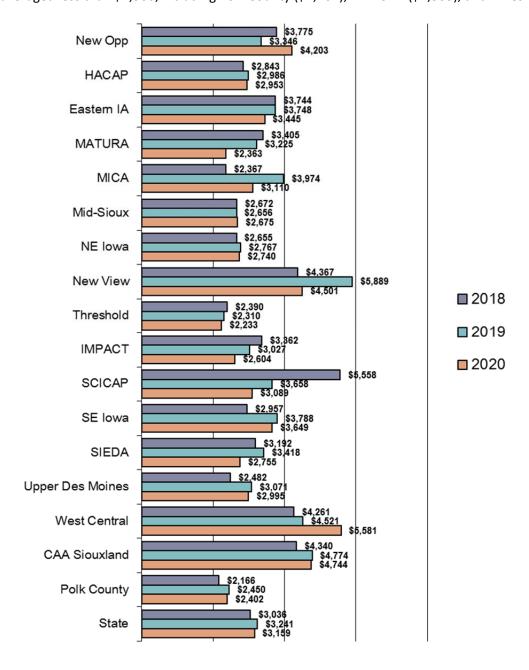


Figure 1.22a Average Program Expenditures on Heating System Replacements by Agency

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Figure 1.22b shows the average utility funding for replacement heating systems of \$2,612 statewide. West Central, CAA Siouxland, SE Iowa, and New Opportunities each spent more than \$3,000. Polk County and Threshold spent less than \$2,000. MATURA had no expenditures of utility funds for this measure.

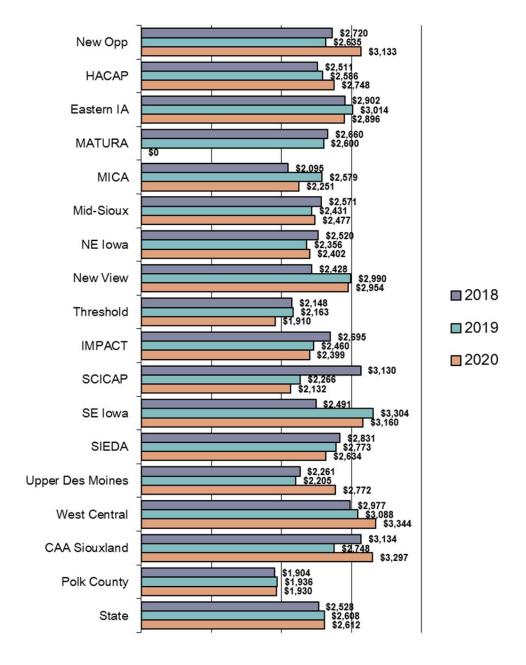


Figure 1.22b Average Utility Expenditures on Heating System Replacements by Agency

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PROGRAM IMPACTS RELATED TO COVID 19

The weatherization assistance program paused installations mid-2020 and incurred additional expenses upon startup owing to the COVID 19 pandemic.



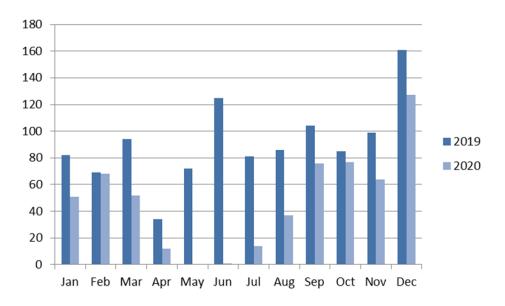


Figure 1.23 Monthly completions in 2019 and 2020

A total of 579 units were weatherized in 2020 compared with 1,092 in 2019, which is a 47% decline. Fewer units were weatherized during every month during 2020 as compared to the prior year. No units were completed during May, and a single unit was recorded as completed in June, 2020.

Costs were higher owing in part to additional expenditures on PPE and COVID-related support (i.e., costs incurred to maintain staffing levels by supporting non-field related weatherization efforts.)

Weatherization costs averaged \$14,927 during the first six months of 2020: this covers the period prior to the pause in weatherization installations. Costs were about 10% higher than during the same period in 2019 (see Table 1.17).

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Table 1.17 Weatherization expenditures in 2019 and 2020

	First	Half of Year			Second Half of	Year		Ful	ll Year
Year	Units	Average Expenditures	Units	Averaged Wx Expenditures excl Covid	PPE Expenditures	Covid Support Expenditures	Average	Units	Annual Average
2019	476	\$13,489	616	\$13,603	-	-	\$13,603	1,092	\$13,553
2020	184	\$14,927	395	\$14,066	207	2116	\$16,389	579	\$15,925

The portion of weatherization expenditures that account for typical installations (i.e., no COVID expenditures) were \$14,066 during the second half of the year -- this was about 3.4% higher than the average in 2019 (\$13,603).

COVID-related expenditures for PPE and support significantly increased the average for the second half of the year as well as the total year. PPE expenditures averaged \$207 per unit in the second half of the year, and COVID-related support expenditures averaged \$2,116 per unit. The combined average expenditure including these COVID-related costs during the second half was \$16,389.

On an annual basis, expenditures averaged \$15,925 for all units and expenditures. This was a 17.5% increase over the 2019 average. If all COVID-related expenditures were excluded, costs would have averaged \$14,340 per unit, or a 5.6% increase.

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2. FUEL CONSUMPTION ANALYSIS

Savings were estimated for all clients based upon measures installed in each dwelling, using algorithms developed in prior studies of the lowa low-income program. The fuel consumption analysis provides adjustment factors to the estimated impacts, with gas adjustments applied to estimates of natural gas, propane, and fuel oil heating impacts.

STUDY SAMPLE AND METHODOLOGY

The treatment groups for the gas and electricity analyses included weatherization jobs completed from May 1, 2019 through September 30, 2020.

We used a comparison group to adjust for non-weatherization program factors that affect fuel usage, including but not limited to fuel price shocks, naturally-occurring conservation, and participation in other energy programs. Our comparison group consisted of all LIHEAP clients of the SLICE utilities and who applied for energy assistance from October, 2020 through March, 2021. In order to assess a change in consumption for the comparison group, we established a pseudo-treatment period for each comparison group household by assigning the same period as that of a randomly selected household from the treatment group.

Estimated usage readings were combined with subsequent actual readings. Phone/postcard readings and final or corrected readings were considered actual readings. Reading codes not corresponding to actual readings were considered estimated.

The weatherization period was defined as beginning with the audit date and ending with the date the dwelling was reported as complete. We truncated the usage data to a period of no more than to 380 days prior to the beginning of the weatherization period, and up to 380 days following end of the weatherization period.

Fuel consumption was weather-normalized using weather data from the same ten weather zones (Figure 2.1). Our long-term normal weather datasets are comprised of the 28-year period ending in Dec, 2017.

The comparison group records were matched with treatment group records based upon normalized annual pre-weatherization consumption, housing type, heating fuel, and model components (heating and or/ cooling and/or baseload).

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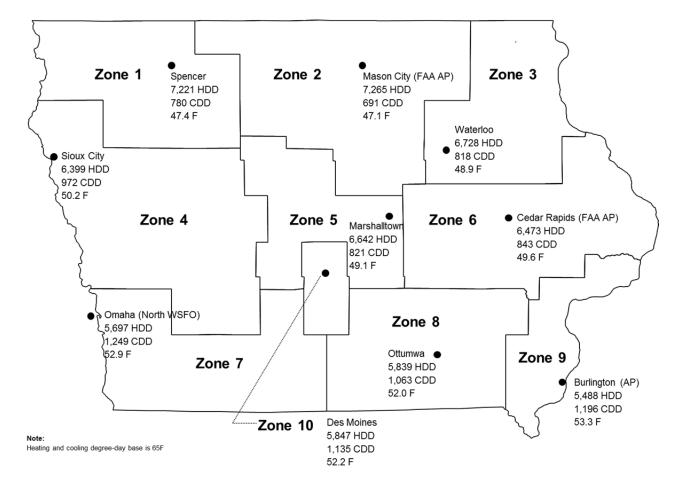


Figure 2.1 Weather zones used in the weather-normalization

MODEL SELECTION

We investigated impacts using five model specifications for each dwelling:

- Heating/Baseload (gas and electricity)
 - o HB using floating point reference temperatures ranging between 40°F to 70°F
 - o HBF using fixed reference temperatures of 62°F for natural gas and 58°F for electricity
- Cooling/Baseload (electricity only)
 - o CB using floating point reference temperatures ranging between 60°F to 72°F
 - CBF using fixed reference temperatures of 68°F
- Heating only (gas only)
 - HO using floating point reference temperatures ranging between 40°F and 70°F
 - HOF using fixed reference temperatures of 62°F

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- Heating/Cooling/Baseload (electricity only)
 - Heating floating point reference temperatures ranging between 40°F and 70°F
 - Cooling floating point reference temperatures ranging between 60°F and 72°F
 - HCF using fixed reference temperatures of 58°F for heating and 68°F for cooling
- BO Baseload (electricity and gas, but no gas models passed the selection process)
 - o flat usage, requiring nine months of data.

Three levels of screens were used, including:

- 1) Insufficient usage history or usage characteristics
- 2) Poor model diagnostics
- 3) Poor model reliability.

SCREENS FOR POOR MODEL DIAGNOSTICS

Models were dropped if:

- the coefficient of variation of NAC exceeded 0.1
- negative values for adjusted r²
- Gas: R² of at least 0.7, electricity: R² of at least 0.5

SCREENS FOR POOR MODEL RELIABILITY

Models were dropped if:

- the normalized annual heating consumption, heating slope, or baseload components were negative
- Minimal requirements for specific model types:
 - Heating models require usage during periods representing at least 50% of the annual heating days
 - Baseload models required 8.5 months of consumption
- Usage histories had insufficient data during heating and/or cooling seasons. Histories must have usage during periods of at least 50% of heating degree days (base 62 for gas, 58 for electricity heating models), and 50% of cooling degree days base 68 (electricity only)
- Homes heating with electricity heating models had less than 40% of annual usage allocated to heating usage

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ATTRITION ANALYSIS - GAS

We requested data for 522 weatherization client dwellings with gas heating and 51,457 LIHEAP client dwellings for our comparison group (also with gas heating).

ATTRITION RATES

Table 2.1 provides a breakout of the attrition rates of the natural gas billing data request, by state and utility.

The utilities returned data for 87% of the treatment group and 82% of the comparison group. For cases that were returned, 95% of the treatment group and 87% of the comparison group (LIHEAP) dwellings has useable histories. Our final analytic dataset after assessing model diagnostics, model reliability, and outlier screens included 368 weatherization client dwellings and 27,718 comparison dwellings, representing 86% and 76% of the cases with useable usage histories for the treatment and comparison groups, respectively.

Table 2.1 Gas Analysis Sample Attrition

		Stat	ie	IP	L	внс	:	MA	Æ
		Trt	Cmpr	Trt	Cmpr	Trt	Cmpr	Trt	Cmpr
	Requested	522	51,457	199	13,974	65	6,815	258	30,668
Return Rate	Returned	454	42,023	185	11,946	62	6,421	207	23,656
	Percentage Returned	87.0%	81.7%	93.0%	85.5%	95.4%	94.2%	80.2%	77.1%
Useable Histories	Both Pre and Pst Cnt	430	36,579	167	8,706	56	4,741	207	23,132
	Pct of Returned	94.7%	87.0%	90.3%	72.9%	90.3%	73.8%	100.0%	97.8%
Passed Model Diagnostics	Both Pre and Pst Cnt	403	32,176	148	7,847	54	4,506	201	19,823
rasseu Model Diagnostics	Pct of Useable Histories	93.7%	88.0%	88.6%	90.1%	96.4%	95.0%	97.1%	85.7%
Passed Reliability and	Both Pre and Pst Cnt	368	27,718	134	6,941	49	4,086	185	16,691
Outlier Screens	Pct of Useable Histories	85.6%	75.8%	80.2%	79.7%	87.5%	86.2%	89.4%	72.2%

Table 2.2 provides the attrition analysis broken out by housing type. Overall, 86% of the returned account data for weatherized single family site-built dwellings passed all analytic screens. Similarly, of those cases with returned data, 90% of mobile homes and 60% of the few multi-family dwellings weatherized by the program passed all analytic screens.

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Table 2.2 Gas Attrition by Housing Type

		Sta	te	IP	L	внс		MA	ΛE
		Trt	Cmpr	Trt	Cmpr	Trt	Cmpr	Trt	Cmpr
Single Family Detached Fr	amed Dwellings								
Requested		455	34,010	176	10,008	59	4,793	220	19,209
Returned		402	29,533	166	9,076	56	4,633	180	15,824
Percentage Returned		88.4%	86.8%	94.3%	90.7%	94.9%	96.7%	81.8%	82.4%
Useable Histories	Both Pre and Pst Cnt	381	26,186	150	6,990	51	3,609	180	15,587
	Pct of Returned	94.8%	88.7%	90.4%	77.0%	91.1%	77.9%	100.0%	98.5%
	Both Pre and Pst Cnt	357	24,083	132	6,372	49	3,470	176	14,241
Passed Model Diagnostics	Pct of Useable Histories	93.7%	92.0%	88.0%	91.2%	96.1%	96.1%	97.8%	91.4%
Passed Reliability and	Both Pre and Pst Cnt	327	20,951	120	5,672	45	3,150	162	12,129
Outlier Screens	Pct of Useable Histories	85.8%	80.0%	80.0%	81.1%	88.2%	87.3%	90.0%	77.8%
Mobile Homes									
Requested		54	4,370	14	1,159	2	771	38	2,440
Returned		40	3,635	11	1,021	2	701	27	1,913
Percentage Returned		74.1%	83.2%	78.6%	88.1%	100.0%	90.9%	71.1%	78.4%
Useable Histories	Both Pre and Pst Cnt	39	3,049	10	733	2	485	27	1,831
	Pct of Returned	97.5%	83.9%	90.9%	71.8%	100.0%	69.2%	100.0%	95.7%
	Both Pre and Pst Cnt	37	2,732	10	657	2	463	25	1,612
Passed Model Diagnostics	Pct of Useable Histories	94.9%	89.6%	100.0%	89.6%	100.0%	95.5%	92.6%	88.0%
Passed Reliability and	Both Pre and Pst Cnt	35	2,357	10	583	2	428	23	1,346
Outlier Screens	Pct of Useable Histories	89.7%	77.3%	100.0%	79.5%	100.0%	88.2%	85.2%	73.5%
Multi-Family									
Requested		13	6,274	9	1,546	4	706	-	4,022
Returned		12	4,743	8	1,102	4	607	-	3,034
Percentage Returned		92.3%	75.6%	88.9%	71.3%	100.0%	86.0%		75.4%
Useable Histories	Both Pre and Pst Cnt	10	3,924	7	574	3	379	-	2,971
	Pct of Returned	83.3%	82.7%	87.5%	52.1%	75.0%	62.4%		97.9%
	Both Pre and Pst Cnt	9	3,094	6	480	3	348	-	2,266
Passed Model Diagnostics	Pct of Useable Histories	90.0%	78.8%	85.7%	83.6%	100.0%	91.8%		76.3%
Passed Reliability and	Both Pre and Pst Cnt	6	2,595	4	415	2	311	-	1,869
Outlier Screens	Pct of Useable Histories	60.0%	66.1%	57.1%	72.3%	66.7%	82.1%		62.9%

GAS IMPACT ANALYSIS

Our results are summarized in Table 2.3. The agency-specific results are summarized on each line, with the overall program impacts summarized on the bottom line. The column labeled 'Population' provides the count of all dwellings with natural gas heating that were treated by the weatherization program during the calendar year. The treatment group columns indicate the number of dwellings in our screened analysis dataset ('n'), the weather-normalized annual consumption prior to weatherization ('Baseline' consumption), the 90% confidence interval on the baseline consumption (interpreted as the variation from baseline for which we are 90% certain that the true mean value of the baseline consumption falls within), the unadjusted savings ('Savings') and the 90% confidence interval on the savings.

The next section of Table 3.2 provides results for the matched comparison group. To the right if those results are the net savings by agency, including average savings and percentage savings.

The overall adjusted savings (reported under the Net Savings column) averaged 224 therms for single family site-built dwellings. The 90% confidence interval was 36 therms, which is suggestive that 90%

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certain that the true population mean savings falls in the approximate range of 188 and 260 therms. The overall mean percent savings was 22.7%, with a 3.2% confidence interval.

Net gas savings for thirty-five mobile homes averaged 189 therms ±107 therms. The overall percentage savings for mobile homes was 20.2%, with a 10.8% confidence interval.

We did not have enough data to provide reliable results for the few multi-family dwellings weatherized.

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Table 2.3 Gas Fuel Consumption Analysis Results

	Population (with gas		Treatme Baseline	nt Group				Compai Baseline	rison Grou	р		Net			
	heating		Cons.		Savings			Cons.		Savings	90%	Savings		Percent	
	source)	n	(therms)	90% CI	(therms)	90% CI	n	(therms)	90% CI	(therms)	CI	(therms)	90% CI	Savings (%)	90% CI
Single Family Detached F	ramed Dwelling	Results													
New Opportunities	19	15	1,164	195	228	249	505	1,034	21	26	28	205	249	17.7%	19.4%
HACAP	47	34	942	70	198	98	2,144	939	8	11	12	187	98	19.8%	9.5%
Eastern IA	26	20	1,041	140	246	180	1,300	994	15	16	21	231	180	22.2%	15.2%
MATURA	12	3	864	81	91	131	78	862	10	19	21	72	133	8.4%	15.2%
MICA	15	11	1,156	200	365	238	517	1,056	19	29	27	337	236	29.2%	16.7%
Mid-Sioux	3	3	1,102	258	248	433	52	1,097	34	30	51	217	435	19.7%	37.7%
NE Iowa	44	32	995	57	82	77	691	985	12	-19	17	101	80	10.2%	7.4%
New View	15	9	1,179	225	211	305	0	0	0	0	0	211	0	17.9%	0.0%
Threshold	43	28	1,226	103	287	133	1,034	1,180	13	26	19	262	133	21.4%	9.6%
IMPACT	21	14	1,102	145	358	170	605	1,037	18	55	24	310	167	28.2%	12.6%
SCICAP	4	2	946	228	225	233	45	948	15	23	27	202	232	21.3%	19.9%
SE Iowa	40	20	1,073	70	389	92	342	1,049	13	-2	21	390	95	36.4%	7.1%
SIEDA	19	17	816	149	213	182	856	801	19	15	27	197	183	24.2%	19.0%
Upper Des Moines	64	45	848	66	180	82	1,400	853	11	9	16	171	83	20.2%	8.6%
West Central	22	15	890	132	334	150	1,096	884	14	21	19	313	149	35.2%	12.5%
CAA Siouxland	9	7	1,144	284	464	323	577	1,136	24	27	33	437	320	38.2%	20.4%
Polk County	71	52	884	58	239	69	2,699	844	6	0	9	240	69	27.1%	6.4%
Overall	474	327	990	28	239	36	20,965	970	3	15	5	224	36	22.7%	3.2%
Mobile Home Results (er	ntire state)														
Overall	54	35	867	84	202	107	2,141	865	11	13	15	189	107	20.2%	10.8%

2.7

SAVINGS WITH RESPECT TO PRE-WEATHERIZATION USAGE

We plotted the relationship between the normalized annual consumption and the net savings for single family site-built dwellings (Figure 2.2). The upward trending regression line indicates the population-weighted fit between NAC and savings, and demonstrates savings in relation to baseline consumption. The statewide average is shown at the center, labeled 'State'.

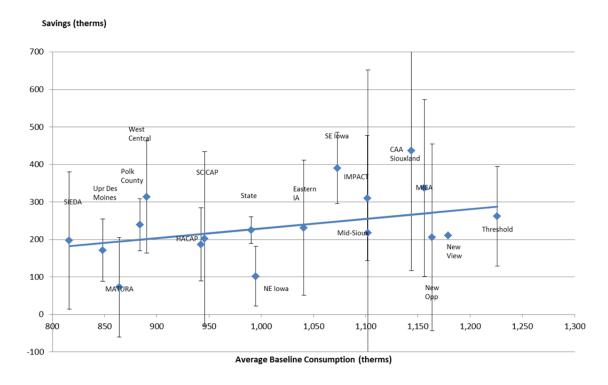


Figure 2.2 Savings in relation to the pre-weatherization normalized annual consumption (single family site-built dwellings).

The 90% confidence intervals are extremely wide for several agencies, including IMPACT, Mid-Sioux, and New Opportunities. The 90% confidence intervals of the average adjusted savings for each agency are shown in the error bars. Agencies with confidence intervals overlapping the regression line produced savings consistent with the state overall for dwellings relative to the baseline consumption for those agencies.

Any agency in which the entire confidence interval falls below the regression line is underperforming relative to other agencies. One agency, NE lowa, fell into this range.

Similarly, any agency in which the entire confidence interval lies above the regression line outperformed other agencies. SE Iowa achieved this.

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The high variation in savings can be attributed to various factors including wide variations in housing stock, agency practices, and lower sample sizes. These factors have become a hindrance to assessing agency-specific results in recent years as fewer numbers of homes weatherized. No confidence interval was determined for New View due to a lack of comparison group dwellings for that agency (New View had halted operations prior to the period in which we sampled the comparison group).

Figure 2.3 provides another view of the savings with respect to baseline consumption. The plot shows a point for the savings for dwellings in our billing dataset, a regression line through all points, and an assessment of the percentage savings as determined by this regression line (shown by the curved line). The chart provides confirmation that absolute savings increase as higher-consumption dwellings are targeted. Percent savings increases significantly as baseline consumption increases at the lower range, and less so at higher ranges as the curve flattens out.

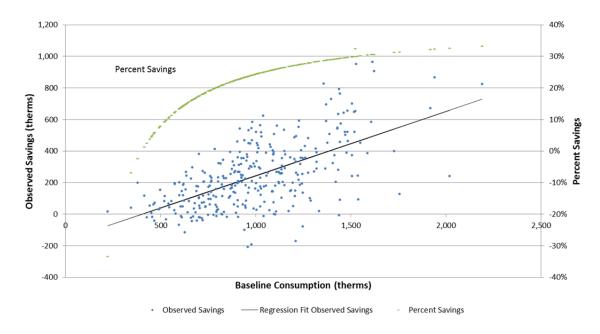


Figure 2.3 Relationship between baseline consumption, savings, and percentage savings

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TRENDS IN BASELINE CONSUMPTION AND ENERGY SAVINGS

Figure 2.4 provides a yearly summary of baseline consumption, savings, and percentage savings for billing analyses conducted since the calendar year 1998 program. The treatment group normalized annual consumption averaged 1,394 therms the CY 1998 program. Baseline consumption has declined by 28.7% since then, averaging 990 therms in CY 2020. Net savings (224 therms) has been trending downward slightly in the past seven years and is in the lower range compared to those in prior years. The percentage savings of 22.6% is slightly less than a year earlier (23.8%).

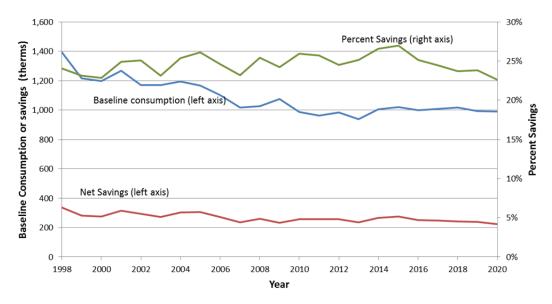


Figure 2.4 Annual Baseline Consumption, Savings, and Percent Savings

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ATTRITION ANALYSIS - ELECTRICITY

We requested data for 535 weatherization clients and 64,185 LIHEAP households for our comparison group. Overall we had 273 treatment and 25,664 comparison group homes which passed all screens.

Table 2.5 Electricity Analysis Sample Attrition

		Stat	te	IPI	L	MA	Ε
		Trt	Cmpr	Trt	Cmpr	Trt	Cmpr
	Requested	535	64,185	303	28,343	232	35,842
Return Rate	Returned	477	53,910	288	24,655	189	29,255
	Percentage Returned	89.2%	84.0%	95.0%	87.0%	81.5%	81.6%
Useable Histories	Both Pre and Pst Cnt	413	42,220	239	15,738	174	26,479
	Pct of Returned	86.6%	78.3%	83.0%	63.8%	92.1%	90.5%
Passed Model Diagnostics	Both Pre and Pst Cnt	348	34,215	195	14,026	153	20,187
Passed Model Diagnostics	Pct of Useable Histories	84.3%	81.0%	81.6%	89.1%	87.9%	76.2%
Passed Reliability and	Both Pre and Pst Cnt	273	25,664	153	11,179	120	14,483
Outlier Screens	Pct of Useable Histories	66.1%	60.8%	64.0%	71.0%	69.0%	54.7%

Table 2.6 provides the attrition analysis broken out by housing type. Most of the cases with electricity results were for weatherized single family detached frame dwellings, totaling 238 cases. Weatherization results for thirty mobile homes and five multi-family units passed all screens.

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Table 2.6 Electricity Attrition by Housing Type

		Stat	te	IPI	L	MA	ιE
		Trt	Cmpr	Trt	Cmpr	Trt	Cmpr
Single Family Detached Fr	amed Dwellings						
Requested		470	36,192	259	16,682	211	19,510
Returned		417	31,687	247	15,254	170	16,433
Percentage Returned		88.7%	87.6%	95.4%	91.4%	80.6%	84.2%
Useable Histories	Both Pre and Pst Cnt	358	25,680	202	10,707	156	14,973
	Pct of Returned	85.9%	81.0%	81.8%	70.2%	91.8%	91.1%
Passed Model Diagnostics	Both Pre and Pst Cnt	304	21,631	168	9,467	136	12,164
	Pct of Useable Histories	84.9%	84.2%	83.2%	88.4%	87.2%	81.2%
Passed Reliability and	Both Pre and Pst Cnt	238	17,291	131	7,886	107	9,405
Outlier Screens	Pct of Useable Histories	66.5%	67.3%	64.9%	73.7%	68.6%	62.8%
Mobile Homes							
Requested		49	4,418	30	2,214	19	2,204
Returned		46	3,619	29	1,912	17	1,707
Percentage Returned		93.9%	81.9%	96.7%	86.4%	89.5%	77.5%
Useable Histories	Both Pre and Pst Cnt	43	2,783	27	1,256	16	1,525
	Pct of Returned	93.5%	76.9%	93.1%	65.7%	94.1%	89.3%
Passed Model Diagnostics	Both Pre and Pst Cnt	36	2,350	21	1,136	15	1,213
	Pct of Useable Histories	83.7%	53.2%	70.0%	51.3%	78.9%	55.0%
Passed Reliability and	Both Pre and Pst Cnt	30	1,910	18	955	12	954
Outlier Screens	Pct of Useable Histories	69.8%	68.6%	66.7%	76.0%	75.0%	62.6%
Multi-Family							
Requested		16	8,885	14	4,124	2	4,761
Returned		14	7,007	12	3,217	2	3,790
Percentage Returned		66.7%	72.8%	0.0%	72.6%	100.0%	73.1%
Useable Histories	Both Pre and Pst Cnt	12	5,062	10	1,639	2	3,423
	Pct of Returned	85.7%	72.2%	83.3%	50.9%	100.0%	90.3%
	Both Pre and Pst Cnt	8	3,905	6	1,482	2	2,423
Passed Model Diagnostics	Pct of Useable Histories	66.7%	77.1%	60.0%	90.4%	100.0%	70.8%
Passed Reliability and	Both Pre and Pst Cnt	5	2,672	4	1,061	1	1,611
Outlier Screens	Pct of Useable Histories	41.7%	52.8%	40.0%	64.7%	50.0%	47.1%

ELECTRICITY IMPACT ANALYSIS

We developed state-level electricity savings results for two groups, those with non-electric space heat and for those with electric space heat. Our results are summarized in Table 2.7.

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Table 2.7 Electricity Fuel Consumption Analysis Results (State Level Results)

	Population		Treatme	nt Group)			Compa	rison G	iroup					
			Baseline					Baseline				Net		Percent	
			Cons.		Savings	90%		Cons.	90%	Savings	90%	Savings	90%	Savings	90%
	n	n	(kWh)	90% CI	(kWh)	CI	n	(kWh)	CI	(kWh)	CI	(kWh)	CI	(%)	CI
	vings for Dwe	T T		tric Space		631	22 921	9 305	48	28	68	617	637	6.4%	6.3%
Overall	623 vings for Dwe	258	9,648	453	643	631	22,921	9,305	48	28	68	617	637	6.4%	6.3%

Dwellings with non-electric space heat averaged 617 kWh (±637 kWh) net savings from lighting, refrigerators and freezers, water heating, cooling measures, and reductions in furnace blower fan usage. The average net savings for dwellings with electric heat averaged 2,492 kWh per dwelling, with a wide 90% confidence range of 3,639 kWh.

COMPARISON OF POPULATION AND SAMPLE ENERGY USAGE

Table 2.8 provides the adjustment factors that were applied to estimated savings for each dwelling weatherized by the program. The adjustment factor for natural gas was also applied to dwellings heated by propane, fuel oil, and other non-electric fuels.

Table 2.8 Adjustment Factors Applied to Estimated Savings

	Estimated	Observed	Adjustment
	Savings	Savings	Factor
Electricity			
Dwellings with Non-Electric Space Heat	660	617	0.93
Dwellings with Electric Space Heat	2,436	2,492	1.02
Natural Gas Heat			
Single Family Detached and Small Multi-family	245	224	0.92
Mobile Home	112	189	1.68

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3. DETAILED SPENDING AND IMPACT PROFILES BY FUNDING ENTITY

This section provides tables of spending and impacts for the utilities, the state, and the overall program. The tables are designed to provide information to meet the filing requirements for cost recovery.

The summaries of impacts for state and utility funding are similar in format to those provided in the earlier SLICE reports.

We show a second table for each of the utilities in this report. These tables show the combined impacts of electricity and natural gas measures from all funding sources. These tables should prove useful for the energy and demand planning departments at the utilities to account for the aggregate impacts of the low-income program, and not just the impacts funded by a specific utility.

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Total Reported Labor, Materials and Utility Admin Expenditures: \$9,287,970

Utility Administration Expenditures: \$67,546

Total Labor and Material Expenditures: \$9,220,424

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																	Billing /	Adjusted F	irst-Year S	avings				Averag						nd Saving	js		
	Num	ber of E	welling	s with I	Impact	ts	Nu	mber c	of Dwel	lings v	ith kW	h Impact								i.					per Dw		Receivir		sures				
					Fuel	ı	S	eason						ending on	Sun	mer	Electricity	/ inter	Annual	Pk-Day	Gas Annual	Propage	Fuel Oil Other	Spending on Materials	Sumn		Electricit Win		Annual	G Pk-Day	as Annual	Propage	Fuel Oil Other
Measure	Total	Electric	Gas	Propane	Oil	Other			ating					Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms	gallons	gallons Mbtu	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms	gallons	gallons Mbtu
Total Efficiency Measures	579	579	452	73	2	2 0	57	78	579					4,547,861	103.7		118.1		388.770	1 000	102,439	18,570	292 0	7,855	0.179		0.204		671	2.43	22	254	146 -
-				13		. 0																											
Total Shell & Htg. Sys. Repl	579 579	579 579	452 452	73 73		2 0			578 578					3,837,969 2,653,454	91.0 91.0	102,707	97.7 95.5	148,460 145,161	251,167 247,868		98,512 59,899		292 C		0.159	179 179	0.169	257 251	434 428	2.39	218		146 -
Wall Insul.	314	298	265	31					18				-	619,685	34.0	41.018	12.2	18,312	59.331	656 205	18,694	2,450	136 0	1,974	0.159	179	0.165	1.017	199	0.77	7:		68 -
Open Blown Ceiling Insul	454	427	350	58	1				45					468,639	34.1	41,139	33.8	51,198	92,336	220			21 0	1,032		97	0.752	1,138	216		5		21 -
Cavity Fill Insul	164	131	133	22	1				8					162,438	5.6	6,698		7,649	14,347	68	6,256	952	66 0	990		52	0.616	956	110		4		
Sloped Attic Insul Kneewall Insul	174 138	154 123	136 113	30 17					8 8					105,139	6.6 2.0	7,956 2 453		5,452	13,408	57	5,238		0 0	604 460	0.043 0.017	52 20	0.453	682 132	87 29	0.42 0.17	39		
Infil. Reduction	574	543	449	71					52					63,530 589,000	7.2	2,453 8,679		1,055 13,325	3,508 22,005	19 78			47 0	1,026		16	0.065	256	41	0.17	1:		
Found./Crawl. Insul	186	58	148	25					13					157,711	2.5	3,047	2.6	3,939	6,987	23	2,131	464	0 0	848	0.051	61	0.200	303	120	0.16	14		
Bandjoist Insul.	220	23	156	40					23					80,639	0.0	0		2,955	2,955	8			6 0	367	0.000	0	0.084	128	128			5 7	6 -
Furnace Blower Fan ¹	526	520	452	72					520					0	0.0	0		58,546	58,546	(3)				0	0.000	0	0.073	113	113	(0.01)	(
Exhaust Ventilation	400 374	400	320 308	47		0		00	400 21					406,672 1.184.515	-1.0	(8,284		(17,271)	(25,555)	(20) 424			(4) C	1,017 3,167	-0.003 0.000	(21)	(0.028)	(43) 157	(64) 157	(0.06)	12:		
Total Heating System Repl Condensing Htg Sys Rep	352	0	307	44		0	-		-					1,076,292	0.0	0		3,299	3,299	424	38,317	6,941	156 0	3,058	0.000	- 0	0.105	- 15/	- 15/	1.37	12:		156 -
Non-Cond Htg Sys Repl	2	0	2	0					-					6,100	0.0	0	0.0	0	0	3	296		0 0	3,050	-	-	-	-	-	1.60	14		
Electric Htg Sys Repl	14	14	0	0					14					45,464	0.0	0		1,983	1,983	0			0 0	3,247		0	0.096	142	142		-	-	
Heat Pump Repl Other Htg Sys Repl	9	9	0	0	-				9					56,658 0	0.0	0		1,317 0	1,317	0	0	_	0 0	6,295	0.000	0	0.097	146	146	-	-	1 - 1	
Canar Fing Oya Teeps		0	J	- 0		, 0		ber of M	Measure	s Install	ed by F	iel Type		0	0.0			- 0						-	<u> </u>	-	-			-		<u> </u>	
			•		Fuel	0					-	Fuel			Summer		Winter		Annual	Pk-Day	Annual		Fuel Oil Other		Summer		Winter			Pk-Day	Annual		Fuel Oil Other
Water Heating	Total 556	179	Gas 349	Propane 28		Other			ctric (728	ropane 53	Oil C	ther 0	633,891	kW		kW 0.4		kWh 22,037	therms 19.0			gallons Mbtu	1,140	kW 0.000		kW			0.054	therms		gallons Mbtu
Temp. Reduct.	32	11	19	2	2 0	0	3	32	11	19	2	0	0	16	0.0		0.0		1,173	0.4	139		0 0	1	0.000		0.000		107	0.02	-	7 8	
WH Wrap	16	6	8	2				17	6	9	2	0	0	2,256	0.0		0.0		635	0.2			0 0	141	0.000		0.000		106	0.03	!		
Pipe Insul. LF Showerhead	513 54	168 17	324 33	21 4					168 20	324 37	21 4	0	0	7,964 491	0.0		0.0 0.1		6,169 2,513	2.9 0.8	1,005 253	73 38	0 0	16	0.000		0.000		37 148		;		
Faucet Aerator	88	27	58	3					36	90	5	0	0	473	0.0		0.0		1,001	0.6	135			5	0.000		0.003		37			3	
Std-Eff Wtr Htr Repl.	0	0	0	0	0	0		0	0	0	0	0	0	0	0.0		0.0		0	0.0	0	0	0 0	0	-		-		-	-	-	-	
Hi-Eff or Electric Wtr Htr Repl.	364	96	249	19) 0	0	-	, ,	96	249	19	0	0	622,692	0.0		0.3		10,546	14.2	2,323		0 0	1,711			0.003		110			, ,,	
Lighting Refrigerator/Freezer ³	416 63	416 63					4,25	59 <u>4</u> 57	67					26,580 49,420	9.1		16.8		86,418 29,148	-	-	-		64 784			0.040		208 463			-	
Refrigerator/Freezer	0	0.0						0	0					49,420	0.0		0.0		29,148				-:::	784	0.057		0.053		463			-	- 1 1
Refrigerator Exchange	55	55					5	6	56					43,413	3.0		2.8		24,098	-	-	-		789			0.050		438		-	-	
Freezer Removal	1	1 10						1	1					30	0.1 0.6		0.1		455	-	-	-		30 598	0.056		0.052		455		-	-	
Freezer Exchange	10	10						10	10					5,977	0.0		0.5		4,595	-		-		596	0.057		0.053		459	-		-	
Total Non-Efficiency Measures	579													4,672,563										8,070									
Misc Ins,Attic Access/Ven	492													188,090										382									
Duct Sealing Duct Insulation	166 276													40,629 37.838										245 137									
Damming Material	289													22,330										77									
Htg. Sys. Tune & Clear	227													55,319										244									
Htg. Sys./WH Other Air Conditioning Work	186 29													102,613 2,288										552 79									
Air Conditioning Work Air Conditioning Replacemen	1													2,200										2,850									
Water Heater Repair	61													6,683										110									
Refrigerator Coil Clean	0													0										0									
Waterbed Mattress Pad Programmable Tstat	0 14													1,400										100									
Unspecified Utility Meas	0													0										0									
CO Detector	552													58,591										106									
Smoke Detector Fuses	403 0													32,263 0										80									
Htg Sys Safety Check	14													960										69	1								
Htg Sys Ventilation	315													76,911										244									
Water Heater Ventilation	244													43,511										178									
Bathroom Ventilation Dryer Ventilation	286 367													57,275 43,686										200 119									
Kitchen Ventilation	45													8,814										196									
Other Exhaust Ventilation	207													10,831										52									
Asbestos Removal (Minor)	2													850										425									
Health/Safety Repairs	432 245													169,086 81,715										391 334									
Health/Safety Other	48													3,416										71									
Consumables	112													5,376										48									
General Repairs	530													370,264										699	-								
Meter Refrig (no action) Meter Freezer (no action)	455 156													0										0	1								
Support	573													2,261,937										3,948									
Covid Support	119													835,896										7,024									
Transportation Allowance Landlord Contr Misc	142 0													21,395										151									
Landlord Contr Misc Landlord Contr Furnace	0													0										0	1								
Landlord Contr DHW	0													ő										0	1								
Client Contr (Any)	0													0										0									
Lead Safe Work	364													129,747										356	1								

¹ Estimates are based upon reduced usage of the furnace due to shell improvement

Dalhoff Associates, LLC

² Impacts from continuous exhaust fans required by ASHRAE 62.2. The winter impacts exceed summer because these also include heating season impacts for dwellings with electric heating.

The total number of dwellings may exceed the number of measures installed in cases where the utility partially funds refrigeration measure replacements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed in cases where the utility partially funds refrigeration measure replacements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed in cases where the utility partially funds refrigeration measure replacements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed in cases where the utility partially funds refrigeration measure replacements.

Total Reported Labor, Materials and Utility Admin Expenditures: \$7,145,395

Utility Administration Expenditures:

Total Labor and Material Expenditures: \$7,145,395

															TOTAL LABO	i aiiu iiia	iteriai Expe	bilaitai 63.	φ1, 140,35C		
	1				В	illing Adj	usted Fire	st-Year S	avings				Avera		Adjusted F			and Savin	gs		
	Number of Dwellings with Impacts	Number of Dwellings with kWh Impacts	Spending on		FI	ectricity			ı	Gas			Spending on	per Dw	elling Rece Elect		easures	1 6	as	1	
	Fuel	Season	Materials	Sum	mer	Winte		Annual	Pk-Day	Annual		Fuel Oil Othe	r Materials	Summ	er	Winter	Annua	al Pk-Day	Annual		uel Oil Other
Measure	Total Electric Gas Propane Oil Ot	her Cooling Heating	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms	gallons	gallons Mbtu	& Labor (\$)	kW	kWh kV	V kW	h kWh	therms	therms	gallons g	allons Mbtu
Total Efficiency Measures	577 576 450 73 2	0 560 576	2,846,925	43.4		51.5		168,707	412	39,083	18,570	292 (4,934	0.078	0.0	189	293	3 0.92	87	254	146 -
Total Shell & Htg. Sys. Repl	575 575 448 73 2	0 553 574	2,185,346	38.2	39,021		65,915	104,935	397	36,192	18,221	292 (71 0.0				81		146 -
Total Shell Measures Wall Insul	575 575 448 73 2 161 140 102 31 0	0 553 574 0 140 6	1,570,235 276.026	38.2 14.1	39,021 16,980	41.5 4.9	63,577 7 491	102,598 24 472	226 72	20,723 6.572	11,280 2,450	136 0	2,731	0.069	71 0.0 121 0.8		11 178 49 179		46 64	155 79	68 -
Open Blown Ceiling Insul	230 186 125 58 1	0 186 18	191,096	12.6	15,221		14,676	29,897	66	5,982		21 (82 0.5		15 16		48		21 -
Cavity Fill Insul	72 54 40 22 1	0 54 2	48,574	2.5	3,001		3,972	6,973	15		952	66 (56 1.2				35		66 -
Sloped Attic Insul Kneewall Insul	99 75 57 30 0 66 54 36 17 0	0 75 6 0 54 4	50,515 23,448	2.9 0.7	3,463 869	2.5 0.4	3,819 617	7,283 1,485	22 5	2,066 484	1,376 331	0 (510	0.038 0.013	46 0.4 16 0.0		37 97 54 28		36 13	46 19	: :
Infil. Reduction	546 480 407 71 2	0 479 47	470,540	5.4	6,507	6.9	10,587	17,095	59	5,364	1,243	47 (862	0.011	14 0.1	47 2	25 36	6 0.14	13	18	24 -
Found./Crawl. Insul Bandioist Insul	85 26 50 25 0 120 11 68 40 1	0 23 4	63,516 39,847	1.0	1,264 0	1.1 0.7	1,653 1,062	2,917 1,062	6		464 274	6 (747		55 0.2 0 0.0		13 112 97 97		11 4	19 7	6 -
Furnace Blower Fan ¹	508 508 434 72 2	0 - 508	0	0.0	0		36,970	36,970	(1)				0 0	0.000	0 0.0		73 73		(0)		(0) -
Exhaust Ventilation ²	400 400 320 47 1	0 400 400	406,672	-1.0	(8,284)		(17,271)	(25,555)	(20)				1,017	-0.003	(21) (0.0		43) (64		(6		(4) -
Total Heating System Repl Condensing Htg Sys Rep	208 16 147 44 1 191 0 146 44 1	0 - 16	615,111 536,633	0.0	0	1.6 0.0	2,337	2,337	170 167	15,468 15,172	6,941 6,941	156 (156 (2,957	0.000	0 0.0	198 1	46 146	6 1.16 1.14	105 104	158 158	156 - 156 -
Non-Cond Hta Svs Repl	2 0 2 0 0	0	6,100	0.0	0	0.0	0	0	3	296	0,941	0 (3.050		1 1			1.60	148	-	
Electric Htg Sys Repl	9 9 0 0 0	0 - 9	28,764	0.0	0	0.9	1,323	1,323	0	0	0	0 (3,196		0 0.0		47 147	7 -	-	-	
Heat Pump Repl Other Htg Sys Repl	9 9 0 0 0	0 - 9	43,613	0.0	0	0.7 0.0	1,015	1,015	0	0	0	0 (4,846	0.000	0 0.0)75 1·	13 113	3 -	-	-	
outer ring eye nepr		Number of Measures Installed by Fuel Type	-				U	U	J		-	J (. 0		-			1 -			
	Fuel Total Electric Gas Propane Oil Ot	Fuel her Total Electric Gas Propane Oil Other		Summer kW		Winter kW		Annual kWh	Pk-Day therms	Annual therms		Fuel Oil Other gallons Mbtu		Summer kW	Win:		Annua kWh	al Pk-Day therms	Annual therms		uel Oil Other allons Mbtu
Water Heating	455 143 284 28 0	0 678 217 408 53 0 0		0.0		0.3		16,441	15.9	2,892	349	0 (0.000	0.0	102	115	5 0.056	10		
Temp. Reduct. WH Wrap	13 4 7 2 0 14 5 7 2 0	0 13 4 7 2 0 0 0 15 5 8 2 0 0	2,056	0.0 0.0		0.0 0.0		490 529	0.1 0.2	51 65	16 18	0 (1 147	0.000 0.000	0.0 0.0		123 106	3 0.02 6 0.03	7	8 9	
Pipe Insul.	212 82 109 21 0	0 15 5 8 2 0 0 0 212 82 109 21 0 0	3,171	0.0		0.0		2,998	1.0			0 (15		0.0		37		3		
LF Showerhead	21 9 8 4 0	0 24 11 9 4 0 0	186	0.0		0.0		1,343	0.2	57	38	0 (9	0.000	0.0	103	149	9 0.02	7	9	
Faucet Aerator Std-Eff Wtr Htr Repl.	34 15 16 3 0 0 0 0 0 0	0 50 19 26 5 0 0 0 0 0 0 0 0 0	178	0.0		0.0		534 0	0.1 0.0	44 0	10	0 (5	0.000	0.0	101	36	6 0.01	3	3	: :
Hi-Eff or Electric Wtr Htr Repl.	364 96 249 19 0	0 364 96 249 19 0 0	622,692	0.0		0.3		10,546	14.2		195	o d	1,711		0.0		110		9	10	
Lighting	150 150	1,546 1,546	9,484	3.5		6.5		33,329	-	-	-		63		0.0		222			-	
Refrigerator/Freezer ³ Refrigerator Removal	40 40 0 0	32 32 0 0	23,795	1.7 0.0		1.6 0.0		14,001	-	- :	-		595 0	0.043	0.0	140	350	-	-	-	
Refrigerator Exchange	32 32	22 22	18,317	1.2		1.1		9,449	-	-	-		572	0.036	0.0		295		-	-	
Freezer Removal Freezer Exchange	1 1	1 1 9 9	30 5,448	0.1 0.5		0.1 0.5		455 4,097	-	- :	- :		30 605	0.056 0.056	0.0		455 455	5 -		- :	: :
-								.,							-			- 1			
Total Non-Efficiency Measures Misc Ins.Attic Access/Ven	579 462		4,298,470 160,775										7,424 348								
Duct Sealing	146		31,578										216								
Duct Insulation Damming Material	266 289		34,616 22,330										130 77								
Htg. Sys. Tune & Clean	207		45,444										220								
Htg. Sys./WH Other	186		102,613										552								
Air Conditioning Work Air Conditioning Replacemen	29		2,288 2,850										79 2 850								
Water Heater Repair	61		6,683										110								
Refrigerator Coil Clean Waterbed Mattress Pad	0		0										0								
Programmable Tstat	1		100										100								
Unspecified Utility Meas	0		0										0								
CO Detector Smoke Detector	552 403		58,591 32,263										106 80								
Fuses	0		0										0								
Htg Sys Safety Check Htg Sys Ventilation	14 172		960 39.865										69 232								
Water Heater Ventilation	243		43,090										177								
Bathroom Ventilation Dryer Ventilation	286 367		57,275 43,686										200								
Kitchen Ventilation	45		43,686 8,814										119 196								
Other Exhaust Ventilation	207		10,831										52 425								
Asbestos Removal (Minor) Health/Safety Repairs	2 417		850 166 088										425 308								
PPE	245		81,715										398 334								
Health/Safety Other Consumables	48 112		3,416 5,376										71 48								
General Repairs	435		295,712										680								
Meter Refrig (no action)	392		0										0								
Meter Freezer (no action) Support	148 564		2,053,625										3,641								
Covid Support	119		835,896										7,024								
Transportation Allowance	142		21,395										151								
Landlord Contr Misc Landlord Contr Furnace	0		0										0								
Landlord Contr DHW	0		0										0								
Client Contr (Any) Lead Safe Work	364		129,747										356								
Unspecifed/Other	0		0										0	<u></u>							

¹ Estimates are based upon reduced usage of the furnace due to shell improvements

Dalhoff Associates, LLC

² Impacts from continuous exhaust fans required by ASHRAE 62.2. The winter impacts exceed summer because these also include heating season impacts for dwellings with electric heat.

³ The total number of dwellings may exceed the number of measures installed in cases where the utility partially funds refrigeration measure replacements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed.

Total Reported Labor, Materials and Utility Admin Expenditures: \$1,002,392

Utility Administration Expenditures: \$36,118 Total Labor and Material Expenditures: \$966,274

	Numbe	er of Dwe	llings	Numbe	r of Dwellings			ı	Billing A	Adjusted I	First-Year	Savings		Avera	ge Billin per Dv		sted Fir Receivi			and Sav	ings
	v	vith Impact	ts	with Elec	tricity Impacts	Spending on Materials		nmer		inter	Annual	Pk-Day	Gas Annual	Spending on Materials	Sumi	mer	Electricit Win	ty iter	Annual	Pk-Day	Sas Annual
Measure	Total	Electric	Gas	Cooling	Heating	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms
Total Efficiency Measures	243	216	134	211	216	786,070	34.4		42.0		130,343	280	25,671	3,235	0.163		0.194		603	2.09	192
Total Shell & Htg. Sys. Repl	224	197	134	187	197	758,822	30.5	36,756	35.8	53,660	90,417	279	25,325	3,388	0.163	197	0.182	272	459	2.08	189
Total Shell Measures	224	197	134	187	197	532,161	30.5	36,756	35.4	53,159	89,915	181	16,369	2,376	0.163	197	0.180	270	456	1.35	122
Wall Insul.	115	99	78	99	6	158,430	11.1	13,412	4.8	6,879	20,291	58	5,259	1,378	0.112	135	0.794	1,147	205	0.74	67
Open Blown Ceiling Insul. Cavity Fill Insul.	173 58	152 44	99 42	151 43	20 4	130,674 62,733	12.4 1.7	14,919 2,077	17.2 2.1	25,936 3,184	40,855 5,261	61 25	5,494 2,297	755 1,082	0.082	99 48	0.862 0.532	1,297 796	269 120	0.62	55 55
Sloped Attic Insul.	59	53	40	53	2	28,994	2.3	2,738	1.1	1,633	4,371	15	1,388	491	0.040	52	0.543	817	82	0.38	35
Kneewall Insul.	53	46	33	46	3	19,973	0.8	962	0.1	138	1,100	5	485	377	0.017	21	0.031	46	24	0.16	15
Infil. Reduction	186	154	125	153	22	66,715	1.2	1,423	1.4	2,100	3,523	8	751	359	0.008	9	0.062	95	23	0.07	6
Found./Crawl. Insul.	61	24	46	19	9	43,684	1.0	1,224	1.5	2,286	3,510	6	517	716	0.053	64	0.168	254	146	0.13	11
Bandjoist Insul.	51	8	43	-	8	20,960	0.0	0	1.1	1,634	1,634	2	225	411	0.000	0	0.136	204	204	0.06	5
Furnace Blower Fan 1	201	174	134	-	174	0	0.0	0	6.2	9,370	9,370	(1)	(46)	0	0.000	0	0.035	54	54	(0.00)	(0)
Exhaust Ventilation ²	0	0	0	0	0	0	0.0	0	0.0	0	0	0	0	0	-	-	-	-	-	-	
Total Heating System Repl	83	4	79	-	4	226,661	0.0	0	0.3	501	501		8,955	2,731	0.000	0	0.085	125	125	1.24	113
Condensing Htg Sys Repl Non-Cond Htg Sys Repl	79 0	0	79 0	-	-	214,761	0.0 0.0	0	0.0	0	0	98 0	8,955 0	2,718	-	-	-	-	-	1.24	113
Electric Htg Sys Repl	3	3	0		3	8,400	0.0	0	0.3	437	437	0	0	2,800	0.000	- 0	0.100	146	146		- :
Heat Pump Repl	1	1	0	-	1	3,500	0.0	0	0.0	64	64	0	0	3,500	0.000	0	0.041	64	64	-	-
Other Htg Sys Repl	0	0	0	-	0	0	0.0	0	0.0	0	0	0	0	0	-	-	-	-	-	-	-
					ber of Measures																
	Total	Electric	C	Total	/ Fuel Type Electric Gas		Summer		Winter kW		Annual kWh	Pk-Day	Annual therms		Summer kW		Winter kW		Annual kWh	Pk-Day therms	Annual
Water Heating	Total 135	Electric 61	Gas 74	182	Electric Gas 88 94	2,349	0.0		0.0		4,268	therms 1.0	tnerms 347	17	0.000		0.001		70	0.014	therms 5
Temp. Reduct.	133	6	74	13	6 7	2,349	0.0		0.0		586	0.1	51	0	0.000		0.000		98	0.014	7
WH Wrap	2	1	1	2	1 1	201	0.0		0.0		106	0.0	8	100	0.000		0.000		106	0.02	8
Pipe Insul.	133	59	74	133	59 74	2,010	0.0		0.0		2,168	0.6	225	15	0.000		0.000		37	0.01	3
LF Showerhead	13	7	6	14	8 6	94	0.0		0.0		1,023	0.2	55	7	0.000		0.003		146	0.03	9
Faucet Aerator	13	9	4	20	14 6	44	0.0		0.0		384 0	0.0	8	3	0.000		0.001		43	0.01	2
Std-Eff Wtr Htr Repl. Hi-Eff or Electric Wtr Htr Repl.	0	0	0	0	0 0	0	0.0		0.0		0	0.0	0	0	-		-		-	-	-
Lighting	138	138	- 0	1,381	1,381	8,027	2.8		5.1		26,314		-	58	0.020		0.037		191	-	
Refrigerator/Freezer ³	21	21		21	21	16,871	1.1		1.1		9,345	-	-	803	0.055		0.051		445	-	-
Refrigerator Removal	0	0		0	0	0	0.0		0.0		0,0.0	-	-	0	-		-		-	-	
Refrigerator Exchange	21	21		20	20	16,342	1.1		1.0		8,847	-	-	778	0.052		0.048		421	-	-
Freezer Removal	0	0		0	0	0	0.0		0.0		0	-	-	0	-		-		-	-	-
Freezer Exchange	1	1		1	1	529	0.1		0.1		498	-		529	0.061		0.057		498	-	
Total Non-Efficiency Measures	242					180,204								745							
Misc Ins,Attic Access/Vent	99					14,187								143							-
Duct Sealing	13					3,069								236							
Duct Insulation	11					3,013								274							
Damming Material	0 40					0 4,585								0							
Htg. Sys. Tune & Clean Htg. Sys./WH Other	0					4,383								115 0							
Air Conditioning Work	Ö					Ö								ő							
Air Conditioning Replacement	0					0								0							
Water Heater Repair	0					0								0							
Refrigerator Coil Clean	0					0								0							
Waterbed Mattress Pad Programmable Tstat	0					900								0 100							
Unspecified Utility Meas.	0					900								100							
CO Detector	0					0								0							
Smoke Detector	0					0								0							
Fuses	0					0								0							
Htg Sys Safety Check	0					14 214								0							
Htg Sys Ventilation Water Heater Ventilation	75 0					14,214 0								190 0							
Bathroom Ventilation	0					0								0							
Dryer Ventilation	0					0								0							
Kitchen Ventilation	0					0								0							
Other Exhaust Ventilation	0					0								0							
Asbestos Removal (Minor) Health/Safety Repairs	0 28					0 2,125								0							
PPE	0					2,125								76 0							
Health/Safety Other	0					o o								Ö							
Consumables	0					0								0							
General Repairs Meter Refrig (no action)	162 29					44,759 0								276 0							
Meter Freezer (no action)	8					0								Ö							
Support	240					93,353								389							
Covid Support	0					0								0							
Transportation Allowance Landlord Contr Misc	0					0								0							
Landlord Contr Misc Landlord Contr Furnace	0					0								0							
Landlord Contr DHW	0					ő								ő							
Client Contr (Any)	0					0								0							
Lead Safe Work	0					0								0							
Unspecifed/Other	0					0								0							

¹ Estimates are based upon reduced usage of the furnace due to shell improvements

² Impacts from continuous exhaust fans required by ASHRAE 62.2. The winter impacts exceed summer because these also include heating season impacts for dwellings with electric heat.

³ The total number of dwellings may exceed the number of measures installed in cases where the utility partially funds refrigeration measure replacements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed.

Alliant - Interstate Power and Light Billing Adjusted Impacts for All Customers of the Utility From All Funding Sources

	Numbe	er of Dwe	llings	Numbe	r of Dwe	pacts Electricity					First-Year	Savings		Average per Dw		-	sted Sa	_		
Measure	v Total	vith Impact Electric	ts Gas	with Elec Seas Cooling		oacts	Sun kW	E nmer kWh		nter kWh	Annual kWh	Pk-Day therms	Gas Annual therms	Summ kW		Electrici Win kW		Annual kWh	Pk-Day therms	Gas Annual therms
Total Efficiency Managemen	254	226	139	225	226		40.3		53.2		159,745	323	29,885	0.179		0.235		707	2.33	215
Total Efficiency Measures	254	220	139	225	220		40.3		53.2		159,745	323	29,000	0.179		0.235		707	2.33	215
Total Shell & Htg. Sys. Repl	254	226	139	224	226		35.8	40,793	46.2	69,064	109,857	318	28,864	0.160	182	0.204	306	486	2.29	208
Total Shell Measures	254	226	139	224	226		35.8	40,793	45.5	68,038	108,831	209	18,892	0.160	182	0.201	301	482	1.50	136
Wall Insul.	129	110	88	110	6		12.8	15,431	4.8	6,879	22,310	64	5,807	0.116	140	0.794	1,147	203	0.73	66
Open Blown Ceiling Insul.	192	169	110	168	20		14.0	16,909	19.3	28,903	45,813	69	6,214	0.083	101	0.965	1,445	271	0.63	56
Cavity Fill Insul.	61	45	45	44	4		1.9	2,240	2.1	3,184	5,423	26	2,412	0.042	51	0.532	796	121	0.59	54
Sloped Attic Insul.	67	59	46	59	2		2.6	3,185	1.1	1,633	4,818	18	1,671	0.045	54	0.543	817	82	0.40	36
Kneewall Insul.	59	51	38	51	3		0.9	1,040	0.1	138	1,178	6	549	0.017	20	0.031	46	23	0.16	14
Infil. Reduction	248	214	138	213	24		2.9	3,439	4.5	6,718	10,157	21	1,914	0.013	16	0.186	280	47	0.15	14
Found./Crawl. Insul.	69	28	52	22	10		1.2	1,406	2.0	3,000	4,406	6	564	0.053	64	0.200	300	157	0.12	11
Bandjoist Insul.	58	9	49	-	9		0.0	0	1.1	1,681	1,681	3	281	0.000	0	0.125	187	187	0.06	6
Furnace Blower Fan ¹	229	201	139	-	201		0.0	0	14.4	21,848	21,848	(1)	(77)	0.000	0	0.072	109	109	(0.01)	(1)
Exhaust Ventilation ²	156	138	82	138	138		-0.4	(2,857)	(3.9)	(5,946)	(8,803)	(5)	(445)	-0.003	(21)	(0.028)	(43)	(64)	(0.06)	(5)
Total Heating System Repl	92	8	84	-	8		0.0	0	0.7	1,026	1,026	110	9,972	0.000	0	0.087	128	128	1.31	119
Condensing Htg Sys Repl	84	0	84	-	-		0.0	0	0.0	0	0	110	9,972	-	-	-	-	-	1.31	119
Non-Cond Htg Sys Repl	0	0	0	-	-		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
Electric Htg Sys Repl	6	6	0	-	6		0.0	0	0.5	760	760	0	0	0.000	0	0.087	127	127	-	-
Heat Pump Repl	2	2	0	-	2		0.0	0	0.2	266	266	0	0	0.000	0	0.086	133	133	-	-
Other Htg Sys Repl	0	0	0	-	0		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
				Marina	ber of Me															
				-	y Fuel Typ		Summer		Winter		Annual	Pk-Day	Annual	Summer		Winter		Annual	Dk Day	Annual
	Total	Electric	Gas		Electric	Gas	kW		kW		kWh	therms	therms	kW		kW		kWh	therms	therms
Water Heating	174	76	98	0	0	0	0.0		0.1		9,551	4.9	1,021	0.000		0.002		126	0.050	10
Temp. Reduct.	13	6	7	0	0	0	0.0		0.0		586	0.1	51	0.000		0.000		98	0.02	7
WH Wrap	11	5	6	0	0	0	0.0		0.0		529	0.2	57	0.000		0.000		106	0.03	9
Pipe Insul.	154	72	82	0	0	0	0.0		0.0		2,643	0.7	248	0.000		0.000		37	0.01	3
LF Showerhead	14	7	7	0	0	0	0.0		0.0		1,023	0.2	62	0.000		0.003		146	0.03	9
Faucet Aerator	14	9	5	0	0	0	0.0		0.0		384	0.0	10	0.000		0.001		43	0.01	2
Std-Eff Wtr Htr Repl.	0	0	0	0	0	0	0.0		0.0		0	0.0	0	-		-		-	-	-
Hi-Eff or Electric Wtr Htr Repl.	109	40	69	0	0	0	0.0		0.1		4,384	3.6	594	0.000		0.003		110	0.05	9
Lighting	149	149		0	0		2.9		5.5		28,093	-	-	0.020		0.037		189	-	-
Refrigerator/Freezer ³	26	26		0	0		1.5		1.4		12,243	-	-	0.058		0.054		471		-
Refrigerator Removal	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Refrigerator Exchange	23	23		0	0		1.3		1.2		10,380	-	-	0.056		0.052		451	-	-
Freezer Removal	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Freezer Exchange	4	4		0	0		0.2		0.2		1,864	-	-	0.057		0.054		466	-	-

Dalhoff Associates, LLC 3.

Utility Administration Expenditures: \$5,415

Total Labor and Material Expenditures: \$141,142

Part			er of Dw			er of Dwellings					ed F	irst-Year S				ge Billin per D		Receivi	ing Me			
The content of the	Measure				Se	ason			1	Vinter			Pk-Day					Win	iter	Annual	Pk-Day	Annual
Part																						
Tree from favource 18	Total Efficiency Measures	31		31	0	0	120,193	0.0	0.0			0	63	5,834	3,877	-		-		-	2.04	188
Williams	Total Shell & Htg. Sys. Repl															-	-	-	-	-		
Count Flame Carlot growth 24		31											39			-	-	-	-	-	1.26	
Cachy Pinnais. 3 0 3 0 0 0 1 1.56 0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																-	-	-	-	-		
Stayled Methods	Cavity Fill Insul.						3.156															
## Responsible 12	Sloped Attic Insul.	5	() 5	0	0	1,856	0.0	0.0		0	0	3	228	371	-	-	-	-	-	0.51	46
Financia (max.) 6							2,405									-	-	-	-	-		
English plane S																						
Famous Pearline Money Family 1																_						
Palman Marie Maning						0					0		(0)		0	-	-	-	-	-		
Concerning is give Regis 22 2 1 -	Exhaust Ventilation ²		(0				0	-	-	-	-	-	-	- ()
No-Control 189-Regel O	Total Heating System Repl) 21		0		0.0	0.0							-	-	-	-	-		
Exerce leg gis-Regeri 0 0 0 0 0 0 0 0 0	Condensing Htg Sys Repl	21		21	-	-		0.0	0.0						2,885	-	-	-	-	-	1.14	104
Head Pump (Right)						- 0									0	_	-		-	-	-	
Total Biochic Gas Total Section Gas Tota							-	0.0							0	_	-	-	-	-	-	-
Marie Feating					-	0	0								0	-	-	-	-	-	-	
Mate					Nu	mber of Measures	1	_								_						
Water Meaning		Total	Electric	Gae:	Total	by Fuel Type Electric Gae							Pk-Day therms									
Well-wing	Water Heating	17	() 17	37	0 37		0.0	0.0			0	0.3	108	17	-				-	0.019	
Pice Institute													0.1	22	0	-		-		-	0.02	7
LE Stokewhead															0	-		-		-	- 0.01	- 2
Fauch Arearor 10															15	-						
HighTigg 0	Faucet Aerator				15		43	0.0	0.0			0	0.1	21	4	-		-		-		
Cighting							-								0	-		-		-	-	-
RefrigaratorFreezer 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Hi-Eff or Electric Wtr Htr Repl.														0	-		-		-	-	-
Refrigerator Femoval Refrigerator Femoval Refrigerator Exchange 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0													-		0	-					-	-
Refrigerate Exchange															0	-						
Freezer Exchange		0	()	0	0		0.0	0.0			0	-	-	0	-		-		-	-	-
Total Non-Efficiency Measures 29 20,949 722													-		0	-		-		-	-	-
Misc Ins. Allie Accessifyert 6	Freezer Exchange	U		,	0	U	0	0.0	0.0			U	-		U	-					-	
Duct Sealing 1 1 350 350 350																						
Duct Insulation																						
Damming Material Hig. Sys. Tune & Clean 117 Hig. Sys. Tune & Clean 3 350 Hig. Sys. Tune & Clean 0 0 Ar. Conditioning Work 0 0 0 Ar. Conditioning Work 0 0 0 Ar. Conditioning Replacement 0 0 0 Ar. Conditioning Replacement 0 0															350							
Hig. Sys. Tune & Clean Hig. Sys. Sys. Tune & Clean Hig. Sys. Sys. Sys. Sys. Sys. Sys. Sys. Sys																						
Air Conditioning Work Air Conditioning Replacement 0 Water Heater Repair 0 Water Heater Repair 0 Water Heater Repair 0 Water Edet Mattress Pad 0 Unspecified Mattress Pad 0 Unspecified Utility Meas. 0 Unspecified Utility Weat. 0 Unspecified Utility Meas. 0 Unspecified Utility Weat. 0 Unspecified Utility Meas. 0 Unspecified Utility Unspecified Utility Unspecified Utility Unspecified Utility Unspecified Utility Unspecifie	Htg. Sys. Tune & Clean						350								117							
Air Conditioning Replacement Water Heater Repair 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							-								0							
Water Heater Repair 0 0 Refrigerator Coil Cloan 0 0 0 Refrigerator Coil Cloan 0 <td>Air Conditioning Work</td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Air Conditioning Work														0							
Waterbeek Mattress Pad 0 0 Programmable Tstat 0 0 Co Detector 0 0 Fuses 0 0 Hig Sys Safety Check 0 0 Hig Sys Ventilation 17 3,480 Mater Heater Ventilation 0 0 Bathroom Ventilation 0 0 Opyer Ventilation 0 0 Offer Exhaust Ventilation 0 0															0							
Programmable Tstat	Refrigerator Coil Clean	0					0								0							
Unspecified Utility Meas. 0 0 CO Detector 0 0 Fuses 0 0 Hig Sys Safety Check 0 0 Hig Sys Ventilation 17 3,490 Water Heater Ventilation 0 0 Bathroom Ventilation 0 0 Opyer Ventilation 0 0 Operation 0 0 Other Exhaust Ventilation 0 0															0							
CO Detector 0 0 Smoke Detector 0 0 Fluses 0 0 Hig Sys Selfty Check 0 0 Hig Sys Ventilation 17 3,490 205 Water Heater Ventilation 0 0 0 Sathroom Ventilation 0 0 0 Dryer Ventilation 0 0 0 Orber Exhaust Ventilation 0 0 0 Other Exhaust Ventilation 0 0 0 Other Exhaust Ventilation 0 0 0 Absebstos Removal (Minor) 0 0 0 Other Exhaust Ventilation 0 0 0 Health/Safety Cheristop 0 0 0 PPE 0 0 0 0 Health/Safety Other 0 0 0 Consumables 0 0 0 0 Meter Ferig (no action) 0 0 0 Meter Ferig (no action) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							-								0							
Smoke Detector 0 0 Fuses 0 0 Hig Sys Safety Check 0 0 Hig Sys Ventilation 17 3,490 Water Heater Ventilation 0 0 Water Heater Ventilation 0 0 Orper Ventilation 0 0 Other Exhaust Ventilation 0 0															0	t						
Hig Sys Safety Check 0	Smoke Detector														0							
Hg Sys Ventilation 17 3,490 205 18 17 18 18 18 18 18 18															0							
Water Heater Ventilation 0 Bathroom Ventilation 0 Oryer Ventilation 0 Other Exhaust Ventilation 0 O 0 Asbestos Removal (Minor) 0 Leatlift/Safety Repairs 2 67 33 PPE 0 O 0 Heatlift/Safety Other 0 Consumables 0 General Repairs 14 Meter Refig (no action) 0 Meter Freezer (no action) 0 Support 29 12,250 422 Covid Support 0 12,250 422 Covid Support 0 12,250 0 12,250 0 12,250 0 12,250 0 12,250 0	Htg Sys Salety Check														205							
Bathroom Ventilation 0 0 Dryer Ventilation 0 0 Kitchen Ventilation 0 0 Other Exhaust Ventilation 0 0 Asbestos Removal (Minor) 0 0 Health/Safety Repairs 2 67 PE 0 0 Health/Safety Other 0 0 Consumables 0 0 General Repairs 14 3,677 283 Meter Refrig (no action) 0 0 Meter Freezer (no action) 0 0 Support 29 12,250 Covid Support 0 0 Transportation Allowance 0 0 Landlord Contr Misc 0 0 Landlord Contr Furnace 0 0 Landlord Contr (Any)	Water Heater Ventilation														0							
Kitchen Ventilation 0 Other Exhaust Ventilation 0 Other Exhaust Ventilation 0 Asbestos Removal (Minor) 0 Health/Safety Repairs 2 67 PE 0 0 Health/Safety Other 0 0 Consumables 0 0 Ceneral Repairs 14 3,677 263 Meter Refig (no action) 0 0 Meter Frezer (no action) 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr (Any) 0 0 0 Landlord Contr	Bathroom Ventilation						-								0							
Other Exhaust Ventilation 0 0 Abestos Removal (Minor) 0 0 Health/Safety Repairs 2 67 PPE 0 0 Consumables 0 0 Ceneral Repairs 14 3,677 285 Meter Refrig (no action) 0 0 Meter Freezer (no action) 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr DHW 0 0 0 Landlord Contr (Any) 0 0 0 Lead Safe Work 0 0 0							0								0							
Asbestos Removal (Minor) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							0								0							
PPE 0 0 0 Health/Safety Other 0 0 0 Consumables 0 0 0 General Repairs 14 3,677 263 Meter Refig (no action) 0 0 0 Meter Freezer (no action) 0 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr DHW 0 0 0 Client Contr (Any) 0 0 0 Lead Safe Work 0 0 0	Asbestos Removal (Minor)														0							
Health/Safety Other 0 0 Consumables 0 0 General Repairs 14 3,677 Meter Refing (no action) 0 0 Meter Freezer (no action) 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr (Any) 0 0 0 Landlord Contr (Any) 0 0 0 Lead Safe Work 0 0 0	Health/Safety Repairs																					
Consumables 0 0 0 General Repairs 14 3,677 283 Meter Refrig (no action) 0 0 0 Meter Freezer (no action) 0 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr DHW 0 0 0 Client Contr (Any) 0 0 0 Lead Safe Work 0 0 0															0							
General Repairs 14 3,677 283 Meter Refrig (no action) 0 0 0 Meter Freezer (no action) 0 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Fumace 0 0 0 Landlord Contr Fumace 0 0 0 Landlord Contr DHW 0 0 0 Client Contr (Any) 0 0 0 Lead Safe Work 0 0 0															0	ł						
Meter Refrig (no action) 0 0 Meter Freezer (no action) 0 0 Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr DHW 0 0 0 Landlord Contr (Any) 0 0 0 Lead Safe Work 0 0 0	General Repairs	14					3,677	<u></u>							263							
Support 29 12,250 422 Covid Support 0 0 0 Transportation Allowance 0 0 0 Landlord Contr Misc 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr Furnace 0 0 0 Landlord Contr DHW 0 0 0 Client Contr (Any) 0 0 0 Lead Safe Work 0 0 0	Meter Refrig (no action)														0	Ī						
Covid Support 0 0 Transportation Allowance 0 0 Landlord Contr Misc 0 0 Landlord Contr Furnace 0 0 Landlord Contr DHW 0 0 Client Contr (Any) 0 0 Lead Safe Work 0 0 0 0	Meter Freezer (no action)														0	ļ						
Transportation Allowance 0 0 Landlord Contr Misc 0 0 Landlord Contr Furnace 0 0 Landlord Contr DHW 0 0 Client Contr (Any) 0 0 Lead Safe Work 0 0 0 0 0	Support Covid Support														422 n							
Landlord Contr Misc 0 Landlord Contr Furnace 0 Landlord Contr DHW 0 Client Contr (Any) 0 Laed Safe Work 0 0 0															0							
Landlord Contr DHW 0 0 Client Contr (Any) 0 0 Lead Safe Work 0 0	Landlord Contr Misc	0					0								0							
Client Contr (Any) 0 0 Lead Safe Work 0 0	Landlord Contr Furnace														0							
Lead Safe Work 0 0							-								0							
	Lead Safe Work														0	ł						
	Unspecifed/Other														0	<u> </u>						

¹Estimates are based upon reduced usage of the furnace due to shell improvements

² Impacts from continuous exhaust fans required by ASHRAE 62.2. The winter impacts exceed summer because these also include heating season impacts for dwellings with electric heat.

The total number of owelings may exceed the number of measures installed in cases where the utility partially funds refigeration measure epidements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed.

Black Hills Energy Billing Adjusted Impacts for All Customers of the Utility From All Funding Sources

	Numbe	er of Dwe	llings	Numbe	er of Dwe	llings			Billing A	Adjusted F	irst-Year	Savings			•	g Adjus Receiv		•		
Measure	v Total	vith Impact	ts Gas	with Ele Seas Cooling		pacts	Sum kW		Electricity W kW	inter kWh	Annual kWh	Pk-Day therms	Gas Annual therms	Sum kW		Electrici Win kW			Pk-Day therms	as Annual therms
Total Efficiency Measures	39	0	39	0	0		0.0		0.0		0	100	9,321	-		-		-	2.58	239
Total Shell & Htg. Sys. Repl	39		39	0	0		0.0	0		0	0		8,960	-	-	-	-	-	2.53	230
Total Shell Measures	39	0	39	0	0		0.0	0		0	0		5,064	-	-	-	-	-	1.43	130
Wall Insul. Open Blown Ceiling Insul.	19 34	0	19 34	0	0 0		0.0 0.0	0	0.0 0.0	0 0	0	26	1,164 2,346	-	-	-	-	-	0.68 0.76	61 69
Cavity Fill Insul.	34 6	0	34 6	0	0		0.0	0	0.0	0	0		2,346	-	-	-	-	-	0.76	62
Sloped Attic Insul.	10	0	10	0	0		0.0	0	0.0	0	0	5	423	-	-	-	-	-	0.00	42
Kneewall Insul.	9	0	9	0	0		0.0	0	0.0	0	0	2	162	-	-	-	-	-	0.47	18
Infil. Reduction	39	0	39	0	0		0.0	0	0.0	0	0	6	592	-	-	-	-	-	0.20	15
Found./Crawl. Insul.	9	0	9	0	0		0.0	0	0.0	0	0	1	103	-	-	-	-	-	0.17	11
Bandjoist Insul.	10	0	10	U	0		0.0	0	0.0	0	0		58	-	-	-	-	-	0.12	6
Furnace Blower Fan ¹	39	0	39	_	0		0.0	0	0.0	0	0	(0)	(18)	_	-	_	_	_	(0.00)	(0)
Exhaust Ventilation ²	25	0	25	0	0			0	0.0	0	0		(135)	_	-	_	_	-	(0.06)	
Total Heating System Repl	30	0	30	-	0		0.0	0		0	0	(1) 43	3,895	-	-	-	-	-	1.43	(5) 130
Condensing Htg Sys Repl	30		30	-	U		0.0	0		0	0		3,895	-	-		-		1.43	130
Non-Cond Htg Sys Repl	0	0	0	_	-		0.0	0	0.0	0	0	0	3,693	-	-	-	-	-	1.43	130
Electric Htg Sys Repl	0	0	0	_	- 0		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
Heat Pump Repl	0	0	0	_	0		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
Other Htg Sys Repl	0	•	0	_	0		0.0	0	0.0	0	0		0	-	-	-	-	-	-	-
Other Fitg Sys Repr	0	- 0		-	- 0		0.0		0.0	0	- 0	U	- 0							
				Num	nber of Me	asures														
					y Fuel Typ		Summer		Winter		Annual	Pk-Day	Annual	Summer		Winter		Annual	Pk-Dav	Annual
	Total	Electric	Gas		Electric	Gas	kW		kW		kWh	therms	therms	kW		kW		kWh	therms	therms
Water Heating	29	0	29	0	0	0	0.0		0.0		0	1.7	361	-		-		-	0.060	12
Temp. Reduct.	4	0	4	0	0	0	0.0		0.0		0	0.1	29	-		-		-	0.02	7
WH Wrap	0	0	0	0	0	0	0.0		0.0		0	0.0	0	-		-		-	-	-
Pipe Insul.	24	0	24	0	0	0	0.0		0.0		0	0.2	70	-		-		-	0.01	3
LF Showerhead	4	0	4	0	0	0	0.0		0.0		0	0.1	28	-		-		-	0.02	7
Faucet Aerator	13	0	13	0	0	0	0.0		0.0		0	0.1	26	-		-		-	0.01	2
Std-Eff Wtr Htr Repl.	0	0	0	0	0	0	0.0		0.0		0	0.0	0	-		-		-	-	-
Hi-Eff or Electric Wtr Htr Repl.	25	0	25	0	0	0	0.0		0.0		0	1.3	206	-		-		-	0.05	8
Lighting	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Refrigerator/Freezer ³	0	0		0	0		0.0		0.0		0		-	-		-		-	-	-
Refrigerator Removal	0	_		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Refrigerator Exchange	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Freezer Removal	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	-
Freezer Exchange	0	0		0	0		0.0		0.0		0	-	-	-		-		-	-	

Dalhoff Associates, LLC 3.

Total Reported Labor, Materials and Utility Admin Expenditures: \$993,626

Utility Administration Expenditures:

Total Labor and Material Expenditures: \$967,613

\$26,013

	Numbe	er of Dwe	llings		r of Dwellings				Billing A	Adjusted I	First-Year \$	Savings		Avera	ge Billin per Dv		sted Fire			and Sav	rings
		vith Impact		with Elec	tricity Impacts on	Spending on Materials	Sun	nmer E	Electricity Wi	inter	Annual	Pk-Day	Gas Annual	Spending on Materials	Sumr	ner	Electricit Win		Annual	Pk-Day	Gas Annual
Measure	Total	Electric	Gas	Cooling	Heating	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms	& Labor (\$)	kW	kWh	kW	kWh	kWh	therms	therms
Total Efficiency Measures	206	168	174	157	168	794,673	25.9		24.7		89,721	344	31,850	3,858	0.165		0.147		534	1.97	183
Total Shell & Htg. Sys. Repl	203	165	173	136	165	773,898	22.3	26,930	18.8	28,885	55,815	342	31,270	3,812	0.164	198	0.114	175	338	1.98	181
Total Shell Measures	202	164	173		164	491,742	22.3	26,930	18.5	28,424	55,354	211	19,269	2,434	0.164	198	0.113	173	338	1.22	111
Wall Insul.	106	80	94	80	6	170,298	8.8	10,626	2.6	3,942	14,568	67	6,102	1,607	0.110	133	0.433	657	182	0.71	65
Open Blown Ceiling Insul.	142	111	120		10	123,371	9.1	10,999	6.8	10,586	21,584	74	6,747	869	0.082	99	0.684	1,059	194	0.61	56
Cavity Fill Insul. Sloped Attic Insul.	58 48	38 33	54 42	37 33	2	47,975 23,775	1.3 1.5	1,620 1,755	0.3	494 0	2,113 1,755	26 17	2,351 1,556	827 495	0.036	44 53	0.158	247 0	56 53	0.47	44 37
Kneewall Insul.	42	29	41	29	1	17,704	0.5	622	0.2	301	923	7	601	422	0.044	21	0.193	301	32	0.40	15
Infil. Reduction	120	85	102		9	44,596	0.6	749	0.4	638	1,387	8	754	372	0.007	9	0.047	71	16	0.08	7
Found./Crawl. Insul.	58	10	56	10	Ō	46,650	0.5	560	0.0	0	560	11	1,013	804	0.046	56	0.000	0	56	0.20	18
Bandjoist Insul.	48	4	44	-	4	17,373	0.0	0	0.2	259	259	2	205	362	0.000	0	0.042	65	65	0.05	5
Furnace Blower Fan 1	191	153	173	-	153	0	0.0	0	8.0	12,206	12,206	(1)	(61)	0	0.000	0	0.052	80	80	(0.00)	(0)
Exhaust Ventilation ²	0	0	0	0	0	0	0.0	0	0.0	0	0	0	0	0	-	-	-	-	-	-	-
Total Heating System Repl	114	6	108	-	6	282,155	0.0	0	0.3	461	461	131	12,001	2,475	0.000	0	0.051	77	77	1.22	111
Condensing Htg Sys Repl	108	0	108	-	-	264,310	0.0	0	0.0	0	0	131	12,001	2,447	-	-	-	-	-	1.22	111
Non-Cond Htg Sys Repl	0	0	0	-	-	0	0.0	0	0.0	0	0	0	0	0	-	-	-			-	-
Electric Htg Sys Repl Heat Pump Repl	3	3	0	-	3	8,300 9,545	0.0	0	0.2 0.2	223 238	223 238	0	0	2,767 3,182	0.000	0	0.051 0.052	74 79	74 79	-	-
Other Htg Sys Repl	0	0	0		0	9,545	0.0	0	0.2	230	230	0	0	3,102	0.000	- 0	0.032	- 19	- 19		
Other ring dys reepi		- 0		Num	ber of Measures	-	0.0		0.0			Ü		0							
				b	Fuel Type	1	Summer		Winter		Annual	Pk-Day	Annual		Summer		Winter		Annual	Pk-Day	Annual
	Total	Electric	Gas	Total	Electric Gas		kW		kW		kWh	therms	therms		kW		kW		kWh	therms	therms
Water Heating	156	28	128		32 189	2,952	0.0		0.0		1,328	1.7	580	19	0.000		0.000		47		5
Temp. Reduct.	3	1	2	3	1 2	0	0.0		0.0		96 0	0.0	15 0	0	0.000		0.000		96	0.02	7
WH Wrap Pipe Insul.	0 153	0 27	0 126		0 0 27 126	2,561	0.0		0.0		1,003	0.0 1.1	385	17	0.000		0.000		37	0.01	- 3
LF Showerhead	17	1	16		1 18	183	0.0		0.0		1,003	0.4	120	11	0.000		0.003		146	0.01	7
Faucet Aerator	31	3	28	46	3 43	208	0.0		0.0		82	0.4	61	7	0.000		0.003		27	0.02	2
Std-Eff Wtr Htr Repl.	0	0	0	0	0 0	0	0.0		0.0		0	0.0	0	0	-		-		-	-	
Hi-Eff or Electric Wtr Htr Repl.	0	0	0	0	0 0	0	0.0		0.0		0	0.0	0	0	-		-		-	-	
Lighting	128	128		1,332	1,332	9,069	2.8		5.2		26,775	-	-	71	0.022		0.041		209	-	-
Refrigerator/Freezer ³	14	14		14	14	8,754	0.7		0.7		5,803	-	-	625	0.051		0.048		414	-	-
Refrigerator Removal	0	0		0	0	0	0.0		0.0		0	-	-	0						-	-
Refrigerator Exchange	14	14		14	14	8,754	0.7		0.7		5,803	-	-	625	0.051		0.048		414	-	-
Freezer Removal Freezer Exchange	0	0		0	0	0	0.0		0.0		0	-		0	-				-	-	-
Treezer Exchange						· ·	0.0		0.0			_			_					_	
Total Non-Efficiency Measures	213					172,940								812							
Misc Ins,Attic Access/Vent	68					12,417								183							
Duct Sealing	21					5,632								268							
Duct Insulation	2					156								78							
Damming Material	0					0								0							
Htg. Sys. Tune & Clean Htg. Sys./WH Other	44 0					4,941 0								112							
Air Conditioning Work	0					0								0							
Air Conditioning Replacement	ő					Ö								Ö							
Water Heater Repair	0					0								0							
Refrigerator Coil Clean	0					0								0							
Waterbed Mattress Pad	0					0								0							
Programmable Tstat	4					400								100							
Unspecified Utility Meas. CO Detector	0					0								0	ł						
Smoke Detector	0					0								0							
Fuses	ő					0								ō							
Htg Sys Safety Check	0					0								0							
Htg Sys Ventilation	101					19,341								191							
Water Heater Ventilation	2					421 0								211							
Bathroom Ventilation Dryer Ventilation						0								0							
Kitchen Ventilation	^					0								0							
Other Exhaust Ventilation	0					0								0							
	0 0 0					U									1						
Asbestos Removal (Minor)	0					0								0							
Health/Safety Repairs	0 0 0 15					0 807								54							
Health/Safety Repairs PPE	0 0 0 15					0 807 0								54 0							
Health/Safety Repairs PPE Health/Safety Other	0 0 0 15 0					0 807 0 0								54 0 0							
Health/Safety Repairs PPE Health/Safety Other Consumables	0 0 0 15 0 0					0 807 0 0								0 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs	0 0 0 15 0 0					0 807 0 0 26,116								0 54 0 0 0 261							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action)	0 0 0 15 0 0					0 807 0 0								0 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs	0 0 0 15 0 0 0 100					0 807 0 0 0 26,116								0 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Freezer (no action)	0 0 0 15 0 0 0 100					0 807 0 0 0 26,116 0								0 0 261 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Freezer (no action) Support Covid Support Transportation Allowance	0 0 0 15 0 0 100 34 0 197 0					0 807 0 0 26,116 0 0 102,709 0								0 0 261 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Freezer (no action) Support Covid Support Transportation Allowance Landlord Contr Misc	0 0 0 15 0 0 100 34 0 197 0					0 807 0 0 26,116 0 0 102,709 0 0								0 0 261 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Frezer (no action) Support Covid Support Transportation Allowance Landlord Contr Misc Landlord Contr Furnace	0 0 0 15 0 0 0 100 34 0 197 0 0					0 807 0 0 26,116 0 0 102,709 0 0								0 0 261 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Freezer (no action) Support Covid Support Transportation Allowance Landlord Contr Misc Landlord Contr DHW	0 0 0 15 0 0 100 34 0 197 0 0 0					0 807 0 0 26,116 0 0 102,709 0 0 0								0 0 261 0							
Health/Safety Repairs PPE Health/Safety Other Consumables General Repairs Meter Refrig (no action) Meter Frezer (no action) Support Covid Support Transportation Allowance Landlord Contr Misc Landlord Contr Furnace	0 0 0 15 0 0 0 100 34 0 197 0 0					0 807 0 0 26,116 0 0 102,709 0 0								0 0 261 0							

¹ Estimates are based upon reduced usage of the furnace due to shell improvements

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² Impacts from continuous exhaust fans required by ASHRAE 62.2. The winter impacts exceed summer because these also include heating season impacts for dwellings with electric heat.

The total number of owelings may exceed the number of measures installed in cases where the utility partially funds refigeration measure epidements. The percentage of expenditures for each appliance is totaled to get the total number of measures installed.

MidAmerican Energy Billing Adjusted Impacts for All Customers of the Utility From All Funding Sources

	Numbe	er of Dwe	llings		er of Dwe			I	Billing A	djusted I	First-Year	Savings		Average per Dw		• •	sted Sa ing Mea	•		
	v	vith Impact	s		ctricity Im	pacts	_		lectricity				Gas	_		Electrici	•			Gas
Manager	Tatal	Flactuia	C	Sea				nmer		nter	Annual	Pk-Day	Annual	Summ			nter		Pk-Day	Annual
Measure	Total	Electric	Gas	Cooling	Heating		kW	kWh	kW	kWh	kWh	therms	therms	kW	kWh	kW	kWh	kWh	therms	therms
Total Efficiency Measures	292	238	249	238	238		43.4		38.7		142,221	604	56,688	0.182		0.162		598	2.42	228
Total Shell & Htg. Sys. Repl	292	238	249	235	238		38.3	42,988	30.2	46,706	89,694	592	54,352	0.163	183	0.127	196	377	2.38	218
Total Shell Measures	292	238	249	235	238		38.3	42,988	29.5	45,661	88,649	354	32,528	0.163	183	0.124	192	372	1.42	131
Wall Insul.	164	132	143	132	7		15.1	18,240	3.5	5,387	23,627	112	10,249	0.115	138	0.498	770	179	0.78	72
Open Blown Ceiling Insul.	219	174	186	174	11		14.1	16,948	7.0	10,898	27,846	115	10,573	0.081	97	0.639	991	160	0.62	57
Cavity Fill Insul.	88	62	80	61	3		2.5	3,022	1.7	2,761	5,783	37	3,394	0.041	50	0.569	920	93	0.46	42
Sloped Attic Insul.	80	57	67	57	2		2.4	2,917	1.1	1,651	4,568	29	2,680	0.042	51	0.552	826	80	0.43	40
Kneewall Insul.	66	48	62	48	2		0.8	979	0.3	390	1,369	10	951	0.017	20	0.126	195	29	0.17	15
Infil. Reduction	290	219	247	219	12		3.0	3,586	1.0	1,580	5,166	46	4,245	0.014	16	0.085	132	24	0.19	17
Found./Crawl. Insul.	83	18	78	17	1		0.8	1,016	0.0	71	1,087	15	1,384	0.050	60	0.045	71	60	0.19	18
Bandjoist Insul.	88	5	83	-	5		0.0	0	0.2	351	351	4	355	0.000	0	0.045	70	70	0.05	4
Furnace Blower Fan ¹	280	226	249	-	226		0.0	0	18.8	28,818	28,818	(1)	(136)	0.000	0	0.083	128	128	(0.01)	(1)
Exhaust Ventilation ²	233	186	198	186	186		-0.5	(3,720)	(4.1)	(6,247)	(9,967)	(13)	(1,166)	-0.002	(20)	(0.022)	(34)	(54)	(0.06)	(6)
Total Heating System Repl	182	6	176	-	6		0.0	0	0.7	1,046	1,046	238	21,824	0.000	0	0.116	174	174	1.35	124
Condensing Htg Sys Repl	176	0	176	-	-		0.0	0	0.0	0	0	238	21,824	-	-	-	-	-	1.35	124
Non-Cond Htg Sys Repl	0	0	0	-	-		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
Electric Htg Sys Repl	3	3	0	-	3		0.0	0	0.3	408	408	0	0	0.000	0	0.093	136	136	-	-
Heat Pump Repl	4	4	0	-	4		0.0	0	0.4	638	638	0	0	0.000	0	0.105	159	159	-	-
Other Htg Sys Repl	0	0	0	-	0		0.0	0	0.0	0	0	0	0	-	-	-	-	-	-	-
				-	nber of Me															
	Total	Electric	Gas		y Fuel Typ Electric	e Gas	Summer kW		Winter kW		Annual kWh	Pk-Day therms	Annual therms	Summer kW		Winter kW		Annual kWh	Pk-Day therms	Annual therms
Water Heating	250	47	203	0	0	0	0.0		0.1		5.453	11.3	2,336	0.000		0.002		116	0.056	12
Temp. Reduct.	8	3	5	0	0	0	0.0		0.0		394	0.1	2,330	0.000		0.002		131	0.030	7
WH Wrap	2	0	2	0	0	0	0.0		0.0		0	0.0	16	0.000		-		-	0.02	8
Pipe Insul.	243	43	200	0	0	0	0.0		0.0		1,575	1.8	634	0.000		0.000		37	0.02	3
LF Showerhead	26	4	22	0	0	0	0.0		0.0		585	0.5	163	0.000		0.003		146	0.01	7
Faucet Aerator	45	5	40	0	0	0	0.0		0.0		165	0.3	99	0.000		0.003		33	0.02	2
Std-Eff Wtr Htr Repl.	0	0	0	0	0	0	0.0		0.0		0	0.0	0	0.000		0.001		-	- 0.01	
Hi-Eff or Electric Wtr Htr Repl.	167	25	142	0	0	0	0.0		0.1		2,734	8.5	1,389	0.000		0.003		109	0.06	10
Lighting	182	182	172	0	0		3.9		7.2		37.160	-	-	0.000		0.040		204	-	-
Refrigerator/Freezer ³	23	23		0	0		1.2		1.1		9,914	_		0.053		0.050		431	-	
Refrigerator Removal	0	0		0	0		0.0		0.0		9,914	-		-		-		-	-	
Refrigerator Exchange	20	20		0	0		1.1		1.0		8.549	_	_	0.053		0.049		427	-	_
Freezer Removal	0	0		0	0		0.0		0.0		0,010	_	_	-		-		-	-	_
Freezer Exchange	3	3		0	0		0.2		0.2		1,366	-	-	0.056		0.052		455	-	-
											,									

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4. SPENDING AND IMPACT PROFILES BY AGENCY

This section provides tables of spending and impacts at an aggregate level for each weatherization agency.

Table 4.1, Billing Adjusted Costs and Impacts for All Measures Installed During Calendar Year 2020 by Agency, provides the counts of units completed, total and average expenditures, and total and average energy impacts for all installed measures without regard to the funding source.

Table 4.2, Billing Adjusted Costs and Impacts for Utility-Funded Measures Installed During Calendar Year 2020 by Agency, provides the counts of units completed, total and average expenditures, and total and average energy impacts for *measures paid for by the utilities*.

Dalhoff Associates, LLC 4.1

Billing Adjusted Costs and Impacts for All Measures Installed During Calendar Year 2020 by Agency

	Nu	ımber of D	wellin	gs with Ir	npacts	;	Tot	al Expend	litures	Avera	ge Expend	litures
								Health,			Health,	
					Fuel		Efficiency	Safety,	Total	Efficiency	Safety,	Total
Agency	Total	Electric	Gas	Propane	Oil	Other	Measures	Repairs	Expenditures	Measures	Repairs	Expenditures
New Opportunities	27	27	15	6	0	0	\$221,277	\$206,544	\$427,821	\$8,195	\$7,650	\$15,845
Hawkeye Area Comm Action Prg	64	64	62	2	0	0	\$463,534	\$696,044	\$1,159,578	\$7,243	\$10,876	\$18,118
Comm Action of Eastern Iowa	25	25	21	4	0	0	\$217,672	\$256,177	\$473,849	\$8,707	\$10,247	\$18,954
MATURA Action Corporation	10	10	9	0	0	0	\$40,556	\$40,015	\$80,571	\$4,056	\$4,001	\$8,057
Mid-Iowa Community Action	24	24	17	5	0	0	\$209,895	\$235,481	\$445,376	\$8,746	\$9,812	\$18,557
Mid-Sioux Opportunity	25	25	18	3	0	0	\$193,407	\$169,514	\$362,922	\$7,736	\$6,781	\$14,517
Northeast Iowa Comm Action Corp	40	40	13	19	1	0	\$238,417	\$150,383	\$388,801	\$5,960	\$3,760	\$9,720
Operation: New View	16	16	5	6	1	0	\$136,378	\$164,691	\$301,069	\$8,524	\$10,293	\$18,817
Operation Threshold	43	43	39	0	0	0	\$391,332	\$321,868	\$713,200	\$9,101	\$7,485	\$16,586
IMPACT	19	19	17	1	0	0	\$176,966	\$184,490	\$361,455	\$9,314	\$9,710	\$19,024
South Central Iowa Comm Action Prg	17	17	9	6	0	0	\$142,473	\$108,849	\$251,322	\$8,381	\$6,403	\$14,784
Comm Action of South Eastern Iowa	41	41	38	0	0	0	\$339,758	\$508,897	\$848,656	\$8,287	\$12,412	\$20,699
Southern Iowa Economic Dvlp Authority	30	30	19	3	0	0	\$193,131	\$239,825	\$432,956	\$6,438	\$7,994	\$14,432
Upper Des Moines Opportunity	67	67	48	15	0	0	\$538,825	\$396,247	\$935,071	\$8,042	\$5,914	\$13,956
West Central Development Corp	26	26	20	3	0	0	\$343,897	\$298,224	\$642,122	\$13,227	\$11,470	\$24,697
Comm Action Agency of Siouxland	12	12	11	0	0	0	\$116,823	\$145,598	\$262,421	\$9,735	\$12,133	\$21,868
Polk County	93	93	91	0	0	0	\$583,519	\$549,716	\$1,133,235	\$6,274	\$5,911	\$12,185

			Billing	Adjusted	l First-\	∕ear Savi	ngs			Average		justed First \ elling Receiv			ings	
	E	Electricity		G	as				ı	Electricity		Gas				
	Summer	Winter		•		Propane	Fuel Oil	Other	Summer	Winter	Annual	Pk-Day	Annual	Propane	Fuel Oil	Other
	kW	kW	kWh	therms	therms	gallons	gallons	Mbtu	kW	kW	kWh	therms	therms	gallons	gallons	Mbtu
New Opportunities	4.4	7.4	18,403	45	4,207	1,396	0	0	0.162	0.275	682	3.02	280	233	-	-
Hawkeye Area Comm Action Prg	7.3	3.8	21,220	124	11,693	261	0	0	0.114	0.060	332	2.00	189	131	-	-
Comm Action of Eastern Iowa	4.0	2.1	9,892	60	5,644	534	0	0	0.158	0.082	396	2.87	269	134	-	-
MATURA Action Corporation	1.5	1.0	3,732	9	807	0	0	0	0.150	0.100	373	1.01	90	-	-	-
Mid-Iowa Community Action	3.5	3.6	10,723	43	4,041	1,012	0	0	0.145	0.151	447	2.52	238	202	-	
Mid-Sioux Opportunity	5.1	8.0	24,534	41	3,754	609	0	0	0.204	0.320	981	2.26	209	203	-	-
Northeast Iowa Comm Action Corp	7.0	12.5	44,193	35	3,373	4,912	103	0	0.176	0.314	1,105	2.72	259	259	103	3 -
Operation: New View	2.7	6.0	18,053	15	1,415	1,593	188	0	0.171	0.374	1,128	3.03	283	265	188	3 -
Operation Threshold	8.4	7.9	24,758	104	9,902	0	0	0	0.195	0.183	576	2.67	254	-	-	-
IMPACT	3.0	1.3	5,969	51	4,837	429	0	0	0.157	0.067	314	3.01	285	429		
South Central Iowa Comm Action Prg	2.7	2.8	9,471	16	1,469	1,156	0	0	0.171	0.164	557	1.83	163	193	-	-
Comm Action of South Eastern Iowa	11.8	12.9	35,598	108	9,273	0	0	0	0.289	0.314	868	2.84	244	-	-	-
Southern Iowa Economic Dvlp Authority	6.4	13.3	31,741	48	4,259	828	0	0	0.212	0.442	1,058	2.51	224	276	-	-
Upper Des Moines Opportunity	11.6	12.8	48,519	89	9,012	4,542	0	0	0.173	0.190	724	1.86	188	303	-	-
West Central Development Corp	7.6	7.6	24,679	68	6,052	1,299	0	0	0.293	0.291	949	3.41	303	433		
Comm Action Agency of Siouxland	2.0	3.8	10,202	30	2,765	0	0	0	0.171	0.320	850	2.70	251	-		-
Polk County	14.6	11.5	47.083	211	19.936	0	0	0	0.157	0.123	506	2.32	219	_	_	_

Billing Adjusted Costs and Impacts for Utility-Funded Measures Installed During Calendar Year 2020 by Agency

		er of Dwell	_	Tot	al Expend	ditures	Avei	age Expe	nditures
					Health,				
				Efficiency	Safety,	Total		Health,	
				Measures	Repairs	Expenditures	Efficiency	Safety,	Total
Agency	Total	Electric	Gas				Measures	Repairs	Expenditures
New Opportunities	20	17	13	\$77,618	\$17,682	\$95,300	\$3,881	\$884	\$4,765
Hawkeye Area Comm Action Prg	58	55	48	\$192,829	\$49,370	\$242,200	\$3,325	\$851	\$4,176
Comm Action of Eastern Iowa	23	18	19	\$103,467	\$22,299	\$125,767	\$4,499	\$970	\$5,468
MATURA Action Corporation	3	1	3	\$6,777	\$2,741	\$9,518	\$2,259	\$914	\$3,173
Mid-Iowa Community Action	21	17	17	\$100,000	\$23,051	\$123,052	\$4,762	\$1,098	\$5,860
Mid-Sioux Opportunity	10	8	7	\$49,056	\$8,921	\$57,977	\$4,906	\$991	\$5,798
Northeast Iowa Comm Action Corp	24	19	12	\$40,039	\$6,359	\$46,398	\$1,668	\$265	\$1,933
Operation: New View	8	8	4	\$22,187	\$4,903	\$27,090	\$2,773	\$613	\$3,386
Operation Threshold	26	25	22	\$120,080	\$21,433	\$141,513	\$4,618	\$691	\$5,443
IMPACT	15	10	13	\$72,909	\$15,824	\$88,733	\$4,861	\$989	\$5,916
South Central Iowa Comm Action Prg	13	11	9	\$34,016	\$10,895	\$44,910	\$2,617	\$908	\$3,455
Comm Action of South Eastern Iowa	39	36	32	\$197,898	\$44,248	\$242,146	\$5,074	\$1,135	\$6,209
Southern Iowa Economic Dvlp Authority	29	29	18	\$102,982	\$27,222	\$130,204	\$3,551	\$939	\$4,490
Upper Des Moines Opportunity	51	43	39	\$203,322	\$40,953	\$244,275	\$3,987	\$803	\$4,790
West Central Development Corp	16	13	14	\$101,051	\$19,644	\$120,694	\$6,316	\$1,228	\$7,543
Comm Action Agency of Siouxland	9	9	9	\$62,387	\$16,525	\$78,911	\$6,932	\$1,836	\$8,768
Polk County	64	64	60	\$214,318	\$42,023	\$256,341	\$3,349	\$657	\$4,005

		ng Adjus Electricit		st-Year S	avings	•	•		Year Costs an ving Measures	•
	Summer kW	Winter kW	•	Pk-Day therms	Annual therms	Summer kW	Electricity Winter kW	Annual kWh	Gas Pk-Day therms	Annual therms
New Opportunities	2.8	3.5	,	29	2,694	0.167	0.208	574	2.25	207
Hawkeye Area Comm Action Prg	5.4	1.9	13,809	85	7,961	0.098	0.034	251	1.78	166
Comm Action of Eastern Iowa	2.3	1.0	6,039	45	4,165	0.137	0.056	336	2.36	219
MATURA Action Corporation	0.0	0.0	46	2	130	0.021	0.014	46	0.50	43
Mid-Iowa Community Action	2.0	3.0	7,279	42	3,885	0.133	0.178	428	2.45	229
Mid-Sioux Opportunity	1.2	3.8	8,401	14	1,282	0.205	0.473	1,050	2.00	183
Northeast Iowa Comm Action Corp	3.2	3.4	15,188	27	2,528	0.168	0.177	799	2.22	211
Operation: New View	1.0	3.4	9,301	7	622	0.128	0.419	1,163	1.68	156
Operation Threshold	4.0	5.7	15,433	44	4,174	0.168	0.228	617	2.00	190
IMPACT	1.5	0.6	3,061	33	3,122	0.145	0.058	306	2.56	240
South Central Iowa Comm Action Prg	1.4	0.3	2,523	11	958	0.154	0.032	229	1.21	106
Comm Action of South Eastern Iowa	9.6	8.4	25,334	69	5,902	0.274	0.234	704	2.17	184
Southern Iowa Economic Dvlp Authority	5.7	13.0	29,748	41	3,614	0.196	0.448	1,026	2.26	201
Upper Des Moines Opportunity	6.3	6.4	25,955	60	5,948	0.145	0.149	604	1.53	153
West Central Development Corp	3.3	3.0	10,345	39	3,388	0.257	0.232	796	2.76	242
Comm Action Agency of Siouxland	1.4	0.9	4,259	22	2,020	0.175	0.100	473	2.43	224
Polk County	9.1	8.3	33,582	118	10,962	0.156	0.130	525	1.97	183

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APPENDIX A -- CLIENT CHARACTERISTICS

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Household characteristics										
Quarterly gross income	\$4,344	\$4,355	\$4,286	\$4,406	\$4,600	\$6,691	\$9,414	\$9,871	\$9,161	\$6,338
Average members	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Percentage of households wit	th:									
Elderly	29.1	29.4	30.8	28.9	31.3	34.4	35.5	38.2	37.7	40.8
Handicapped	32.9	30.1	32.6	31.3	30.6	34.1	33.4	35.1	33.0	29.5
Young children	25.2	21.9	20.1	22.4	19.4	17.4	20.7	17.6	18.9	18.8
Housing type (%)										
Single family home	89.6	87.3	84.8	87.4	88.4	88.1	89.1	87.9	88.0	88.3
Mobile home	10.0	10.2	11.9	10.6	8.6	7.9	7.2	7.5	8.6	8.3
Small Multi-family	0.4	2.5	3.3	2.0	3.0	3.9	3.7	4.6	3.4	3.5
Heating system type (%)										
Natural gas	81.0	80.8	80.3	84.2	86.7	85.4	84.1	86.9	85.6	78.1
Propane	12.9	13.3	12.3	9.2	8.1	8.6	8.3	6.3	8.4	12.6
Fuel oil	0.8	0.8	0.9	0.2	0.1	0.5	1.1	0.3	0.2	0.3
Electricity	5.4	5.1	6.4	6.4	5.2	5.5	6.4	6.6	5.9	9.0
Other	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Air conditioning type (%)										
Central	58.7	57.3	60.2	63.6	62.0	62.6	64.9	67.9	67.1	69.1
Room	27.8	30.4	29.4	26.3	29.5	28.0	27.3	26.2	28.1	22.8
None or Missing Data	13.6	12.3	10.4	10.1	8.5	9.4	7.8	5.9	4.8	8.1
Blower door readings (avera	age cfm50	0)								
Pre	3,294	3,454	3,281	3,437	3,429	3,420	3,447	3,601	3,535	3,327
Post	2,054	2,139	2,053	2,100	2,148	2,565	2,160	2,283	2,218	2,210

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A.2 Dalhoff Associates, LLC

			APPE	NDIX B -	FIGURE D	DATA				
Figure 1.1 First Year Energy Savi										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	286,414	192,441	102,711	116,295	113,515	107,412	89,404	84,822	70,868	38,370
Infiltration Reduction	59,030	35,991	24,403	24,864	22,482	20,948	16,743	16,078	16,432	7,148
Insulation	494,564	333,793	197,200	197,846	184,203	148,756	123,312	116,900	118,016	54,818
Light/Water Heat/Other Utilit	16,057	9,698	7,726	6,002	6,062	4,403	3,874	3,586	3,336	1,605
Water Heater Replacement	54,904	32,819	25,296	28,290	33,942	29,679	23,656	5,486	4,730	2,323
Whole House Ventilation					-2,392	-4,936	-4,269	-3,681	-3,746	-1,824
Figure 1.2 First Year Energy Savi	ngs (kWh) – Pro	gram								
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	8,324	4,975	3,937	186,516	201,190	185,546	159,209	141,656	102,592	61,845
Infiltration Reduction	150,295	59,937	39,935	46,035	32,037	41,401	42,306	32,996	27,914	22,005
Insulation	1,811,722	759,702	466,832	466,307	358,537	446,239	470,351	393,957	296,097	192,872
Light/Water Heat/Other Utilit	2,734,566	947,748	596,538	567,195	572,018	371,009	369,048	372,411	328,967	127,057
Water Heater Replacement	19,171	7,824	12,343	14,023	15,089	17,269	15,857	12,699	8,466	10,546
Whole House Ventilation					-24,538	-59,517	-70,405	-55,641	-44,172	-25,555
Figure 1.3 Overall Program Expe	enditures									
9	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	8,182,168	5,189,193	3,123,974	3,465,461	3,376,066	3,390,913	2,747,745	2,639,470	2,427,437	1,343,847
Infiltration Reduction	2,357,653	1,476,133	1,002,359	1,041,087	1,005,719	1,182,412	1,045,485	1,050,911	1,091,550	589,000
Insulation	12,616,772	7,584,763	4,317,731	4,509,492	4,279,518	4,188,388	3,440,858	3,296,812	3,144,993	1,845,872
Light/Water Heat/Other Utilit	1,233,806	720,138	424,488	356,538	327,532	328,738	241,252	181,688	201,940	87,199
Other	2,584,355	1,988,982	1,752,150	1,700,878	2,151,835	1,982,511	1,558,300	1,558,818	1,433,013	1,692,941
Repair	2,405,336	1,491,583	1,039,839	971,976	785,187	930,041	828,300	841,939	656,413	370,264
Support	8,932,316	5,818,840	4,656,124	4,864,035	4,756,716	5,302,237	4,570,198	4,333,342	3,955,748	2,261,937
Water Heater Replacement	2,426,666	1,527,656	1,034,375	1,316,775	1,562,901	1,579,574	1,289,234	1,216,971	1,093,003	622,692
Whole House Ventilation	687,151	648,556	367,224	488,871	368,924	1,018,951	898,996	802,972	795,679	406,672
Figure 1 4 Average Brogram Evn	anditures per U	ousing Unit								
Figure 1.4 Average Program Exp	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	1,800	1,750	1,690	2,080	2,230	2,302	2,189	2,281	2,223	2,321
Infiltration Reduction	520	500	540	620	660	803	833	908	1,000	1,017
Insulation	2,780	2,550	2,330	2,710	2,830	2,843	2,742	2,849	2,880	3,188
Light/Water Heat/Other Ut	2,780	2,330	2,330	2,710	2,830	2,843	192	157	185	151
Other	690	670	950	1,020	1,420	1,346	1,242	1,347	1,312	2,924
Repair	530	500	560	580	520	631	660	728	601	639
Support	1,970	1,960	2,520	2,920	3,140	3,600	3,642	3,745	3,622	3,907
Water Heater Repl	540	510	560	790	1,030	1,072	1,027	1,052	1,001	1,075
Whole House Ventilation	150	220	200	290	240	692	716	694	729	702
	9,258	8,901	9,577	11,227	12,295	13,512	13,255	13,762	13,553	15,925
Figure 4 C First Vers Client First	C+ Ci /N-									
Figure 1.6 First Year Client Fuel (2012	2014	2015	2016	2017	2018	2019	2020
Whole House Ventilation	2011	2012	2013	2014			2017			
	271 107	227 712	121 071	120.024	-5,593	-12,094	-13,169	-10,721	-9,291	-5,077
Heating System Work	371,197	227,712	121,871	129,924	123,290	114,855	107,911	89,550	67,844	43,177
Infiltration Reduction Insulation	84,236 759,964	43,906 424,194	29,920 256,624	28,584 234,798	23,482 199,673	23,425 183,128	21,220	17,763 149,405	16,180 127,081	9,303 75,201
Light/Water Heat/Other Ut	280,880	103,539	66,702	63,990	67,400	45,384	174,531 46,038	46,041	41,775	16,230
Water Heater Replacement	63,944	37,826	29,556	31,404	35,593	31,142	27,027	7,249	5,625	3,591
water neater kepiacement	03,944	37,020	29,550	31,404	33,393	31,142	27,027	7,249	3,023	3,391
Figure 1.8 First Year Energy Savi	•									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	111,218	67,910	60,813	70,795	67,323	69,667	58,964	56,587	39,540	23,032
Infiltration Reduction	10,340	5,358	5,129	5,467	4,923	4,784	5,275	5,361	3,766	1,783
Insulation	207,156	131,917	131,486	132,525	119,370	102,315	93,879	82,856	73,820	37,505
Light/Water Heat/Other Utilit	6,809	4,029	4,604	3,911	3,852	2,809	2,838	2,480	1,794	1,035
Water Heater Replacement	25,346	13,943	15,335	15,826	18,230	17,885	16,361	3,501	2,272	0

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Figure 1.9 First Year Energy Savi	ngs (kWh) – Util	ity only								
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	3,286	417	224	64,339	66,083	71,506	66,476	56,869	32,598	22,538
Infiltration Reduction	18,659	7,535	6,267	9,268	8,069	8,430	12,372	9,802	8,018	4,910
Insulation	613,470	264,752	237,590	282,915	212,946	283,722	321,895	242,091	153,290	118,784
Light/Water Heat/Other Utilit	922,461	347,294	336,976	344,858	350,640	218,339	251,166	247,622	174,167	73,832
Water Heater Replacement	11,516	4,774	3,587	5,753	6,780	9,119	9,580	7,629	2,532	0
5. 4401070 5 10										
Figure 1.10 Utility Expenditures		2012	2012	2014	2015	2016	2017	2010	2010	2020
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating System Work	2,082,247	1,176,515	1,200,207	1,557,590	1,520,693	1,594,196	1,379,543	1,344,597	984,042	580,579
Infiltration Reduction	288,225	173,869	172,746	198,737	204,838	212,265	273,962	271,847	230,486	118,461
Insulation	3,753,358	2,295,748	2,306,634	2,528,094	2,353,124	2,422,997	2,190,461	2,014,536	1,638,982	992,074
Light/Water Heat/Other Utilit	375,480	249,184	227,782	200,560	188,571	180,770	160,696	106,432	97,986	48,313
Other	128,109	72,842	62,892	107,646	124,082	147,766	176,289	182,118	127,974	52,738
Repair	157,260	96,832	104,157	129,832	121,538	123,880	168,145	177,192	126,545	74,552
Support	706,131	420,502	466,296	564,572	523,448	602,760	585,371	548,279	393,167	208,312
Water Heater Replacement	702,797	414,525	481,837	597,828	762,163	849,809	815,113	685,224	469,445	0

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