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IOWA UTILITIES BOARD



**Black Hills Energy**  
**Natural Gas Energy Efficiency**  
**Programs**  
**Annual Report**  
**2014**

*Prepared for*  
Iowa Utilities Board

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***Prepared by***  
Black Hills Energy

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# Executive Summary

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Black Hills Energy is pleased to present this 2014 annual report on its gas energy efficiency plan, pursuant to Docket No. EEP-2013-0001 of the Iowa Utility Board.

## Program Portfolio Overview

Black Hills Energy's energy efficiency portfolio of programs targets four sectors:

- Residential
- Nonresidential
- Low income
- Public purpose

Black Hills Energy designed its programs to address the particular needs of each sector's various customer types.

The residential programs contain the following elements:

- Evaluations
- Prescriptive rebates
- New construction

The nonresidential programs contain the following elements:

- Commercial evaluations
- Prescriptive and custom rebates
- New construction

The low-income programs contain the following elements:

- Low-income weatherization and weatherization teams
- Energy education
- Multifamily improvements
- Affordable housing
- Green Iowa AmeriCorps (GIAC)

The public purpose programs contain the following elements:

- School-based energy education
- Tree programs (e.g., Trees Forever and Trees for Kids/Teens Programs)
- Other public purpose programs (e.g., funding for the Iowa Energy Center [IEC] and the Center for Global and Regional Environmental Research [CGRER])

## Program Budgets, Savings, and Cost-Effectiveness

Table ES-1 presents projected 2014 budgets and actual expenditures for the program sectors and categories, which includes general expenditures, cross-program training, marketing, and administration.

**Table ES-1. 2014 Utility Budget by Sector\***

Sector/Category	2014 Budget	2014 Actual	Percentage of Budget
Residential	\$3,568,200	\$3,438,063	96%
Nonresidential	\$1,151,600	\$531,904	46%
Low Income	\$677,600	\$631,655	93%
Public Purpose	\$448,300	\$376,887	84%
Cross-Program Expenditures	\$360,000	\$947,197	263%
Other Funding Initiatives**	\$25,000	\$0	0%
<b>Total</b>	<b>\$6,230,700</b>	<b>\$5,925,707</b>	<b>95%</b>

\* May not sum to total due to rounding.

\*\* Other Funding Initiatives include the technical reference manual, joint utility study, and the next energy efficiency plan preparation.

Table ES-2 provides the projected 2014 budget and actual expenditures by program.

**Table ES-2. Program 2014 Budget Summaries\***

Program Category	2014 Projected Budget	2014 Actual Expenditures	Percentage of Budget
<b>Residential Programs</b>			
R.1 – Residential Evaluation	\$706,700	\$352,747	50%
R.2 – Residential Prescriptive	\$2,377,800	\$3,013,904	127%
R.3 – Residential New Construction	\$483,800	\$71,412	15%
<b>Nonresidential Programs</b>			
NR.1 – Nonresidential Evaluation	\$96,700	\$62,799	65%
NR.2 – Nonresidential Prescriptive	\$785,900	\$332,976	42%
NR.3 – Nonresidential Custom	\$52,200	\$27,908	53%
NR.4 – Nonresidential New Construction	\$216,900	\$108,221	50%
<b>Low-Income Programs</b>			
LI.1 – Weatherization Program	\$598,100	\$585,476	98%
LI.2 – Energy Education Program	\$23,500	\$28,816	123%
LI.3 – Multifamily Efficiency Improvement Initiative Program	\$14,700	\$6,721	46%
LI.4 – Affordable Homes Program	\$3,600	\$0	0%
LI.5 – Weatherization Team Program	\$15,700	\$642	4%
LI.6 – GIAC	\$22,000	\$10,000	45%
<b>Public Purpose Programs</b>			
PP.1 – School-Based Energy Education	\$81,300	\$81,452	100%
PP.2 – Tree Planting Programs	\$141,500	\$141,505	100%
PP.3 – IEC and CGRER	\$225,500	\$153,930	68%
<b>Cross-Program Training, Marketing, and Administration</b>			
	\$360,000	\$947,197	263%
<b>Other Funding Initiatives**</b>			
	\$25,000	\$0	0%
<b>Total Budget</b>			
	<b>\$6,230,700</b>	<b>\$5,925,707</b>	<b>95%</b>

\* May not sum to total due to rounding.

\*\* Other Funding Initiatives include the technical reference manual, joint utility study, and the next energy efficiency plan preparation.

Table ES-3 presents projected and actual savings for each sector.

**Table ES-3. 2014 Savings (MCF) by Sector\***

Sector	2014 Projected	2014 Actual	Percentage of Goal
Residential	70,081	64,294	92%
Nonresidential	30,759	28,844	94%
Low Income	4,217	6,344	150%
Public Purpose	3,856	8,417	218%
<b>Total</b>	<b>108,913</b>	<b>107,899</b>	<b>99%</b>

Table ES-4 provides 2014 projected and actual savings, by program.

**Table ES-4. Projected and Actual Savings (MCF) by Program\***

Program Category	2014 Projected MCF	2014 Actual MCF	Percent of Goal
<b>Residential Programs</b>			
R.1 – Residential Evaluation	5,503	2,644	48%
R.2 – Residential Prescriptive	55,331	61,650	111%
R.3 – Residential New Construction	9,247	-	0%
<b>Nonresidential Programs</b>			
NR.1 – Nonresidential Evaluation	320	3	1%
NR.2 – Nonresidential Prescriptive	14,012	25,127	179%
NR.3 – Nonresidential Custom	5,928	2,126	36%
NR.4 – Nonresidential New Construction	10,499	1,587	15%
<b>Low-Income Programs</b>			
LI.1 – Weatherization Program	1,650	1,952	118%
LI.2 – Energy Education Program	969	3,514	363%
LI.3 – Multifamily Efficiency Improvement Initiative Program	2	-	0%
LI.4 – Affordable Homes Program	37	-	0%
LI.5 – Weatherization Team Program	779	679	87%
LI.6 – GIAC	780	200	26%
<b>Public Purpose Programs</b>			
PP.1 – School-Based Energy Education	3,655	5,151	141%
PP.2 – Tree Planting Programs	201	3,266	1,625%
PP.3 – IEC & CGRER	N/A	N/A	N/A
<b>Total Savings</b>			
	<b>108,913</b>	<b>107,899</b>	<b>99%</b>

\*May not sum due to rounding.

Table ES-5 provides 2014 projected and actual peak demand savings by program.

**Table ES-5. Projected and Actual Peak Demand Savings (MCF/day) by Program\***

Program Category	2014 Projected MCF	2014 Actual MCF	Percentage of Goal
<b>Residential Programs</b>			
R.1 – Residential Evaluation	60	7	12%
R.2 – Residential Prescriptive	581	658	113%
R.3 – Residential New Construction	101	0	0%
<b>Nonresidential Programs</b>			
NR.1 – Nonresidential Evaluation	3	0.01	0.4%
NR.2 – Nonresidential Prescriptive	142	261	184%
NR.3 – Nonresidential Custom	62	15	25%
NR.4 – Nonresidential New Construction	110	17	15%
<b>Low-Income Programs</b>			
LI.1 – Weatherization Program	18	21	119%
LI.2 – Energy Education Program	11	38	349%
LI.3 – Multifamily Efficiency Improvement Initiative Program	0.02	0	0%
LI.4 – Affordable Homes Program	0.4	0	0%
LI.5 – Weatherization Team Program	9	7	82%
LI.6 – GIAC	9	2	24%
<b>Public Purpose Programs</b>			
PP.1 – School-Based Energy Education	40	56	141%
PP.2 – Tree Planting Programs	2	36	1,785%
PP.3 – IEC & CGRER	N/A	N/A	N/A
<b>Total</b>	<b>1,148</b>	<b>1,119</b>	<b>97%</b>

Table ES- 6 provides 2014 overall portfolio cost-effectiveness data.

**Table ES- 6. Portfolio Cost-Effectiveness**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$11,359,923	\$12,151,222	\$791,299	1.07
Utility Cost Test (UCT)	\$5,925,707	\$7,457,104	\$1,531,397	1.26
Ratepayer Impact (RIM)	\$13,525,289	\$7,457,104	-\$6,068,185	0.55
Participant Cost (PCT)	\$8,358,372	\$10,855,602	\$1,787,715	1.20

## Report Contents

In addition to the Executive Summary, this report includes the following chapters and appendices:

- Chapters 1, 2, 3 and 4 detail the overall energy efficiency protocols for the residential, nonresidential, low-income, and public purpose programs, respectively. The chapters contain a general discussion of topics relevant to the programs as well as detailed descriptions of individual programs (e.g., budgets, participation, measures, impacts, and, where required, cost-effectiveness results).
- The following appendices complete the document, providing data necessary for successfully filing the report:
  - Appendix A: Confidential Cost-Effectiveness Assumptions
  - Appendix B: Confidential Detailed Cost-Effectiveness Workbooks (in Microsoft Excel format)

# 1. Residential Programs

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## Introduction

This chapter describes Black Hills Energy’s portfolio of residential energy efficiency programs. It begins with the overall cost-effectiveness for the sector portfolio and includes a detailed description of each program. Table 1 lists Black Hills Energy’s portfolio of residential programs.

**Table 1. Black Hills Energy Residential Programs**

Program
R.1 – Residential Evaluation
R.2 – Residential Prescriptive
R.3 – Residential New Construction

## Residential Sector Cost-Effectiveness

Table 2 shows the three residential programs’ cost-effectiveness, combined into a single portfolio.

**Table 2. Residential Programs’ Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$7,705,270	\$7,355,754	-\$349,517	0.95
Utility Cost Test (UCT)	\$3,438,063	\$4,518,374	\$1,080,311	1.31
Ratepayer Impact (RIM)	\$8,055,796	\$4,518,374	-\$3,537,422	0.56
Participant Cost (PCT)	\$6,868,681	\$6,990,970	\$122,288	1.02

## R.1 – Residential Evaluation Program

### Program Description

The Residential Evaluation Program offers four types of evaluations to single-family households: (1) a free online evaluation, (2) a free walk-through evaluation, (3) a Tier I comprehensive evaluation, and (4) a Tier II comprehensive evaluation. Black Hills Energy offers these four components to provide customers with multiple entry points to the program. In addition to the single-family components, the program also offers an on-site evaluation for multifamily homes. Both the single-family and multifamily evaluators provide recommendations to customers about how they can reduce their energy consumption, while maintaining or improving the comfort of their homes.

Customers who receive recommendations during their on-site evaluation for shell measure improvements are eligible to obtain incentives through Black Hills Energy’s Residential Prescriptive Program. In addition, customers who participate in the Residential Evaluation

Program are informed of a 10% bonus incentive for those who install three or more measures during the program year.

## Program Summary

Table 3 shows a comparison of the program budget and goals to actual 2014 program performance.

**Table 3. Residential Evaluation Program Summary**

Measured Target	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	2,645	1,151	44%
Expenditures	\$706,700	\$352,747	50%
Energy Target (MCF)	5,503	2,644	48%
Demand Impacts (MCF/day)	60	7	12%

## Measures and Incentives

The Residential Evaluation Program offers participants the following energy efficiency measures at no cost:

- Faucet aerators
- Outlet gaskets
- Hot water pipe insulation
- Low-flow showerheads
- Low-cost infiltration measures

On average, a participating customer receives about \$30 worth of measures during the evaluation.

## Participation

The Residential Evaluation Program projected 2,645 participants in 2014 and achieved 1,151 participants.

## Budget

Black Hills Energy covers the entire cost of all direct install measures and walk-through evaluations.<sup>1</sup> Customers who participate in the Tier I comprehensive evaluation are required to pay a \$100 copay; Black Hills Energy covers the remaining cost of approximately \$300. Customers who opt for the Tier II comprehensive evaluation are required to pay a \$200 copay; Black Hills Energy covers the remaining cost of approximately \$500. Customers who participate in the multifamily evaluation are required to pay an \$800 copay; Black Hills Energy covers the remaining costs, which is approximately an additional \$800 per site.

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<sup>1</sup> The walk-through evaluation and corresponding leave-behind measures have a monetary value of approximately \$200 per home.

The proposed program budget for 2014 was \$706,700. Actual expenditures equaled \$352,747.

## Savings

Projected program savings were 5,503 MCF for 2014, and actual savings equaled 2,644 MCF.

## Cost-Effectiveness Results

Table 4 presents the cost-effectiveness analysis results, which are based on 2014 program activity.

**Table 4. Residential Evaluation Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$356,038	\$161,452	-\$194,585	0.45
Utility Cost Test (UCT)	\$352,747	\$119,785	-\$232,962	0.34
Ratepayer Impact (RIM)	\$490,235	\$119,785	-\$370,450	0.24
Participant Cost (PCT)	\$194,614	\$324,548	\$129,934	1.67

## R.2 – Residential Prescriptive Program

### Program Description

The Residential Prescriptive Program provides incentives to customers who improve the efficiency of their home through the following activities: (1) installing measures such as high-efficiency furnaces, boilers, water heaters, and setback thermostats; (2) early replacement of water heaters; (3) furnace maintenance; (4) innovative space- and water-heating technologies; (5) high-efficiency clothes washers; and (6) envelope measures such as roof, wall, and foundation insulation and infiltration.<sup>2,3</sup>

### Program Summary

Table 5 compares the program’s budget and goals to actual 2014 program performance.

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<sup>2</sup> Customers must have natural gas water heating to be eligible for the clothes washer incentive.

<sup>3</sup> Customer must have natural gas heating as their primary heating source and must have received an on-site evaluation to be eligible for envelope measure incentives and the end-of-life water heater incentive.

**Table 5. Residential Prescriptive Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	11,279	10,270	91%
Expenditures	\$2,377,800	\$3,013,904	127%
Energy Target (MCF)	55,331	61,650	111%
Demand Impacts (MCF/day)	581	658	113%

## Measures and Rebates

Table 6 and Table 7 list eligible measures, their efficiency levels, and their rebate levels. Insulation measure rebate structures cover roughly two-thirds of the measure’s incremental costs and encourage customers to adopt the highest-efficiency levels technically feasible.

**Table 6. Residential Prescriptive Program Measure Summary**

Measure Name	Measure Description	Proposed Incentive	Dealer Spiff
<b>R.2 Residential Prescriptive</b>			
Quality Install Furnace/Boiler	Quality installation of furnace and/or boiler		\$150
Furnace	96% AFUE or greater	\$600	
Furnace	94% to 95.9% AFUE	\$400	
Boiler	95% AFUE or greater	\$600	
Gas Fireplace	70% AFUE or greater, intermittent ignition, heat rated, and thermostatic control with blower	\$250	
Duct Sealing	8 CFM/100 square feet of CFA	70% up to \$200	
Integrated Space and Water Heater	Integrated space and water heater ≥ 84% CAE or 95% boiler indirect-fired water heater	\$375	\$175
Multizone Thermostat	Individual room temperature control for major occupied rooms	\$450	\$60
Furnace/Boiler Maintenance	Furnace and/or boiler maintenance	\$50	
Setback Thermostat	5-1-1, 5-2, or 7-day (customer installation)	Up to \$20	
Setback Thermostat	5-1-1, 5-2, or 7-day (professional installation)	Up to \$50	
Wi-Fi Programmable Thermostat	Wi-Fi programmable thermostat	\$50	
Furnace Maintenance and Setback Thermostat	Furnace maintenance and setback thermostat (professional installation)	\$150	
Boiler Maintenance and Setback Thermostat	Boiler maintenance and setback thermostat (professional installation)	\$150	

**Table 7. Residential Prescriptive Program Measure Summary Continued**

Measure Name	Measure Description	Proposed Incentive	Dealer Spiff
<b>R.2 Residential Prescriptive (continued)</b>			
Insulation (ceiling)	R-49	70% up to \$750	
Insulation (2x4 wall)	R-13	70% up to \$750	
Insulation (2x6 wall)	R-20 or R-13 w/ R-5 sheathing	70% up to \$750	
Insulation (basement wall)	R-15	70% up to \$750	
Insulation (foundation)	R-15	70% up to \$750	
Insulation (floor)	R-30*	70% up to \$750	
Insulation (rim and band joist)	R-10	70% up to \$750	
Infiltration Control	7.0 ACH 50	70% up to \$200	
Thermal Door	ENERGY STAR® door (R-4.8 or U-0.20)	\$10	
Water Heater	0.67 to 0.79 EF storage	\$150	\$10
Water Heater	Greater than 0.80 EF or 90% thermal efficiency condensing or tankless	\$300	\$60
Water Heater	Replacement before end of life (storage), minimum EF = 0.67	\$425	\$10
Clothes Washer	ENERGY STAR clothes washer	\$50	
<b>Residential Prescriptive Bundle</b>			
Rebate Bundle	10% bonus incentive on top of rebate package if minimum of three residential prescriptive measures are installed within the program year	10% of total incentives received	

\* IA code is R-30 or insulation to fill the cavity (R-19 minimum).

## Participation

Projected installations for 2014 were 11,279. Actual program installations totaled 10,270.

## Budget

The proposed budget for 2014 was \$2,377,800. Actual program expenditures equaled \$3,013,904.

## Savings

Black Hills Energy projected program savings of 55,331 MCF for 2014. The program achieved actual savings of 61,650 MCF.

## Cost-Effectiveness Results

Table 8 lists cost-effectiveness analysis results for the Residential Prescriptive Program, which are based on 2014 program activity.

**Table 8. Residential Prescriptive Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$7,277,820	\$7,194,301	-\$83,519	0.99
Utility Cost Test (UCT)	\$3,013,904	\$4,398,589	\$1,384,686	1.46
Ratepayer Impact (RIM)	\$7,494,148	\$4,398,589	-\$3,095,559	0.59
Participant Cost (PCT)	\$6,674,067	\$6,666,422	-\$7,645	1.00

## R.3 – Residential New Construction Program

### Program Description

Black Hills Energy designed the Residential New Construction Program to promote the construction of energy-efficient single-family and multifamily homes by providing incentives to new home builders for installing high-efficiency, natural gas-fired space and water heating equipment and more robust thermal envelope measures. The Residential New Construction Program takes a comprehensive approach to overall efficiency and was designed to minimize the lost opportunities for energy savings in each structure.

In 2014, Black Hills Energy hosted three trade ally meetings to present the Residential New Construction Program. The feedback from these meetings resulted in an update to the program in July 2014, in which two tiers were developed and offered. Tier 1 offered the initial measure mix and incentive whereas Tier 2 excluded the drain water heat recovery for a lesser incentive.

### Program Summary

Table 9 shows a comparison of program budgets and goals to actual 2014 program performance.

**Table 9. Residential New Construction Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	450	0*	0%
Expenditures	\$483,800	\$71,412	15%
Energy Savings (MCF)	9,247	0	0%
Demand Impacts (MCF/day)	101	0	0%

\* Several builders applied for rebates through the Residential Prescriptive Program rather than the Residential New Construction Program.

### Measures and Rebates

Participating homebuilders can meet the program's efficiency standards by installing the equipment under Tier 1 or Tier 2, specified in Table 10. Builders may also apply for additional rebates under the Residential Prescriptive Program, such as for high-efficiency clothes washers.

**Table 10. Residential New Construction Program Tiers and Measure Summary**

Measure Name	Efficiency Requirement	Proposed Incentive
<b>Tier 1</b>		
Quality Install Furnace	Manual J	\$1,000
Wall Insulation	Wall insulation R20 + R5	
Doors	ENERGY STAR U-Factor = 0.2	
Furnace	96% AFUE	
Drain Water Heat Recovery	Power pipe system	
Water Heater	0.67 EF storage (ENERGY STAR)	
<b>Tier 2</b>		
Quality Install Furnace	Manual J	\$800
Wall Insulation	Wall insulation R20 + R5	
Doors	ENERGY STAR U-Factor = 0.2	
Furnace	96% AFUE	
Water Heater	0.67 EF storage (ENERGY STAR)	

## Participation

The projected participation in 2014 was 450. There were no participants in 2014.

## Budget

The proposed annual budget for 2014 was \$483,800. Actual budget expenditures equaled \$71,412.

## Savings

Black Hills Energy projected savings of 9,247 MCF 2014; however, there was no participation and thus the program did not achieve savings.

## Cost-Effectiveness Results

Table 11 lists cost-effectiveness analysis results, which are based on 2014 program activity.

**Table 11. Residential New Construction Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$71,412	\$0	-\$71,412	0.00
Utility Cost Test (UCT)	\$71,412	\$0	-\$71,412	0.00
Ratepayer Impact (RIM)	\$71,412	\$0	-\$71,412	0.00
Participant Cost (PCT)	\$0	\$0	\$0	0.00

## 2. Nonresidential Programs

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### Introduction

This chapter describes Black Hills Energy’s portfolio of nonresidential energy efficiency programs. It begins with the overall cost-effectiveness for the sector portfolio and includes a detailed description of each program. Table 12 lists Black Hills Energy’s portfolio of nonresidential programs.

**Table 12. Black Hills Energy Nonresidential Programs**

Program
NR.1 – Nonresidential Evaluation
NR.2 – Nonresidential Prescriptive
NR.3 – Nonresidential Custom
NR.4 – Nonresidential New Construction

### Nonresidential Sector Portfolio Cost-Effectiveness

Table 13 shows the cost-effectiveness of the four nonresidential programs combined.

**Table 13. Nonresidential Programs’ Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$1,593,161	\$3,377,548	\$1,784,387	2.12
Utility Cost Test (UCT)	\$531,904	\$2,054,070	\$1,522,165	3.86
Ratepayer Impact (RIM)	\$2,613,516	\$2,054,070	-\$559,446	0.79
Participant Cost (PCT)	\$1,381,870	\$2,295,250	\$913,379	1.66

### NR.1 – Nonresidential Evaluation Program

#### Program Description

The Nonresidential Evaluation Program has two commercial components—a small commercial evaluation and a large commercial evaluation, which is new—and one industrial outreach component. Black Hills Energy is offering the two commercial components to provide customers of both small and large facilities access to on-site energy evaluations. Through the industrial outreach component, Black Hills Energy provides free industrial on-site energy evaluations. Both the commercial and industrial evaluations include recommendations for customers for ways they can reduce their energy consumption.

Customers who receive recommendations for shell measure improvements are eligible to obtain incentives through Black Hill Energy’s Nonresidential Prescriptive Program. Additional qualifying measures may be submitted to the Nonresidential Custom Program.

## Program Summary

Table 14 compares the program’s budget and goals to actual 2014 program performance. This program obtains direct savings from leave-behind measures.

**Table 14. Nonresidential Evaluation Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	160	112	70%
Expenditures	\$96,700	\$62,799	65%
Energy Target (MCF)	320	3	1%
Demand Impacts (MCF/day)	3	0.01	0.4%

## Measures and Incentives

Free low-cost measures that are provided and/or installed to commercial customers include the following:

- Water heater pipe insulation
- Low-flow showerheads
- Flip faucet aerators (kitchen)
- Standard faucet aerators (bathroom)
- Low-flow spray heads (commercial kitchen facilities only)

## Participation

Black Hills Energy estimated 2014 program participation to be 160 commercial customers and 112 customers actually participated.

## Budget

Of a \$96,700 proposed budget for 2014, the program expended \$62,799.

## Savings

Black Hills Energy projected 320 MCF in savings in from the 2014 program, but achieved actual savings of 3 MCF.

## Cost-Effectiveness Results

Table 15 lists cost-effectiveness analysis results, which are based on 2014 program activity.

**Table 15. Nonresidential Evaluation Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$65,646	\$166	-\$65,480	0.00
Utility Cost Test (UCT)	\$62,799	\$123	-\$62,676	0.00
Ratepayer Impact (RIM)	\$62,935	\$123	-\$62,812	0.00
Participant Cost (PCT)	\$45,929	\$43,215	-\$2,715	0.94

## NR.2 – Nonresidential Prescriptive Program

### Program Description

The Nonresidential Prescriptive Program provides a full range of energy-efficiency options for space and water heating and for commercial cooking equipment; the program primarily focuses on the small business sector. This program offers cash rebates to nonresidential customers for purchasing high-efficiency natural gas equipment and incentives to dealers that sell eligible equipment.

### Program Summary

Table 16 shows a comparison of the program budget and goals to actual 2014 program performance.

**Table 16. Nonresidential Prescriptive Program Summary**

	Budget or Goal	Actual	Percent Budget or Goal Achieved
Participation	784	631	80%
Expenditures	\$785,900	\$332,976	42%
Energy Savings (MCF)	14,012	25,127	179%
Demand Impacts (MCF/day)	142	261	184%

### Measures and Rebates

The incentives for the Nonresidential Prescriptive Program are similar to those available to residential customers for similar equipment and/or were designed to cover up to one-half of the incremental cost of the measure. Tiered incentive levels are included to promote the higher efficiency measures.

As part of the QA/QC process, Black Hills Energy requires all space heating equipment to bear the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Certified mark. All water heaters must either include AHRI certification or be listed as ENERGY STAR-qualified. In addition, to promote these high-efficiency measures, Black Hills Energy offers dealer spiffs to encourage them to promote and stock high-efficiency equipment.

To help ensure that furnaces are properly sized and installed, the dealer spiff for those units will be contingent on receiving documentation showing proper installation practice and/or requiring the contractor to complete a training course. Contractors submitting applications for quality installation spiffs must either use the Save software or be NATE certified.

Table 17 and Table 18 list the eligible measures and their corresponding incentive levels.

**Table 17. Nonresidential Prescriptive Program Measure Summary**

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
<b>Nonresidential Prescriptive</b>				
Broiler	EF greater than 34%	15% efficient	\$100	\$10
Convection Oven	ENERGY STAR	Standard	\$200	\$20
Conveyor Oven	40% with thermostatic controls	15% efficient	\$1,350	\$50
Fryer	ENERGY STAR	Standard	\$525	\$50
Griddle	ENERGY STAR	32% efficient	\$600	\$50
Steam Cooker	ENERGY STAR	Standard	\$1,000	\$50
Rotisserie Oven	EF 31% efficient rotisserie oven	EF 25% standard oven	\$1,350	\$50
Rotating Rack Oven	EF 40% rotating rack oven	EF 25% deck oven	\$1,500	\$50
Char Broiler	EF 38% or greater efficient char broiler	EF 33% standard char broiler	\$1,100	\$50
Salamander Broiler	EF 35% or greater efficient salamander broiler	Conversion of radiant to infrared; EF 22.5% broiler	\$525	\$50
Duct Repair, Sealing, and Insulation Package	Reduction in duct losses to 5% and new duct insulation (R-8 in unconditioned spaces)	No repair or sealing, 15% duct losses; no insulation	\$0.45/linear foot	
Duct Insulation	New duct insulation (R-8 in unconditioned spaces)	No insulation	\$0.30/linear foot	
Quality Install Furnace/Boiler	Quality installation of furnace and/or boiler	Standard install		\$150
Furnace	94% to 95.9% AFUE	Federal standard 78% AFUE	\$400	
Furnace	96% AFUE or greater	Federal standard 78% AFUE	\$600	
Furnace/Boiler Maintenance	Furnace and/or boiler maintenance	Unmaintained furnace/boiler	\$100	

**Table 18. Nonresidential Prescriptive Program Measure Summary (continued)**

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
<b>Nonresidential Prescriptive (continued)</b>				
Boiler < 300 kBtuh	90% to 94.9% AFUE	82% AFUE standard boiler	\$800	
Boiler < 300 kBtuh	95% or greater AFUE	82% AFUE standard boiler	\$1,200	
Setback Thermostat	5-1-1, 5-2, or 7-day (professional installation)	Manual thermostat	Up to \$70	
Setback Thermostat	5-1-1, 5-2, or 7-day (self-installation)	Manual thermostat	Up to \$50	
Spa Covers	Greater than R-14	No cover	\$50	
Swimming Pool Covers	Transparent	No cover	\$250	
Doors	U-Factor = 0.35	Standard door (U-Factor = 0.55)	\$25	
Infiltration Control	Weather-stripping	Standard practice	70% up to \$1,500	
Insulation (floor)	R-30	Average existing insulation (R-10)	70% or \$0.30/square foot	
Insulation (roof)	R-20 continuous insulation	Average existing insulation (R-10)	70% or \$0.30/square foot	
Insulation (wall)	R-13 + R-7.5	Average existing insulation (R-10)	70% or \$0.30/square foot	
Vent Damper	Vent damper for boiler	No damper	\$160	
Water Heater	0.67 to 0.79 EF storage	Standard water heater (federal standard)	\$150	\$10
Water Heater	Greater than 0.80 EF or 90% thermal efficiency condensing or tankless	Standard water heater (federal standard)	\$300	\$60

## Participation

In 2014, Black Hills Energy projected program participation of 784 (set equal to the number of installations). Actual participation was 631.

## Budget

Of the \$785,900 proposed for the 2014 budget, the program expended \$332,976.

## Savings

Black Hills Energy projected 14,012 MCF in savings for the 2014 program; the program achieved savings of 25,127 MCF.

## Cost-Effectiveness Results

Table 19 lists cost-effectiveness analysis results, which are based on 2014 program activity.

**Table 19. Nonresidential Prescriptive Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$1,199,629	\$2,961,714	\$1,762,084	2.47
Utility Cost Test (UCT)	\$332,976	\$1,788,278	\$1,455,302	5.37
Ratepayer Impact (RIM)	\$2,139,490	\$1,788,278	-\$351,212	0.84
Participant Cost (PCT)	\$1,106,355	\$1,952,622	\$846,267	1.76

## NR.3 – Nonresidential Custom Program

### Program Description

Through the Nonresidential Custom Program, Black Hills Energy provides customer incentives for the installation of energy-efficient natural gas equipment not specified in the Nonresidential Prescriptive Program. Generally, this includes measures for which there would be a wide variation in cost, depending on a facility's specifics. The Nonresidential Custom Program buys down energy-efficient upgrades to a two-year payback or up to one-half of the equipment's incremental cost (whichever is less), up to \$3,000. In most cases, the program requires expert analyses to determine potential energy savings, base case, incremental costs, and other project parameters, and Black Hills Energy provides funding to support such analysis.

### Program Summary

Table 20 shows a comparison of the program budget and goals to actual 2014 program performance.

**Table 20. Nonresidential Custom Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	12	8	67%
Expenditures	\$52,200	\$27,908	53%
Energy Savings (MCF)	5,928	2,126	36%
Demand Impacts (MCF/day)	62	15	25%

## Measures and Rebates

Given the individual analysis conducted for each proposed project, any technology could be considered for the program if a customer can demonstrate the measure cost-effectively produced natural gas savings. Black Hills Energy expected, however, that most program activity would include applications of the following technologies:

- Boiler and furnace retrocommissioning
- Large boilers (> 300 kBtu/h)
- Process-related equipment for industrial or agricultural customers
- Heat recovery devices and automated ventilation control sensors
- Boiler turbulators
- Direct-fired make-up air units

## Participation

Black Hills Energy projected 12 participants for the 2014 program. Actual participation was eight.

## Budget

Of the \$52,200 proposed for the 2014 budget, the program expended \$27,908.

## Savings

Black Hills Energy projected 5,928 MCF in savings for the 2014 program. The program achieved actual savings of 2,126 MCF.

## Cost-Effectiveness Results

Table 21 lists cost-effectiveness analysis results, which are based on 2014 program activity.

**Table 21. Nonresidential Custom Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$95,202	\$249,527	\$154,325	2.62
Utility Cost Test (UCT)	\$27,908	\$153,887	\$125,979	5.51
Ratepayer Impact (RIM)	\$189,652	\$153,887	-\$35,765	0.81
Participant Cost (PCT)	\$77,709	\$163,678	\$85,969	2.11

## NR.4 – Nonresidential New Construction Program

### Program Description

The Nonresidential New Construction Program encourages builders of nonresidential facilities to build with energy-efficiency in mind. The program covers new construction and major renovations, primarily in the commercial sector, although some multifamily and light industrial

projects may qualify. Black Hills Energy offers program design assistance and incentives for the design team as well as incentives for the builder.

## Program Summary

Table 22 shows a comparison of the program’s budget and goals to actual 2014 program performance.

**Table 22. Nonresidential New Construction Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	8	6	75%
Expenditures	\$216,900	\$108,221	50%
Energy Target (MCF)	10,499	1,587	15%
Demand Impacts (MCF/day)	110	17	15%

## Measures and Rebates

Energy efficiency strategies offered by the program include building shell/envelope and heating systems, with four tracks of available assistance as shown in Table 23.

**Table 23. Nonresidential New Construction Participation Tracks**

Track	Description	Design Team Incentive	Construction Incentive
<b>Track 1</b>	Targets the construction of commercial buildings smaller than, or up to, 15,000 square feet in size that are primarily design/build or design/bi/build constructions.	\$1,000	\$.06-\$.19/kWh \$.60-\$1.90/therm
<b>Track 2</b>	Targets buildings larger than 15,000 square feet that are straightforward in design and may be on a faster design schedule. Track II provides evaluation of efficiency options of one type of mechanical system solution.	\$3,500	\$.06-\$.19/kWh \$.60-\$1.90/therm
<b>Track 3</b>	Targets buildings larger than 15,000 square feet and is ideal for projects with energy savings goals in mind and enough time to integrate new ideas and strategies into the design. Buildings designed in this track are typically modeled to achieve energy savings of 30 to 40% greater than Energy Code.	\$5,500	\$.06-\$.19/kWh \$.60-\$1.90/therm
<b>Track 4</b>	Offers incentives and assistance to help building owners or developers achieve energy savings of 40 to 60% better than current energy code. This track also provides technical and certification support for participants to meet the requirements of LEED Eac1, ENERGY STAR, EPAAct, 2030 Challenge and other initiatives.	\$6,500 (one module) \$7,500 (two module) \$8,500 (two modules)	\$.17-\$.19/kWh \$1.70-\$1.90/therm

## Participation

Black Hills Energy projected eight program participants for the 2014 program and engaged six participants.

## Budget

Of the \$216,900 proposed for 2014 budget, the program expended \$108,221.

## Savings

Black Hills Energy projected 10,499 MCF in savings for the 2014 program and achieved actual savings of 1,587 MCF.

## Cost-Effectiveness Results

Table 24 lists results from the cost-effectiveness analysis, which are based on 2014 program activity.

**Table 24. Nonresidential New Construction Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$232,684	\$166,142	-\$66,542	0.71
Utility Cost Test (UCT)	\$108,221	\$111,782	\$3,560	1.03
Ratepayer Impact (RIM)	\$221,438	\$111,782	-\$109,657	0.50
Participant Cost (PCT)	\$151,877	\$135,735	-\$16,142	0.89

### 3. Low-Income Programs

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#### Introduction

This chapter describes Black Hills Energy’s portfolio of low-income energy efficiency programs. It begins with the overall cost-effectiveness for the sector portfolio and includes a detailed description of each program. Table 25 lists the low-income programs.

**Table 25. Low-Income Programs**

Program
LI.1 – Weatherization Program
LI.2 – Energy Education Program
LI.3 – Multifamily Efficiency Improvement Initiative Program
LI.4 – Affordable Homes Program
LI.5 – Weatherization Team Program
LI.6 – GIAC

The low-income programs provide energy-efficiency saving opportunities to the most vulnerable energy customers in the Iowa service area. Black Hills Energy coordinates with MidAmerican Energy Company and Alliant Energy through the Iowa Utility Association (IUA) to deliver three of these programs:

- Low-Income Weatherization
- Low-Income Energy Education
- Low-Income Multifamily Efficiency Improvement Initiative

#### Low-Income Sector Cost-Effectiveness Results

Table 26 lists results from the cost-effectiveness analysis, which are based on 2014 program activity.

**Table 26. Low-income Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$710,591	\$524,377	-\$186,214	0.74
Utility Cost Test (UCT)	\$631,655	\$353,322	-\$278,333	0.56
Ratepayer Impact (RIM)	\$992,240	\$353,322	-\$638,918	0.36
Participant Cost (PCT)	\$0	\$976,507	\$976,507	N/A

# S.1 – Low-Income Weatherization Program

## Program Description

The Low-Income Weatherization Program provides funding for weatherization efforts performed by local community action agencies (CAAs). Black Hills Energy provides this funding to the Iowa Department of Human Rights, which in turn distributes the funding to various CAAs.

## Program Summary

Table 27 shows a comparison of the program’s budget and goals to actual 2014 program performance.

**Table 27. Low-Income Weatherization Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	110	131	119%
Expenditures	\$598,100	\$585,476	98%
Energy Target (MCF)	1,650	1,952	118%
Demand Impacts (MCF/day)	18	21	119%

## Measures

The Low-Income Weatherization Program targets a broad range of low-income customers throughout Black Hills Energy’s service territory. The CAAs deliver the weatherization improvements on behalf of Black Hills Energy. Measures include infiltration, insulation, energy efficiency equipment, and direct install measures such as:

- Building shell and heating system inspections and adjustments (e.g., cleaning furnace, and caulking)
- Wall insulation
- Ceiling insulation
- Infiltration reduction
- Foundation/crawlspace insulation
- Band joist insulation
- Hot water temperature turn-down
- Water heater wraps
- Pipe insulation
- Low-flow showerheads
- Faucet aerators

## Participation

Black Hills Energy projected 110 participants for 2014 and engaged 131 participants.

## Program Budget

Of the \$598,100 proposed for the 2014 budget, the program expended \$585,476.

## Savings

Black Hills Energy estimated savings of 1,650 MCF for 2014 and achieved 1,952 MCF.

## S.2 – Low-Income Energy Education Program

### Program Description

Black Hills Energy provides energy education materials and low-cost efficiency measures to customers qualifying for energy assistance. The program helps eligible customers reduce their overall energy burdens. Delivered through local CAAs, participants attend a one-hour workshop or receive home visits by agency staff. During energy education sessions, participants receive a Home Savings Kit. Once they install the kit's various measures and take additional energy-saving actions, participants complete a short survey and return it to their agency. With joint funding from the Alliant Energy-IPL and MidAmerican Energy, the program provided energy education to 4,500 homes during the 2014 heating season.

### Program Summary

Table 28 shows a comparison of the program's budget and goals to actual 2014 program performance.

**Table 28. Low-Income Energy Education Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	3,000	4,500	150%
Expenditures	\$23,500	\$28,816	123%
Energy Target (MCF)	969	3,514	363%
Demand Impacts (MCF/day)	11	38	349%

### Participation

The expected participation in 2014 was 3,000 participants. The program engaged 4,500 participants.

### Program Budget

The proposed budget for 2014 was \$23,500. The program expended \$28,816.

### Savings

Black Hills Energy projected estimated savings associated with its program contribution to be 969 MCF; actual savings were 3,514 MCF.

## S.3 – Low-Income Multifamily Efficiency Improvement Initiative

### Program Description

Black Hills Energy has actively participated in developing the Multifamily Efficiency Improvement Initiative with the Iowa Finance Authority and the other major Iowa utilities. This program provides low-cost measures and enhanced incentives to owners and developers of affordable multifamily housing. Black Hills Energy offers an incentive equaling 40% of installed costs when projects are determined to be cost-effective. When projects are not cost-effective, Black Hills Energy provides incentives of up to five times the annual savings estimate.

### Program Summary

Table 29 shows a comparison of the program’s budget and goals to actual 2014 program performance.

**Table 29. Low-Income Multifamily Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	2	0	0%
Expenditures	\$14,700	\$6,721	46%
Energy Target (MCF)	2	0	0%
Demand Impacts (MCF/day)	0.02	0	0%

### Measures

In addition to the financial incentives offered through the program, Black Hills Energy provides energy-efficient direct installation kits for participating rental units. The kits contain the following energy-saving measures:

- Low-flow kitchen and bathroom faucet aerators
- Hot water pipe insulation
- Low-flow showerheads

### Participation

Black Hills Energy projected two participants for 2014, but did not engage any participants in the program.

### Program Budget

Of the \$14,700 proposed for the 2014 budget, the program expended \$6,721.

### Savings

This program did not achieve any savings.

## S.4 – Low-Income Affordable Housing

### Program Description

Black Hills Energy offers enhanced incentives for residential homes built by nonprofit organizations such as Habitat for Humanity, Community Housing Initiatives, and Community Action Corporations. Black Hills Energy provides \$1,100 per new home that meets the requirements of the Low-Income Affordable Housing Program. In addition to meeting program requirements, participants must install an ENERGY STAR clothes washer and natural gas dryer. Black Hills Energy coordinates this program with the Trees Forever Program by encouraging program participants to identify opportunities for planting trees at new construction sites.

### Program Summary

Table 30 shows a comparison of the program’s budget and goals to actual 2014 program performance.

**Table 30. Low-Income Affordable Housing Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	3	0	0%
Expenditures	\$3,600	\$0	0%
Energy Target (MCF)	37	0	0%
Demand Impacts (MCF/day)	0.40	0	0%

### Participation

Black Hills Energy projected three participants for 2014 but did not engage any participations.

### Program Budget

Of the \$3,600 proposed for the 2014 budget, the program expended \$0.

### Savings

Black Hills Energy projected 37 MCF in savings did not achieve savings as there were no participants.

## S.5 – Weatherization Team

### Program Description

Black Hills Energy’s Weatherization Team brings together volunteers from the company’s staff and the community to offer simple weatherization measures and services to low-income households across Black Hills Energy’s service territory. Prior to the volunteer work day, Black Hills Energy provides a complete energy evaluation of each selected home. This evaluation identifies simple infiltration reduction opportunities, low-cost energy-efficient retrofits, and minor repairs to increase the home’s energy efficiency.

### Program Summary

Table 31 shows a comparison the program’s budget and goals to actual 2014 program performance.

**Table 31. Low-Income Weatherization Team Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	110	87	79%
Expenditures	\$15,700	\$642	4%
Energy Target (MCF)	779	679	87%
Demand Impacts (MCF/day)	9	7	82%

### Measures

The services the Weatherization Team provides at no cost include:

- Caulking around doors and windows
- Weather-stripping around door and windows
- Installing door sweep(s)
- Installing plastic window film on the interior and exterior
- Filling/sealing holes in sidewalls and foundation

The measures the Weatherization Team provides at no cost include:

- Hot water heater blankets
- Hot water pipe insulation
- Furnace filter replacements
- Low-flow showerheads
- Programmable thermostats
- Kitchen and bathroom low-flow faucet aerators

In addition, the Weatherization Team also performs a number of health and safety home improvements.

## Participation

Black Hills Energy projected 110 participants for 2014 and engaged 87 participants.

## Program Budget

Of the \$15,700 proposed for the 2014 budget, the program expended \$642.

## Savings

Black Hills Energy's projected 779 MCF in savings and realized 679 MCF in estimated savings.

## S.6 – Low-Income Green Iowa AmeriCorps

### Program Description

Green Iowa AmeriCorps (GIAC)'s mission is to help Iowans become more energy efficient through residential weatherization, energy education, and community outreach services.<sup>4</sup> The target audience includes low-income, income limited, elderly, veterans, and disabled customers, in addition to those on community action program waitlists. Through this program, Black Hills Energy provides support to GIAC staff to perform home evaluations and weatherize homes at no cost to the renter or homeowner.

### Program Summary

Table 32 shows a comparison of the program's budget and goals to actual 2014 program performance.

**Table 32. Low-Income Green Iowa AmeriCorps Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	300	77	26%
Expenditures	\$22,000	\$10,000	45%
Energy Target (MCF)	780	200	26%
Demand Impacts (MCF/day)	9	2	24%

### Measures

GIAC provides energy evaluations and the following measures at no cost:

- Air infiltration improvements (e.g., caulking and weather stripping)
- Hot water pipe insulation
- Low-flow aerators
- Water heater thermostat setback

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<sup>4</sup> More information about GIAC is available online at [www.greeniowaamericorps.org](http://www.greeniowaamericorps.org).

## Participation

Black Hills Energy projected 300 participants for the 2014 program and engaged 77 participants.

## Program Budget

Of the \$22,000 proposed for the 2014 budget, the program expended \$10,000.

## Savings

Black Hills Energy projected 780 MCF savings in 2014. The program realized achieved actual savings of 200 MCF.

## 4. Public Purpose Programs

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### Introduction

This chapter presents Black Hills Energy’s public purpose programs, lending value to the utility’s customers and Iowa’s citizens or meeting the specific needs of special customer classes. This chapter begins with the overall cost-effectiveness for the public purpose programs, which is followed by a detailed description of each program. Table 33 lists the public purpose programs.

**Table 33. Public Purpose Programs**

Program
PP.1 School-Based Energy Education Program
PP.2 Tree Planting Programs
PP.3 IEC and CGRER

### Public Purpose Sector Cost-Effectiveness Results

Table 34 lists results from the cost-effectiveness analysis, which are based on 2014 program activity.

**Table 34. Public Purpose Program’s Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$403,703	\$893,543	\$489,839	2.21
Utility Cost Test (UCT)	\$376,887	\$531,338	\$154,451	1.41
Ratepayer Impact (RIM)	\$916,541	\$531,338	-\$385,202	0.58
Participant Cost (PCT)	\$107,820	\$592,875	\$485,055	5.50

### PP.1 – School-Based Energy Education Program

#### Program Description

The School-Based Energy Education Program creates long-term energy savings via enhanced awareness of energy efficiency among youth in Black Hills Energy’s service territory. The program is centered on the concept that energy efficiency awareness can be greatly enhanced among youth, who more easily develop a conservation-oriented mindset regarding energy use in the home than adults. The primary means of engendering these subtle-yet-significant behavioral changes is a specific curriculum designed to complement existing natural science-based education.

The program provides a kit of low-cost measures, designed to help energy-saving ideas and concepts resonate with participating students. The curriculum and kit provide educational and hands-on methods for teaching students to evaluate energy-efficient retrofit impacts and to

change behaviors. For example, a flow meter accompanies the low-flow showerhead, permitting students to measure their water use before and after installation. Such comparisons provide concrete examples of actions that save energy and help the environment.

## Program Summary

Table 35 shows a comparison of the program budget and goals to actual 2014 program performance.

**Table 35. School-Based Energy Education Program Summary**

	Budget or Goal	Actual	Percentage Budget or Goal Achieved
Participation	1,700	2,396	141%
Expenditures	\$81,300	\$81,452	100%
Energy Savings (MCF)	3,655	5,151	141%
Demand Impacts (MCF/day)	40	56	141%

## Measures

The kit supplied to each student and teacher participating in the program includes the following measures:

- Faucet aerators
- Flow meter
- Low-flow showerheads
- Low-cost infiltration measures
- Various educational materials (e.g., air temperature check cards)

Teachers also receive a complete energy-education curriculum, including recommended lesson plans, activities, and tests.

## Participation

Black Hills Energy projected serving 1,700 students and their families in 2014 and actually served 2,396 students and families.

## Program Budget

The 2014 budget was \$81,300. The program expended \$81,452.

## Savings

Black Hills Energy projected 3,655 MCF in savings for 2014. The program realized savings of 5,151 MCF.

## Cost-Effectiveness Results

Table 36 lists cost-effectiveness analysis results, which are based on 2014 program activities.

**Table 36. School-Based Energy Education Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Societal Cost (SCT)	\$108,268	\$255,923	\$147,655	2.36
Utility Cost Test (UCT)	\$81,452	\$205,719	\$124,267	2.53
Ratepayer Impact (RIM)	\$293,500	\$205,719	-\$87,781	0.70
Participant Cost (PCT)	\$107,820	\$288,668	\$180,848	2.68

## **PP.2 – Tree Planting Programs**

Black Hills Energy provides annual funding for two tree planting programs: Trees Forever and Trees for Kids/Teens. Both programs encourage tree planting to save energy and improve the environment. Black Hills Energy recognizes the potential to incorporate tree planting with the Low-Income Affordable Housing Program and encourages participants of that program to identify opportunities for trees to be planted at new construction sites.

The Trees Forever Program is operated by a nonprofit organization of the same name. The organization emphasizes energy efficiency and conservation as it encourages and provides support for community-based tree planting efforts.

The Trees for Kids/Teens Program is administered by the Iowa Department of Natural Resources, which works with youth to teach them the importance of planting trees through landscaping projects on school grounds. Education and tree planting are conducted hand-in-hand.

In total, the tree programs expended \$141,505 in 2014. Black Hills Energy projected 201 MCF of savings and realized 3,266 MCF of savings from 1,435 trees planted.

## **PP.3 – Iowa Energy Center and Center for Global and Regional Environmental Research**

Black Hills Energy provided funding through the energy-efficiency planning process for the Iowa Energy Center and the Center for Global and Regional Environmental Research. Both of these organizations receive funding as a percentage of total revenues. Differences between budgeted and actual expenditures resulted from differences between expected and actual revenues. Black Hills Energy provided a total of \$153,930 to support these organizations.

## 5. Appendices

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### Appendix A. Confidential Cost-Effectiveness Assumptions

#### Avoided Costs

Black Hills Energy generates natural gas avoided costs pursuant to the Iowa Utility Board rules for measure- and program-level cost-effectiveness tests, which contributed to the development of this energy efficiency plan. Table A-1 shows avoided energy costs, and Table A-2 shows avoided capacity costs.

**Table A-1. Natural Gas Avoided Energy Costs**

Year	Avoided Energy Cost (\$/therm)
2014	\$0.51
2015	\$0.54
2016	\$0.56
2017	\$0.59
2018	\$0.62
2019	\$0.64
2020	\$0.67
2021	\$0.69
2022	\$0.72
2023	\$0.75
2024	\$0.77
2025	\$0.79
2026	\$0.81
2027	\$0.83
2028	\$0.85
2029	\$0.87
2030	\$0.89
2031	\$0.91
2032	\$0.94
2033	\$0.96
2034	\$0.98
2035	\$1.01
2036	\$1.03
2037	\$1.06
2038	\$1.09
2039	\$1.11
2040	\$1.14

**Table A-2. Natural Gas Avoided Capacity Costs**

Year	Avoided Capacity Cost (\$/peak therm-month)
2014	\$0.69
2015	\$0.70
2016	\$0.72
2017	\$0.74
2018	\$0.76
2019	\$0.78
2020	\$0.80
2021	\$0.82
2022	\$0.84
2023	\$0.86
2024	\$0.88
2025	\$0.90
2026	\$0.92
2027	\$0.95
2028	\$0.97
2029	\$0.99
2030	\$1.02
2031	\$1.04
2032	\$1.07
2033	\$1.10
2034	\$1.12
2035	\$1.15
2036	\$1.18
2037	\$1.21
2038	\$1.24
2039	\$1.27
2040	\$1.30

## Discount Rates

Other key parameters used in the analysis included discount rates. The discount rate varied depending on the cost-effectiveness test. Table A-3 summarizes these values and their associated data sources.

**Table A-3. Discount Rates**

	Rate	Data Source
Societal Cost Test Discount Rate	4.81%	Based on the 10-year T-bill average, October 2007
Utility Cost Test/Rate Impact Measure Test Discount Rate	7.51%	Utility avoided cost of capital
Participant Cost Test Discount Rate	10.0%	Assumption

## **Appendix B. Confidential Detailed Cost-Effectiveness Workbooks**

Available as MS Excel workbooks.