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IOWA UTILITIES BOARD

Black Hills Energy

Improving life with energy

Black Hills Energy

Natural Gas Energy-Efficiency Plan 2014-2018

Prepared for:
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List of Acronyms

ACH	Air changes per hour
AFUE	Annual fuel utilization efficiency
AHRI	Air Conditioning, Heating and Refrigeration Institute
AMO	Advanced Manufacturing Office
Board	Iowa Utilities Board
CAA	Community action agencies
CAE	Combined annual efficiency
CFA	Conditioned floor area
CFM	Cubic feet per minute
CGRER	Center for Global and Regional Environmental Research
DOE	Department of Energy
DSM	Demand-side management
EDA	Energy design assistance
EEM	Energy-efficiency measures
EECR	Energy Efficiency Cost Recovery
EF	Energy factor
EM&V	Evaluation, measurement, and verification
FTE	Full-time equivalent
HPwES	Home Performance with ENERGY STAR®
IAC	Iowa Administrative Code
IEC	Iowa Energy Center
IECC	International Energy Conservation Code
IOU	Investor-owned utility

IUA	Iowa Utility Association
NATE	North American Technician Excellence
NPV	Net present value
NYMEX	New York Mercantile Exchange
OCA	Office of Consumer Advocates
QA/QC	Quality assurance/quality control
SCT	Societal Cost Test
UCT	Utility Cost Test

Executive Summary

Black Hills Energy is pleased to submit this Energy-Efficiency Plan (Plan) in compliance with §§ 476.6(14) and (16) (2007) of the Code of Iowa and 199 Iowa Administrative Code (IAC), Chapter 35, subrule 35.8(2). This filing is made pursuant to the Iowa Utilities Board (Board) final Order in Docket number EEP-2013-0001.

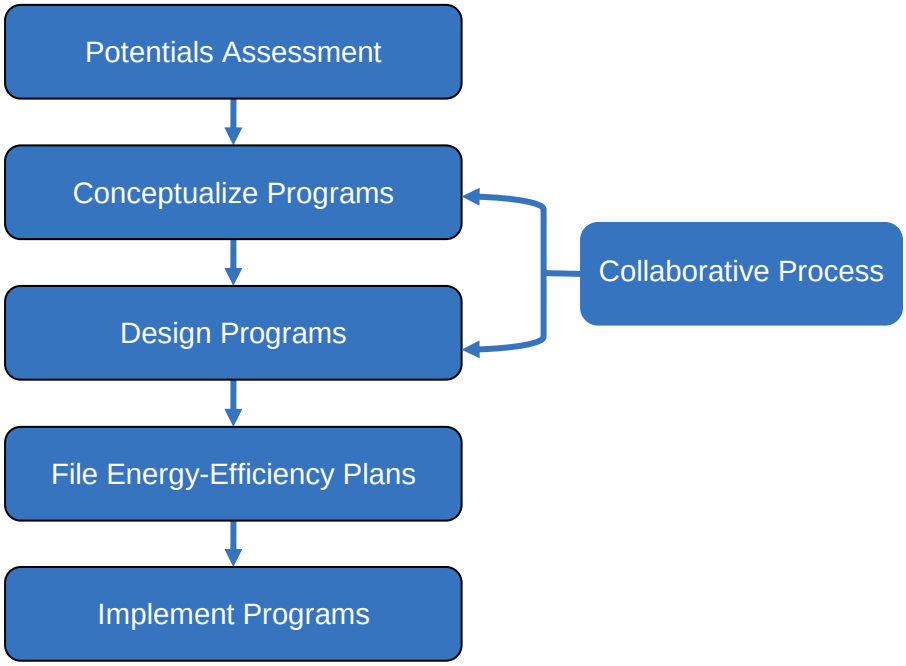
For over two decades, Black Hills Energy has offered energy-efficiency programs to Iowa customers in the residential, nonresidential, low-income, and public purpose sectors throughout the service territory. To ensure they continue serving their customers and the State of Iowa by providing well-rounded energy-efficiency programs, Black Hills Energy remains committed to the following key values:

- ***Black Hills Energy customers benefit from energy-efficiency programs***. Energy efficiency ensures that Iowans maintain the quality of life and home comfort they have come to enjoy without increasing their monthly bills. Black Hills Energy offers a suite of inclusive customer programs that provide a variety of savings opportunities.

- ***The State of Iowa benefits greatly from energy-efficiency programs.*** Energy efficiency is an integral part of maintaining Iowans quality of life that enables them to pursue a cost-effective and less expensive alternative to constructing new pipelines and purchasing natural gas. In addition, Iowans benefit from retaining stable power sources with few disruptions and having a cleaner environment.

Guided by these values, Black Hills Energy developed this Plan adhering to a rigorous planning process that began in 2011 with the Joint Utility Technology Assessment (Joint Utility Study) and culminated in this document. The various phases of this process are shown in Figure ES-1; the first box, Potentials Assessment, pertains to the Joint Utility Study, while the rest of the boxes are specific to the development of Black Hills Energy's energy-efficiency portfolio.

Figure ES-1. Program Planning Process



Recent significant changes are making it much more difficult to plan for cost-efficient, natural gas energy-efficiency programs. For example, the United States Department of Energy's (DOE's) efficiency standards for boilers are increasing and therefore dramatically reducing the savings that are attributable to upgrading from the standard measure to even the highest-efficiency unit. In addition, the upcoming 2012 International Energy Conservation Code® (IECC) will make it much more challenging to attribute savings from new construction programs, as the gap between building to code and building high-efficiency continues to shrink. Furthermore, forecasted gas prices continue to decline and are expected to remain low for the foreseeable future. These changes, along with the maturity of energy-efficiency programs such as those offered by Black Hills Energy, have made it a challenge for this Plan to remain cost-effective while maintaining a well-rounded portfolio of programs for Iowans. To achieve this balance, the overall Plan budget is substantially reduced from historical funding levels.

ES.1 Program Portfolio Overview

Black Hills Energy's energy-efficiency portfolio includes programs for four sectors: residential, nonresidential, low-income, and public purpose. Black Hills Energy designed each set of these programs to address the specific needs of the customer sector.

Residential. To streamline the residential programs and make it easier for customers to identify which upgrades may benefit from, Black Hills Energy will merge the Space and Water Heating Program with the Envelope Measures Retrofit Program into the Residential Prescriptive Program. The reconfigured program will include a new bonus incentive to encourage participants to install multiple comprehensive measures. Through the Residential Prescriptive Program, Black Hills Energy will provide incentives for several new measures, including early

replacement of eligible water heaters, 95% annual fuel utilization efficiency (AFUE) boilers, 70% AFUE gas fireplaces, Wi-Fi programmable thermostats, floor insulation (R-30), and duct sealing. The new program also omits several measures that are no longer cost-effective.

In addition to the Residential Prescriptive Program, Black Hills Energy will offer an enhanced Residential Evaluation Program. This program will include a multifamily evaluation option, as well as the following four entry points for single family customers:

1. Free online evaluation
2. Free walkthrough evaluation
3. Tier I: Comprehensive evaluation with diagnostic testing
4. Tier II: Comprehensive evaluation with diagnostic testing and test-out

To maintain a well-rounded residential suite of programs, Black Hills Energy will offer a Residential New Construction Program, which was modified to be more streamlined and cost-effective.

Nonresidential. Black Hills Energy will expand the Nonresidential Evaluation Program to include both small and larger commercial buildings.

The Nonresidential Prescriptive Program will include new HVAC measures, as well as offering an enhanced set of commercial cooking measures. Black Hills Energy will also eliminate several program measures that are no longer cost-effective.

The design of the Nonresidential Custom and Nonresidential New Construction programs will remain consistent with the programs' designs in the former program cycle (2009-2013); however, savings in both the residential and nonresidential new construction programs will decline due to the 2012 IECC and increased federal standards.

Low-Income and Public Purpose. Black Hills Energy continues to support the low-income sector by offering these programs: Low-Income Weatherization, Low-Income Energy Education, Low-Income Affordable Housing, the Black Hills Energy Weatherization Team, and the Low-Income Multifamily Efficiency Improvement Initiative, which now includes incentives of either 40% of the installed cost or five times a project's annual savings. Black Hills Energy will also continue the public purpose sector programs by funding the Iowa Energy Center (IEC), the Center for Global and Regional Environmental Research (CGRER), tree planting programs, and the School-Based Energy Education Program.

In addition to the customer-specific programs, Black Hills Energy will continue to implement a robust customer outreach and marketing campaign to increase program awareness and participation, as well as sponsor trade ally trainings.

ES.2 Program Measures

Table ES-1 through Table ES-7[1] provide a summary of the measures offered, as well as the measure descriptions, base equipment it will replace, proposed customer incentive, and proposed dealer spiff, when applicable. The proposed incentive column in Table ES-1 represents the value of the measure, and costs are born by Black Hills Energy. The column may not represent a rebate that is sent to the customer, as is in the case for evaluations.

Table ES-1. BHE Portfolio Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.1 Residential Evaluation Program				
Single Family Evaluations				
Online Evaluation	Online evaluation	No evaluation		
Walkthrough Evaluation	Walkthrough evaluation, including the installation of faucet aerators, hot water pipe insulation, low-flow showerheads, and an energy-saving infiltration kit (includes outlet gaskets and other measures)	No evaluation; existing conditions	$200	
Tier 1	Comprehensive whole-house evaluation including kits and diagnostic testing	No evaluation	$300	
Tier 2	Comprehensive whole-house evaluation including kits and diagnostic testing and test-out	No evaluation	$500	
Multifamily Evaluations				
Evaluation of Common Areas	Walkthrough evaluation	No evaluation	$800	
Kits	Faucet aerators, outlet gaskets, hot water pipe insulation, low-flow showerheads, and low-cost infiltration measures	No evaluation	cost of kit	

[1] Details around measures listed in all the Measure Summary tables, including measure savings and costs, can be found in Appendix B.

Table ES-2. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.2 Residential Prescriptive Program				
Quality Install Furnace/Boiler	Quality installation of furnace and/or boiler	Standard install		$150
Furnace	96% AFUE or greater	Federal standard 78% AFUE	$600	
Furnace	94% to 95.9% AFUE	Federal standard 78% AFUE	$400	
Boiler	95% AFUE or greater	Federal standard 82% AFUE	$600	
Gas Fireplace	70% AFUE or greater, intermittent ignition, heat rated, thermostatic control with blower	60% AFUE	$250	
Duct Sealing	8 cubic feet per minute (CFM)/100 square feet of conditioned floor area (CFA)	Existing CFM/100 square feet of CFA	70% up to $200	
Integrated Space and Water Heater	Integrated space and water heater ≥ 84% combined annual efficiency (CAE) or 95% boiler and indirect-fired water heater	Standard boiler 82% AFUE and water heater energy factor (EF) = 0.59	$375	$175
Multizone Thermostat	Individual room temperature control for major occupied rooms	Programmable thermostat with central control only	$450	$60
Furnace/Boiler Maintenance	Furnace and/or boiler maintenance	Unmaintained furnace/boiler	$50	
Setback Thermostat	5-1-1, 5-2, or 7-day (customer installation)	Manual thermostat	Up to $20	
Setback Thermostat	5-1-1, 5-2, or 7-day (professional installation)	Manual thermostat	Up to $50	
Wi-Fi Programmable Thermostat	Wi-Fi programmable thermostat	Manual thermostat	$50	
Furnace Maintenance and Setback Thermostat	Furnace maintenance and setback thermostat (professional installation)	Unmaintained furnace; manual thermostat	$150	
Boiler Maintenance and Setback Thermostat	Boiler maintenance and setback thermostat (professional installation)	Unmaintained furnace; manual thermostat	$150	

Table ES-3. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.2 Residential Prescriptive Program (continued)				
Insulation (ceiling)	R-49	Average existing insulation (R-15.7)	70% up to $750	
Insulation (2x4 wall)	R-13	Average existing insulation (R-2.1)	70% up to $750	
Insulation (2x6 wall)	R-20 or R-13 w/ R-5 sheathing	Average existing insulation (R-2.1)	70% up to $750	
Insulation (basement wall)	R-15	Average existing insulation (R-2.1)	70% up to $750	
Insulation (foundation)	R-15	Average existing insulation (R-2.1)	70% up to $750	
Insulation (floor)	R-30*	Average existing insulation (R-1.8)	70% up to $750	
Insulation (rim and band joist)	R-10	No rim and band joist insulation	70% up to $750	
Infiltration Control	7.0 air changes per hour (ACH) 50	Existing infiltration (10.0 ACH 50)	70% up to $200	
Thermal Door	ENERGY STAR® door (R-4.8 or U-0.20)	Standard code door (R-2.9)	$10	
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
Water Heater	Replacement before end of life (storage), minimum EF = 0.67	Standard water heater (federal standard)	$425	$10 or $60**
Clothes Washer	ENERGY STAR® clothes washer	Standard clothes washer (federal standard)	$50	
Residential Prescriptive Bundle				
Rebate Bundle	10% bonus incentive on top of rebate package if minimum of three residential prescriptive measures are installed within the program year	N/A	10% of total incentives received	

* IA code is R-30 or insulation to fill the cavity (R-19 minimum).
** The amount of the dealer spiff depends on the efficiency level of the water heater installed.

Table ES-4. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.3 Residential New Construction Program				
Quality Install Furnace	Quality installation of furnace	Standard installation	$1,000	
Wall Insulation	Wall insulation R20+ R5	Code insulation (R-20)		
Doors	ENERGY STAR U-Factor = 0.2	Door U-Factor = 0.35		
Furnace	96% AFUE	Federal standard 78% AFUE		
Drain Water Heat Recovery	Power pipe system	No drain water heat recovery		
Water Heater	0.67 EF storage (ENERGY STAR)	Federal standard EF = 0.59		
NR.1 Nonresidential Evaluation Program				
Small Building Evaluation	Small building evaluation	No evaluation	$300	
Large Building Evaluation	Large building evaluation	No evaluation	$2,000	

Table ES-5. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
NR.2 Nonresidential Prescriptive Program				
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 ES-6. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
NR.2 Nonresidential Prescriptive Program (continued)				
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

Table ES-7. BHE Portfolio Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
NR.3 Nonresidential Custom Program				
Various	N/A	N/A	$3,000	
NR.4 Nonresidential New Construction Program				
New Construction Incentives	At least 5% savings compared to code	Building built to code	Design team incentive based on square feet; construction incentive of $0.50/therm to $1.40/therm	
Low-Income Programs				
LI.1 Low-Income Weatherization Program	Infiltration, insulation, equipment, direct install	Existing condition	Cost of project	
LI.2 Low-Income Energy Education Program	Low-cost measures and education	Existing condition	Cost of kit	
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program	Faucet aerators, hot water pipe insulation, low-flow showerheads	Existing condition	40% of installed costs or five times the annual savings	
LI.4 Low-Income Affordable Housing Program	Infiltration, insulation, equipment	Code-level construction	$1,100	
LI.5 Weatherization Team	Infiltration, insulation, direct install	Existing condition	Cost of project	
Public Purpose Program				
PP.1 School-Based Energy Education Program	Kit with low-cost measures and education	No training/kit	Cost of kit ($45 each)	

ES.3 Program Savings

Developing the Plan provided Black Hills Energy with an opportunity to review and adjust the portfolio of energy-efficiency programs, explore program improvements, and expand offerings where appropriate. The projected savings from Black Hills Energy's full program portfolio is estimated to be over 575,000 Dth (see Table ES-8).[2] The annual savings goal from this portfolio is approximately 0.68% of annual sales.

[2] All savings values in this Plan are rounded to the nearest whole number. The individual results of goals and budgets in this report's tables may not sum to the total due to rounding.

Table ES-8. Energy Savings Goals Summary (Dekatherms)*

Program Name	2014	2015	2016	2017	2018	2014-2018 Total
R.1 Residential Evaluation Program	5,503	5,510	5,517	5,524	5,532	27,587
R.2 Residential Prescriptive Program	55,331	56,787	58,094	59,678	61,331	291,222
R.3 Residential New Construction Program	9,247	9,720	10,172	10,665	11,158	50,961
RESIDENTIAL SUBTOTAL	70,081	72,017	73,783	75,867	78,021	369,770
NR.1 Nonresidential Evaluation Program	320	336	353	371	389	1,770
NR.2 Nonresidential Prescriptive Program	14,012	14,719	15,674	15,077	15,818	75,301
NR.3 Nonresidential Custom Program	5,928	6,224	6,536	6,862	7,206	32,756
NR.4 Nonresidential New Construction Program	10,499	10,499	10,499	10,499	10,499	52,493
NONRESIDENTIAL SUBTOTAL	30,759	31,778	33,062	32,809	33,912	162,321
LI.1 Low-Income Weatherization Program	1,650	1,695	1,740	1,770	1,815	8,670
LI.2 Low-Income Energy Education Program	969	969	969	969	969	4,845
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program	2	2	4	4	4	18
LI.4 Low-Income Affordable Housing Program	37	37	37	37	37	186
LI.5 Weatherization Team	779	779	779	779	779	3,895
LI.6 GIAC	780	780	780	780	780	3,900
LOW-INCOME SUBTOTAL	4,217	4,262	4,309	4,339	4,384	21,514
PP.1 School-Based Energy Education Program	3,655	3,728	3,803	3,879	3,956	19,021
PP.2 Tree Planting Programs	201	211	222	233	245	1,113
PP.3 IEC & CGRER	-	-	-	-	-	-
PUBLIC PURPOSE SUBTOTAL	3,856	3,940	4,025	4,112	4,201	20,134
GRAND TOTAL	108,913	111,996	115,179	117,128	120,518	573,738
Retail Sales Forecast	17,0925,500	17,051,900	17,025,400	17,005,200	16,991,300	
Plan Target as Percent of Sales	0.64%	0.66%	0.68%	0.69%	0.71%	

* Individual results may not sum to total due to rounding.

Table ES-9 provides a summary of the peak annual saving goals.

Table ES-9. Peak Energy Savings Goals (Peak Dekatherms)*

Program Name	2014	2015	2016	2017	2018	2014-2018 Total
R.1 Residential Evaluation Program	60	60	60	60	60	301
R.2 Residential Prescriptive Program	581	597	612	629	647	3,066
R.3 Residential New Construction Program	101	106	111	117	122	557
RESIDENTIAL SUBTOTAL	742	763	783	806	829	3,924
NR.1 Nonresidential Evaluation Program	3	3	4	4	4	18
NR.2 Nonresidential Prescriptive Program	142	149	157	150	158	755
NR.3 Nonresidential Custom Program	62	65	68	72	75	343
NR.4 Nonresidential New Construction Program	110	110	110	110	110	550
NONRESIDENTIAL SUBTOTAL	317	327	339	336	347	1,666
LI.1 Low-Income Weatherization Program	18	19	19	19	20	95
LI.2 Low-Income Energy Education Program	11	11	11	11	11	53
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program	0.02	0.02	0.05	0.05	0.05	0.2
LI.4 Low-Income Affordable Housing Program	0.4	0.4	0.4	0.4	0.4	2
LI.5 Weatherization Team	9	9	9	9	9	43
LI.6 GIAC	9	9	9	9	9	43
LOW-INCOME SUBTOTAL	38	38	39	39	39	192
PP.1 School-Based Energy Education Program	40	41	42	42	43	208
PP.2 Tree Planting Programs	2	2	2	3	3	12
PP.3 IEC & CGRER	-	-	-	-	-	-
PUBLIC PURPOSE SUBTOTAL	42	43	44	45	46	220
GRAND TOTAL	1,148	1,181	1,214	1,236	1,271	6,046

* Individual results may not sum to total due to rounding.

ES.4 Portfolio Budget, Cost-Effectiveness, and Full-Time Equivalents

As mentioned above, the overall budget for Black Hills Energy's energy-efficiency portfolio represents a reduction from historical funding levels. The total budget for the five-year Plan is approximately $33 million.

Table ES-10 presents the budgets for individual 2014-2018 programs.

Table ES-10. Plan Budget Summary*

Program Name	2014	2015	2016	2017	2018	2014-2018 Total
R.1 Residential Evaluation Program	$706,700	$697,000	$697,300	$697,600	$697,900	$3,496,500
R.2 Residential Prescriptive Program	$2,377,800~~$2,378,500~~	$2,480,100~~$2,480,800~~	$2,585,900~~$2,586,700~~	$2,697,000~~$2,697,800~~	$2,812,100~~$2,813,000~~	$12,952,900~~$12,956,800~~
R.3 Residential New Construction Program	$483,800	$506,800	$530,500	$555,800	$584,200	$2,660,900
RESIDENTIAL SUBTOTAL	$3,568,200~~$3,568,900~~	$3,683,800~~$3,684,500~~	$3,813,700~~$3,814,500~~	$3,950,400~~$3,951,200~~	$4,094,200~~$4,095,100~~	$19,110,300~~$19,114,200~~
NR.1 Nonresidential Evaluation Program	$96,700	$101,500	$106,600	$111,900	$117,500	$534,300
NR.2 Nonresidential Prescriptive Program	$785,900	$826,000	$874,800	$919,200	$965,800	$4,371,700
NR.3 Nonresidential Custom Program	$52,200	$54,800	$57,600	$60,900	$64,000	$289,500
NR.4 Nonresidential New Construction Program	$216,900	$217,100	$217,400	$217,600	$217,900	$1,086,800
NONRESIDENTIAL SUBTOTAL	$1,151,600	$1,199,400	$1,256,300	$1,309,700	$1,365,200	$6,282,300
LI.1 Low-Income Weatherization Program	$598,100	$614,400	$630,600	$641,800	$658,100	$3,142,900
LI.2 Low-Income Energy Education Program	$23,500	$23,500	$23,600	$23,600	$23,600	$117,800
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program	$14,700	$14,800	$26,900	$27,000	$27,100	$110,500
LI.4 Low-Income Affordable Housing	$3,600	$3,600	$3,600	$3,600	$3,700	$18,200

Program Name	2014	2015	2016	2017	2018	2014-2018 Total
Program						
LI.5 Weatherization Team	$15,700	$15,700	$15,800	$15,800	$15,900	$78,900
LI6. GIAC	$22,000	$22,000	$22,000	$22,000	$22,000	$110,000
LOW-INCOME SUBTOTAL	$677,600	$694,000	$722,500	$733,900	$750,300	$3,578,300
PP.1 School-Based Energy Education Program	$81,300	$82,900	$84,600	$86,300	$88,000	$423,000
PP.2 Tree Planting Programs	$141,500	$145,000	$148,600	$152,300	$156,100	$743,500
PP.3 IEC & CGRER	$225,500	$231,100	$236,900	$242,800	$248,900	$1,185,300
PUBLIC PURPOSE SUBTOTAL	$448,200	$459,000	$470,100	$481,400	$493,000	$2,351,800
CROSS PROGRAM EXPENDITURES	$360,000	$369,000	$378,200	$387,700	$397,400	$1,892,300
OTHER FUNDING INITIATIVES**	$25,000	$25,000	$10,000	$250,000	$90,000	$400,000
GRAND TOTAL	$6,230,700~~$6,231,400~~	$6,430,200~~$6,431,000~~	$6,650,900~~$6,651,600~~	$7,113,000~~$7,113,800~~	$7,190,200~~$7,191,100~~	$33,615,000~~$33,618,800~~

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

** Other funding initiatives include the Technical Reference Manual, Joint Utility Study, and the next energy-efficiency Plan preparation. See the Other Funding Initiatives chapter for details.

Analyzing a program's cost-effectiveness is an important part of the planning process, both in terms of meeting the regulatory requirement and in designing the programs themselves. Table ES-11 shows the cost-effectiveness of the program portfolio for the full five-year program cycle.[3] Cost-effectiveness is presented for each sector level.

Table ES-11. Benefit/Cost Plan Summary

	Benefits (NPV)*	Costs (NPV)*	Net Benefits	B/C Ratio
Utility Cost Test	$35,291,904	$27,913,614	$7,378,290	1.26
Participant Cost Test	$54,467,303	$46,177,873	$8,289,431	1.18
Ratepayer Impact Test	$35,291,904	$63,617,881	-$28,325,977	0.55
Societal Cost Test	$62,989,203	$58,991,045	$3,998,158	1.07

* NPV stands for net present value.

Table ES-12 presents Black Hills Energy's estimated full-time equivalent (FTE) staff for the Plan.[4]

Table ES-12. Black Hills Energy FTE

	FTE
Program Admin	3.65
Marketing	0.85
TOTAL	4.50

* Numbers may not sum to total due to rounding

ES.5 Plan Contents

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

- The Introduction chapter explains the Plan development process and discusses the various components that went into developing the portfolio.
- The Black Hills Energy Data chapter reviews the underlying assumptions and data inputs that guided the technical portions of the process, including analyses conducted as part of the Joint Utility Study.

[3] Cost-effectiveness results at the program level are found in Appendix G, while details on avoided costs are provided in Appendix D.

[4] All FTE tables have been calculated based historic budget and time allotments.

- The Assessment of Energy-Efficiency Potential chapter describes the economic screening of energy-efficiency measures, including details of the underlying methodology, results, and how these were incorporated into the program design.

- The Overall Program Design chapter presents the overall program development strategy.

- The Residential Programs chapter describes the residential programs, including sector-level effectiveness results, program descriptions, delivery and promotional activities, target markets, trade allies (where appropriate), eligible measures and incentives, projected participation, energy and peak savings, outside services (where appropriate), budget, and evaluation activities.

- The Nonresidential Programs chapter describes the nonresidential programs, including sector-level effectiveness results, program descriptions, delivery and promotional activities, target markets, trade allies (where appropriate), eligible measures and incentives, projected participation, energy and peak savings, outside services (where appropriate), budget, and evaluation activities.

- The Low-Income Programs chapter describes the low-income programs, including sector-level effectiveness results, program descriptions, delivery and promotional activities, target markets, trade allies (where appropriate), eligible measures and incentives, projected participation (where appropriate), energy and peak savings, outside services (where appropriate), budget, and evaluation activities.

- The Public Purpose Programs chapter describes the public purpose programs, including sector-level effectiveness results, program descriptions, delivery and promotional activities, target markets, trade allies (where appropriate), eligible measures and incentives, projected participation (where appropriate), energy and peak savings, outside services (where appropriate), budget, and evaluation activities.

- The Energy-Efficiency Cost Recovery chapter contains rate impacts across the residential, general service, and non-general service nonresidential sectors.

- The Conclusion/Request for Plan Approval chapter presents the Plans' conclusion and a request for approval.

- The Other Funding Initiatives chapter describes other funding initiatives, including the possible development of a statewide Technical Reference Manual and the estimated planning budget for the next program cycle (2019-2023).

- The List of Appendices chapter includes a list of the following appendices:

    - Appendix A: Volume 1 – Potentials Assessment

    - Appendix B: Volume 2 – Potentials Assessment: Appendices

    - Appendix C: Collaborative Presentations

- Appendix D: Avoided Cost Methodology
- Appendix E: Gas Forecasts
- Appendix F: Rate Tariffs
- Appendix G: Detailed Cost-Effectiveness Results
- Appendix H: Cross-Reference to Board Rules

1. Introduction

1.1 Black Hills Energy Philosophy

Black Hills Energy is pleased to submit the following 2014-2018 Energy-Efficiency Plan to the Iowa Utilities Board for approval.

Despite the challenges of increasingly efficient codes and standards, as well as low projected natural gas prices, Black Hills Energy viewed the development of this Plan as an opportunity to review its programs, explore program improvements, and expand measure offerings. Black Hills Energy views energy efficiency as having an essential role in planning for the utilization of resources, and as a critical component of providing excellent customer service. The overarching goal for this Plan is to offer customers the best possible portfolio of energy-efficiency programs while maintaining Black Hills Energy's commitment to environmental stewardship. Black Hills Energy looks forward to working expeditiously with the Board and other parties interested in this proceeding, and to implementing the portfolio as soon as possible to maximize customer benefits.

This chapter is focused on describing the process used to develop the Plan and illustrating how a wide range of information and input were incorporated, which resulted in a well-rounded and cost-effective portfolio.

1.2 Plan Development Process Overview

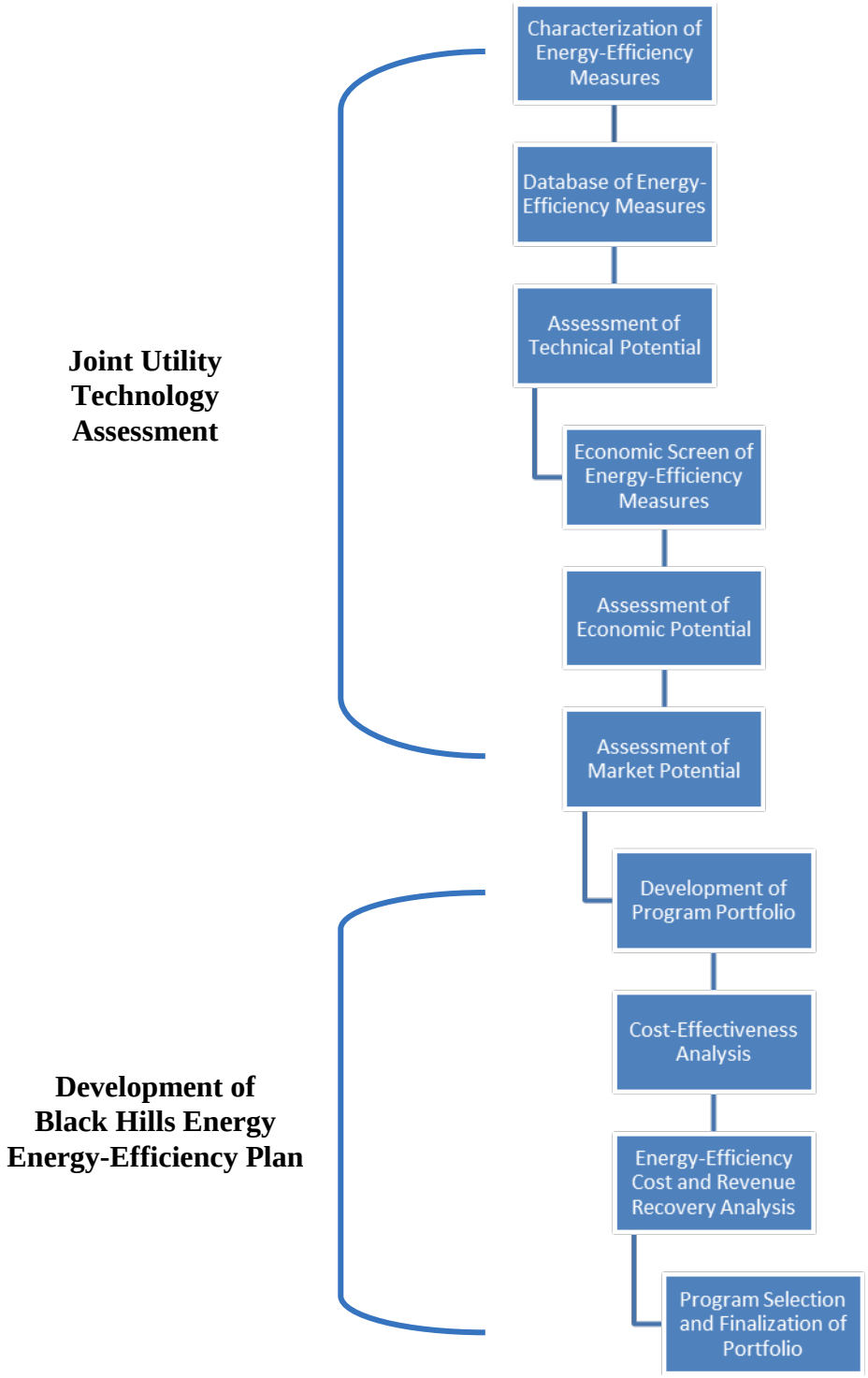
Figure 1 represents the primary steps in Black Hills Energy's planning process. The first six steps, the Joint Utility Technology Assessment, consisted of a Joint Utility Study with Iowa's three major investor-owned utilities (IOUs) who collaborated to produce assessments of the technical, economic, and market potentials for energy efficiency within their respective service territories.

For these assessments, consistent input parameters for energy-efficiency measure (EEM) savings were employed, with savings estimates calibrated to each utilities' customers and load forecasts. The Joint Utility Study results are presented in this Plan as follows:

- Appendix A: Volume 1 – Potentials Assessment
- Appendix B: Volume 2 – Potentials Assessment: Appendices

The second set of steps in the planning process—the development of Black Hills Energy's Energy-Efficiency Plan—picked up where the first set of steps ended, and consisted of taking the results of potentials assessments and combining them with numerous other elements, discussed below, to develop the portfolio of energy-efficiency programs.

Figure 1. Assessment and Planning Process

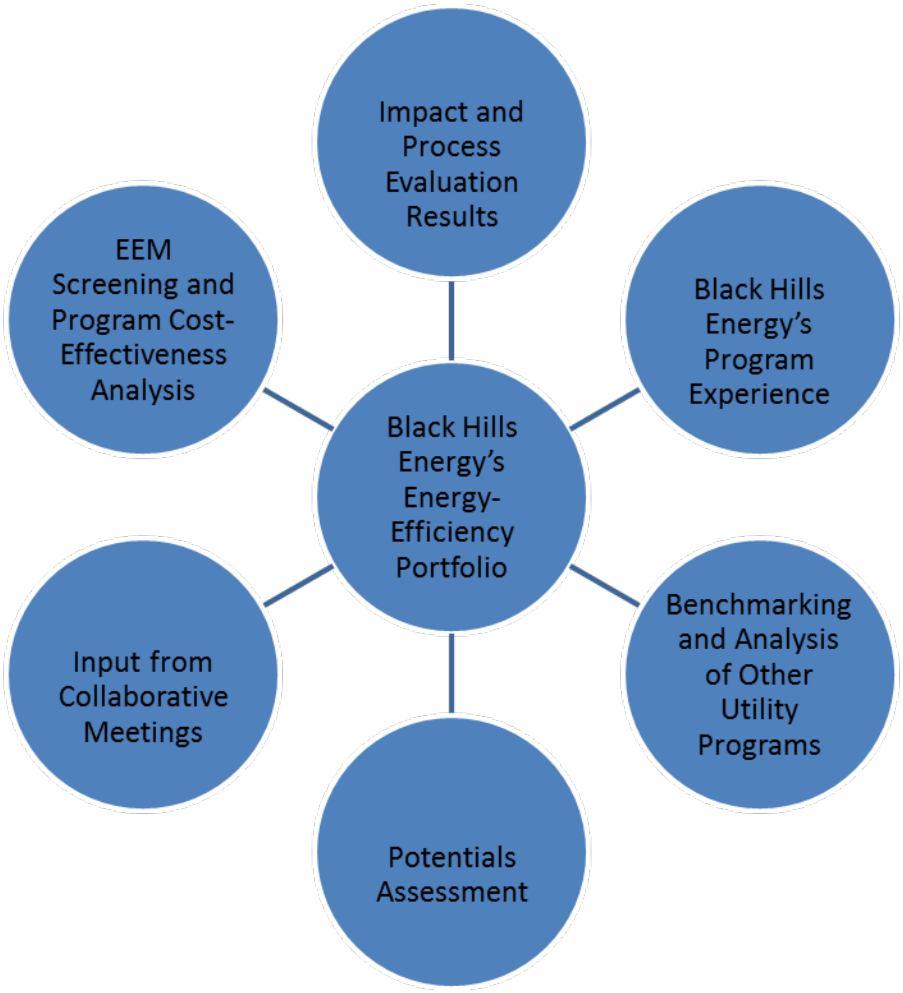


1.3 Multicriteria Approach

Although many steps in the planning process follow a specific sequence, in which the results from one activity inform the next, the final portfolio of programs is dependent on multiple criteria, which influences the design throughout the planning process.

Figure 2 illustrates the numerous elements that contributed to the final portfolio of energy-efficiency programs.

Figure 2. Criteria for Development of Portfolio



1.4 Role of Past Programs

Black Hills Energy currently offers programs to both residential and nonresidential customers. Residential customers have been able to take advantage of free home energy evaluations,[5] as well as incentives for high-efficiency measures such as furnaces, boilers, water heaters, and envelope measures for retrofitting and new construction. Black Hills Energy offers nonresidential customers facility evaluations, as well as prescriptive and custom incentives for energy-efficiency upgrades. In addition, Black Hills Energy funds a number of low-income and public purpose programs.

Historically, Black Hills Energy's programs have continuously provided ample savings opportunities for Iowans. In 2011, the savings achieved across the portfolio were 144,009 MCF (97% of goal); with the residential sector leading the savings with 107,308 MCF (105% of goal).[6] Because of Black Hills Energy's strong commitment to providing customers with a variety of savings opportunities, it was a priority to develop this Plan to carefully balance achieving a cost-effective portfolio with maintaining programs Iowans can count on year after year. This portfolio of programs was designed based on the most current knowledge and information available, as well as on input from key stakeholders. The combination of these efforts helped Black Hills Energy identify new program opportunities and enhance existing programs.

1.5 Benchmarking

In addition to reviewing existing programs, Black Hills Energy examined the efforts of other utilities throughout the country to identify innovative program and incentive strategies that could help achieve greater participation and savings. For example, including a multifamily evaluation program, in addition to providing direct installation measures, reflects a growing trend of targeted best practice services to multifamily customers.

1.6 Collaborative and Trade Ally Meetings

As part of the regulatory requirements for developing this Plan, collaborative meetings provided valuable insight into the process of designing the new portfolio. Black Hills Energy held two collaborative meetings in Des Moines during the Plan development, each attended by stakeholders from the government, ratepayer interest groups, and other private-sector interests. In addition, Black Hills Energy held a trade ally meeting in Dubuque to gather feedback from interested contractors. Details on the collaborative and trade-ally meetings, including copies of the presentations given at each meeting, are included in Appendix C: Collaborative Presentations.

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[5] Customers in the Council Bluffs and Decorah areas were also able to participate in the Home Performance with ENERGY STAR® (HPwES) pilot program during the 2009-2013 Plan.

[6] In 2011, these savings were achieved by spending $7,898,903, or 126% of the approved budget.

Below is a high-level summary of each meeting:

- At the first meeting, a stakeholder collaborative held on April 3, 2012, the objective was to present Black Hills Energy's current programs and historical accomplishments, introduce the stakeholders to the program planning process, and gather feedback on potential changes and expansions to the program portfolio.

- The trade ally meeting took place on May 8, 2012. At this meeting, the emphasis was to gather feedback regarding potential program changes. Specifically, the following items were discussed: bonus rebates for bundled measures, an early replacement incentive, expanding the Residential Evaluation and Nonresidential Evaluation programs, substantial changes to the Residential New Construction Program, and trade ally training.

- The third stakeholder collaborative took place on October 4, 2012. This final meeting allowed Black Hills Energy to present more detailed descriptions of the programs and preliminary cost-effectiveness results to interested stakeholders. It also gave attendants another opportunity to provide comments and suggestions before the program designs were finalized.

The following ideas were generated and discussed during the collaborative meetings:

- Continue trade ally training, specifically in sales and program changes

- Maintain trade ally incentives (spiffs)

- Expand participation options for the Residential Evaluation Program

- Offer a bonus bundle rebate for residential prescriptive measures

- Provide an early replacement incentive for furnaces

- Simplify furnace and boiler measures by only offering an incentive for the top tier

- Add a multifamily evaluation program

- Add a large commercial evaluation program

- Consider conducting a utility cost test (UCT) as well as societal cost test (SCT) to measure program and portfolio cost-effectiveness

1.7 Quality Assurance and Quality Control

Quality assurance is an integral aspect of both portfolio development and program implementation. Black Hills Energy incorporates quality assurance and quality control (QA/QC) procedures throughout the programs, including for third-party implementer and trade ally recruitment and training, program operations, and implementation. Black Hills Energy's internal QA/QC procedures include:

- Ongoing tracking of program activities and costs through a program tracking database system
- Applying rigorous screening and qualifying protocols to engage third-party implementers and trade allies who directly interact with customers
- Conducting planning, coordination, supervision, and technical direction for all relevant parties, including providing a clear definition of roles and responsibilities
- Tracking, monitoring, and reporting activities and results using the program tracking database

1.8 Program Evaluation

For the 2009-2013 program cycle, Black Hills Energy engaged in a comprehensive process and impact evaluation. Black Hills Energy reviewed the completed findings and recommendations from the evaluation during this planning process, and applied lessons learned to improve the current filing. For example, Black Hills Energy updated savings relative to new energy code and ENERGY STAR requirements; developed a trade ally network; included higher efficiency tiers for boiler and furnace rebates; and better defined rebate requirements for integrated space and water heaters.

For this Plan (2014-2018), Black Hills Energy continues to be committed to comprehensive evaluation. Black Hills Energy will collaborate with other Iowa IOUs and with the Office of Consumer Advocates (OCA), as appropriate, to develop a uniform approach to impact and process evaluation. For example, Black Hills Energy will encourage its evaluation, measurement, and verification (EM&V) contractor to follow the methods prescribed in the Uniform Methods Project.[7] Black Hills Energy will develop a schedule such that each program is evaluated at least once during the implementation cycle. The impact assessment will focus on developing accurate estimates of the program's actual savings based on the industry standard methodology, including the use of an energy-efficiency Technical Reference Manual if one has been developed for the State of Iowa. The process evaluation will concentrate on assessing the program's design,

[7] The Uniform Methods Project has industry accepted approaches to EM&V for a variety of measures, including residential furnaces and boilers. Further information is available at www.eere.doe.gov/ump.

operation, and implementation. Specific evaluation activities are discussed in each program section in chapters 5 through 8.

1.9 Assessments of Potential

An important aspect in the development of the Plan has been formulating ambitious yet realizable goals. For the program process, one of the primary means of establishing goals has been to assess energy-savings potential. The assessment of technical, economic, and market potentials began during the first phase of each project and continued with the assessment of program potential in the second phase.

This four-tiered approach (technical, economic, market, and program potential) provides an upper bound based on the potential of viable technologies, and then applies real-world constraints, including historical achievement, to bring the assessment within expected levels. The Assessment of Energy-Efficiency Potential chapter provides a detailed discussion of the methodology and results of the different potentials assessments.

1.10 Measure and Program Screening

A critical element in the planning process was determining the cost-effectiveness of each program, as well as of the portfolio as a whole.[8] Iowa administrative rules section 199-35 requires the program portfolio to be tested for cost-effectiveness from the societal, utility, ratepayer impact, and participant perspectives. The rules also require that the utility explain its rational for choosing an alternate test if the portfolio does not pass the SCT. This portfolio of programs passes the SCT with a benefit/cost ratio of 1.06. It also passes cost-effectiveness from the utility and participant perspectives.

Going forward, Black Hills Energy proposes that both the SCT and UCT be given due consideration. The UCT measures the impact of the program or portfolio on average rates. Passing the UCT benefit\cost analysis ensures that the portfolio will make the average rates lower than they would be otherwise. The SCT measures the costs and benefits from a total cost perspective, including both participant and utility costs. While in theory this appears attractive, in practice it is frequently difficult to determine the true costs and benefits from a societal perspective. Societal costs include the program administrative costs and the incremental cost of a measure associated with the increased efficiency. Frequently, higher efficiency measures also have other attributes that contribute to their cost, such as high-end controls or a more attractive design.

Similarly on the benefit side, program participants may perceive benefits that are not captured from an economic perspective. Examples might be increased comfort, satisfaction from having the latest technology, feeling like they are making an environmental difference, and an increase in productivity. Such benefits are very real from the participant's perspective, but are not easily

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[8] Low-income and public purpose programs are not required to pass cost-effectiveness testing.

captured in an economic test. Balancing the societal perspective with the UCT helps to alleviate negative customer impacts that may not be readily obvious when using the SCT alone.

Because the UCT measures the impacts of the program or portfolio on the average utility rates, programs that pass the test ensure that rates will be lower than they otherwise would be. There may be instances when a program or portfolio passes the UCT but fails the SCT. Black Hills Energy believes that the appropriate threshold in such instances is the UCT. This approach ensures that average rates are minimized while increasing the breadth of measures that can be offered. Cost-effectiveness results from the sector level are included at the beginning of each sector section.

Black Hills Energy considered the importance of the cost-effectiveness requirement throughout the planning process, beginning with screening the EEMs. Although programs are not precluded from including non-cost-effective EEMs, cost-effectiveness did provide a critical starting point for selecting measures for each program. However, there are cases where non-cost-effective EEMs are still included in a program. For example, the Residential Prescriptive Program continues to include the highest tiers of energy-efficient water heaters (0.67 EF and 0.80 EF), which ensures that customers are offered incentives to install the most efficient water heating equipment.

2. Black Hills Energy Data

Black Hills Energy generated avoided costs for natural gas pursuant to Board rules for both the measure- and program-level cost-effectiveness tests that contributed to the development of this Energy-Efficiency Plan. This chapter explains the various components included in generating avoided costs for both energy and capacity. Additional details are presented in Appendix D: Avoided Cost Methodology.

2.1 Gas Capacity Costs

According to Iowa administrative rule 199-35.10(4) a, calculations of the avoided capacity costs shall be based on the following formula:

$$\textit{Avoided Capacity Costs} = [(D + OC) \times (1 + RM)] \times (1 + EF)] \qquad \text{(Equation 1)}$$

Where:

- *D* (demand) is the greater of *CD* or *FD*.
  - *CD* (current demand costs) is the utility's average demand costs expressed in dollars per DTh or Mcf during peak and off-peak periods.
  - *FD* (future demand costs) is the utility's average future demand costs over the 20-year period expressed in dollars per DTh or Mcf when supplying gas during peak and off-peak periods.
- *OC* (other cost) is the value of any other costs per DTh or Mcf related to the acquisition of gas supply or transportation by the utility over the 20-year period in the peak and off-peak periods.
- *RM* (reserve margin) is the reserve margin adopted by the utility.
- *EF* (externality factor) is a 7.5% factor applied to avoided capacity costs in the peak and off-peak periods to account for the societal costs of supplying energy. Alternatively, the utility may propose a different externality factor if they submit documentation of its accuracy.

To calculate gas capacity costs, Black Hills Energy used historical demand costs from calendar year 2011, the most recent year with complete capacity cost data available at the time the economic analysis was conducted. As these costs generally reflect long-term contracts, they are equivalent to future demand costs (*FD* in Equation 1).

A unit of capacity saved on the peak day effectively reduces the required capacity under contract for each day of the year by that same unit. The calculation of demand costs is thus determined by summing all monthly capacity costs to yield annual capacity costs, then dividing by the demand over all the peak months (e.g., November through March), using Equation 2:

D = Annual Capacity Costs/Average Monthly Demand in DTh (Equation 2)

The remaining inputs necessary to determine avoided capacity costs are:

- Other costs (*OC*) are set equal to zero, as no other costs are offset from peak capacity reductions.
- The reserve margin (*RM*) is 3.15%.
- The externality factor (*EF*) for the SCT is 7.5%. (Note: the *EF* does not apply to the other tests required by the state—the ratepayer, utility, and participant cost-effectiveness perspectives.)

After applying an annual inflation rate of 2.5% to obtain the value of annual capacity costs for the first program year (2014) and adding the reserve margin, the gas capacity cost is $8.85 per peak-day therm, including the 7.5% externality factor for the SCT. The stream of capacity cost values continues to increase annually by the 2.5% inflation rate over the planning horizon.

2.2 Gas Energy Costs

According to Iowa administrative rule 199-35.10(4)b, calculations of avoided energy costs in the peak and off-peak periods on a seasonal basis shall be based on the following formula:

Avoided Energy Costs = (E + VOM) x (1 + EF) (Equation 3)

Where:

- *E* (energy costs) is the greater of *ME* or *FE*.
    - *ME* (current marginal energy costs) is the utility's current marginal energy costs expressed in dollars per DTh or Mcf during peak and off-peak periods.
    - *FE* (future energy costs) is the utility's average future energy costs over the 20-year period expressed in dollars per DTh or Mcf during peak and off-peak periods.
- *VOM* (variable operations and maintenance costs) is the utility's average variable operations and maintenance costs over the 20-year period expressed in dollars per DTh or Mcf during peak and off-peak periods.
- *EF* (externality factor) is a 7.5% factor applied to avoided energy costs in the peak and off-peak periods to account for societal costs of supplying energy. Alternatively, the

utility may propose a different externality factor if they submit documentation of its accuracy.

Black Hills Energy compared *ME* and *FE*, which were derived from the New York Mercantile Exchange's (NYMEX's) Henry Hub Natural Gas settlement prices. Black Hills Energy determined that the *ME* costs provided a higher estimate of gas energy costs.

The remaining inputs necessary to determine avoided capacity costs are:

- Variable operations and maintenance costs (*VOM*) are set equal to zero, as no other costs are offset from gas energy savings.
- The externality factor (*EF*) for the SCT is again 7.5%.

Black Hills Energy determined energy costs for 2014 by applying the escalation rates based on NYMEX 2011 future prices, which yielded a value of $0.61 per therm for winter energy and $0.50 per therm for summer energy. These figures include the 7.5% externality factor for the SCT. As the NYMEX future prices only apply through 2023, Black Hills Energy increased the stream of energy cost values by the 2.5% inflation rate annually for the remainder of the planning horizon.

2.3 Customer and Load Forecasts

Black Hills Energy used its 2011 long-term, 20-year customer and load forecasts to develop long-term estimates of technical and economic potential (see Appendix A: Volume 1 – Potentials Assessment and Appendix B: Volume 2 – Potentials Assessment: Appendices). Details on the development of these long-term forecasts are given in Appendix E: Gas Forecasts. The development of rate impacts associated with the 2014-2018 Energy-Efficiency Plan is based on actual 2011 sales and customer data.

2.4 Discount and Inflation Rates

The other key parameters used in the analysis are discount and inflation rates. The discount rate varies by cost-effectiveness test perspective, and, as discussed previously, Black Hills Energy used a variety of data-specific inflation rates. Table 1 summarizes these values and their associated data sources.

Table 1. Discount Rates

Test	Rate	Data Source
Utility Cost Test Ratepayer Impact Test	9.18%	Post-tax weighted average cost of capital
Participant Cost Test	10.00%	Assumption of the cost of borrowing
Societal Cost Test	3.86%	12-month average of the 10- and 30- year treasury bond (data pulled 10/11/2011)

3. Assessment of Energy-Efficiency Potential

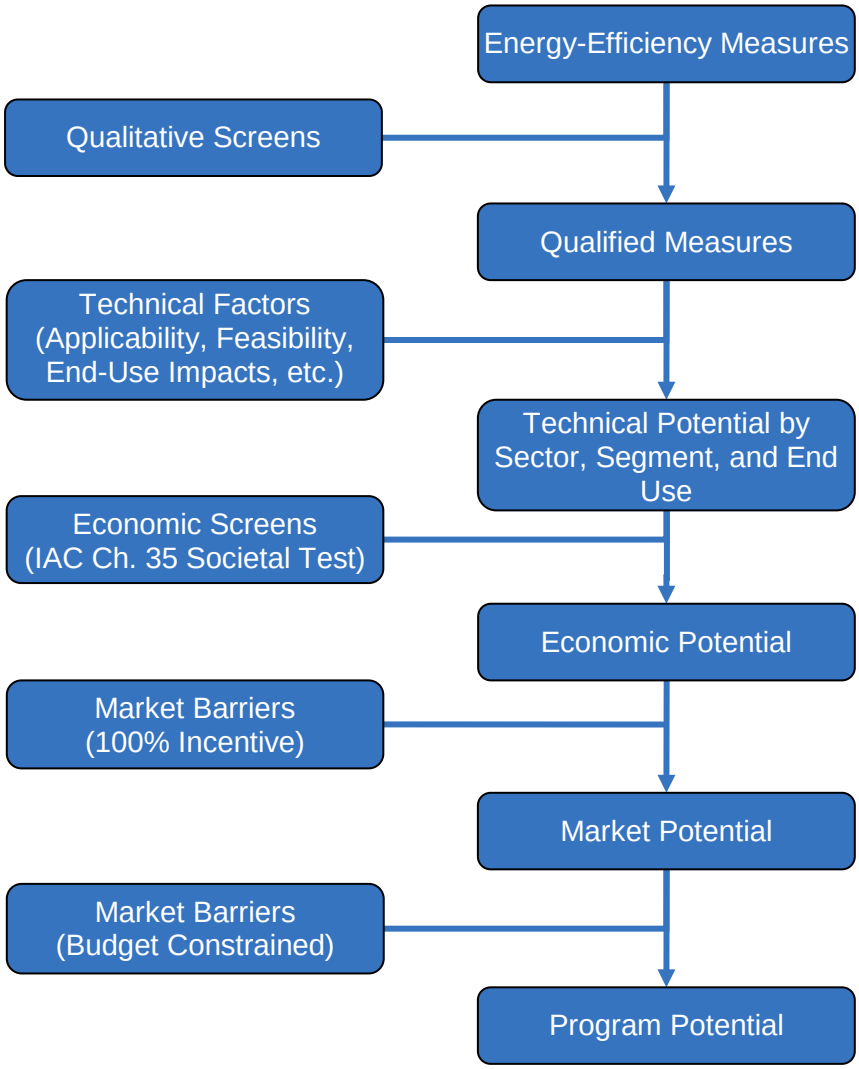
An important step in developing realizable energy savings goals for Black Hills Energy's energy-efficiency programs was assessing potential savings for natural gas associated with EEMs. The Joint Utility Study developed estimates of technical, economic, and market energy-efficiency potentials.[9] This chapter first describes the methodology underlying those assessments of potentials, and then summarizes the resulting estimates for Black Hills Energy's energy and capacity savings.

3.1 Alternative Definitions of Energy-Efficiency Potential

Black Hills Energy started the portfolio assessment based on four different types of energy-efficiency potential defined and used to describe savings from EEMs: technical, economic, market, and program, where the first three were determined through the Joint Utility Study. These are depicted in Figure 3.

[9] See Appendices A and B.

Figure 3. Alternative Types of Energy-Efficiency Potential



Black Hills Energy's definitions for these alternative estimates of demand-side management (DSM) potential are consistent with those from the Board:

- **Base case forecast**: A forecast that represents energy consumption in the absence of new conservation activities. It establishes a benchmark against which the impact of EEMs can be assessed. The effects of codes, equipment standards, and naturally occurring efficiency improvements are included in the base case forecast.

- **Technical potential**: The energy savings from conversion to the most energy-efficient technologies and measures. All equipment is converted at the end of its useful life or when new equipment is installed.

- **Economic potential**: A subset of technical potential, economic potential represents the energy savings from converting to the most energy-efficient technologies and from

measures that are cost-effective when equipment is replaced at the end of its useful life, or when new equipment is installed. No administrative costs are included in this assessment.

- **Market potential**: This is the energy-savings potential from DSM programs, accounting for program cost-effectiveness and real-world constraints (i.e., penetration rates less than 100%). This scenario assumes that the utility pays 100% of the incremental cost, and is considered a maximum achievable potential.

- **Program potential**: A subset of market potential, program potential is limited by incentive and marketing budget constraints. Administrative and training costs are included. In this context, program potential establishes the program savings goals of Black Hills Energy's 2014-2018 energy-efficiency programs.

3.2 Methodology and Data Inputs

A detailed description of the methodology for estimating Black Hills Energy's EEM technical potential is provided in the Joint Utility Study (see Appendix A: Volume 1 – Potentials Assessment). The Joint Utility Study describes how the *Excel Potential Model* is calibrated to Black Hills Energy's Iowa load and customer counts, how various data inputs are used by the model, and how potential is estimated across the new construction, equipment replacement, and retrofit markets.

Estimates of economic potential are based on modified savings for new construction, equipment replacement, and retrofit EEMs using the maximum savings *only* for measures and technologies that are cost-effective. That is, the savings are based on a subset of EEMs used in the assessment of technical potential. These subsets are based on detailed measure screens that allow for variation among sectors, building types, and building vintages. For example, the highest efficiency furnace might be cost-effective in single family homes but not in apartments; therefore, it would only be included in the savings assessment for single family homes.[10]

The assessment of market potential is based on the same savings figures as the economic potential, with modifications made to the assumptions of market penetration based on 100% incentive levels. This was estimated by benchmarking with other utility achievements and extrapolating to the high incentive amount.

Program potential is a subset of market potential, based on Black Hills Energy's programmatic successes, best practice studies, and feedback from trade allies. Whereas market potential estimates assume 100% incentive with high penetration, the program potential estimates rely on realistic penetration rates achieved from actual utility energy-efficiency programs. In addition, some measures would theoretically offer savings, but trade ally feedback discouraged the inclusion of the measure within a program due to ease of implementation issues or other

[10] This methodology is described further in the Joint Utility Study report, provided here as appendices A and B.

secondary considerations. Black Hills Energy's program potential estimates are based on realizable savings from proven measures.

3.3 Black Hills Energy's Technical, Economic, Market, and Program Potential Savings

Table 2 presents Black Hills Energy's sales, along with technical, economic, and market potential, in DTh, as well as the savings in percentage of baseline sales.[11] These numbers represent the potential over 10 years. Annual potential could roughly be estimated as 1/10 of the values given. In other words, the annual market potential (that assumes utility programs cover 100% of incentives) is estimated to be approximately 1.6% of annual sales.

Table 2. Black Hills Energy Total 10-Year Potential Energy Savings (in DTh)

Sector	Annual Sales	Technical Potential	% of Sales	Economic Potential	% of Sales	Market Potential	% of Sales
Residential	105,983	44,238	42%	28,891	27%	18,779	18%
Commercial	57,302	15,941	28%	13,076	23%	8,499	15%
Industrial	6,697	575	9%	540	8%	351	5%
Overall	169,982	60,754	36%	42,507	25%	27,629	16%

The program potential for the residential and nonresidential sectors is based on program goals. The annual program potential is provided in Table 3.

Table 3. Black Hills Energy Annual Program Potential (Thousand Therms)

Sector	Annual Sales	Program Potential	% of Sales
Residential*	105,983	820	0.77%
Nonresidential**	63,999	364	0.57%
Overall	169,982	1,185	0.70%

* This row includes savings from the low-income sector and the public purpose sector's School-Based Energy Education Program.
** This row includes savings from the public purpose sector's tree planting programs.

The potentials over the five-year plan horizon are provided in Table 4 below.

[11] The potentials and their derivation are described further in the Joint Utility Study report, provided here as appendices A and B.

Table 4. Technical, Economic, Market Potential and Plan Targets

Plan Year	2014	2015	2016	2017	2018
Retail Sales Forecast ('000 Therms)	170,925	170,519	170,254	170,052	169,913
Technical Potential ('000 Therms)	7297	6899	6732	6564	6462
Technical Potential % of Sales	4.3%	4.0%	4.0%	3.9%	3.8%
Technical Potential ('000 Peak Therms)	77	72	71	69	68
Economic Potential ('000 Therms)	4771	4596	4529	4462	4454
Economic Potential % of Sales	2.8%	2.7%	2.7%	2.6%	2.6%
Economic Potential ('000 Peak Therms)	50	48	48	47	47
Market Potential ('000 Therms)	3101	2987	2944	2900	2895
Market Potential as % of Sales	1.8%	1.8%	1.7%	1.7%	1.7%
Market Potential ('000 Peak Therms)	33	31	31	30	30
Plan Targets ('000 Therms)	1089	1120	1152	1171	1205
Plan Targets % of Sales	0.64%	0.66%	0.68%	0.69%	0.71%
Plan Targets ('000 Peak Therms)	11	12	12	12	13

A break-down of the sector and program-specific savings associated with program potential estimates are provided in chapters 5 through 8.

4. Overall Program Design

This chapter provides the program design background, including details on program evaluation, qualifying EEMs, the impacts of those measures, participation, eligibility to participate, trade ally training, marketing and outreach, program delivery mechanisms, associated program budgets, and cost-effectiveness calculations. These details provide the foundation to Black Hills Energy's comprehensive approach to providing energy-efficiency services to customers and developing savings targets as identified in this Plan.

As was discussed in the Introduction, Black Hills Energy sought to incorporate information from a variety of sources throughout developing this portfolio. Our intention was to create a well-balanced, cost-effective set of programs that will serve the needs of Black Hills Energy's consumers and the State of Iowa by continuing to promote the efficient use of energy.

Historically, Black Hills Energy has had substantial success with energy-efficiency programs. Therefore, many of the programs included in the Plan are based on Black Hills Energy's current portfolio. However, the program-development process highlighted several areas where additional savings opportunities exist. As a result, the portfolio includes two entirely new components (multifamily evaluations and large commercial evaluations), as well as innovative changes or expansions to several existing programs. For example, the Residential Evaluation Program now includes four entry points, and the Nonresidential Prescriptive Program has expanded commercial kitchen offerings.

Although this plan puts forward the best assumptions in program delivery and impacts, Black Hills Energy will continue to engage stakeholders to ensure the programs are cost effective. To this end, Black Hills Energy will convene a Fall Operations meeting each year to inform stakeholders of any proposed program changes and to gather input of potential changes to the Plan.

4.1 Program Evaluation

Evaluation is a critical component of each program in the portfolio, as it provides the necessary feedback to determine whether individual programs and the overall portfolio are achieving the intended objectives. As part of a rigorous evaluation, verification of energy savings for each relevant program through impact evaluations establishes whether a program is achieving the intended impacts. In addition to impact verification, process evaluations confirm areas of structural success and highlight aspects of program operations that could be improved. All programs will have both impact and process evaluations during the five-year plan.

The depth of process and impact evaluations will vary by program, with higher savings measures receiving more attention than lower saving offerings. In general, however, impact evaluations consist of assessing quantifiable program impacts for energy and peak savings. These are

typically based on some combination of engineering estimates, installation verifications, samples of meter data from participants, and statistical billing analyses.[12] Impact evaluations will also include a review of participation rates and measure adoption tendencies. For applicable measures, these will follow the methodology outlined in the Uniform Methods Project. Process evaluations will emphasize program delivery, administration, and customer satisfaction. More qualitative in nature, process evaluations are typically based on interviews and surveys of utility staff, implementers, trade allies, program participants, and nonparticipants.

Black Hills Energy has implemented a robust tracking system that not only provides participant information, but also can allow BHE to track conversion rates across the portfolio. That is, through this system, Black Hills Energy can determine which customers who received an on-site evaluation also installed measures (and which measures). This will benefit the process evaluation efforts to review program effectiveness.

4.2 Qualifying Energy-Efficiency Measures

Qualifying EEMs represent either more efficient models of end-use appliances, such as water heaters, or technological improvements that can make an end-use appliance more efficient in its use of energy, such as insulation upgrades. Nearly all the programs encourage the adoption of at least one EEM. The EEMs that qualify for each program are intended to represent a substantial improvement over the standard efficiency available on the market. This has meant that, in some instances, some EEMs with incentives might not currently be readily available to consumers. For example, a program might promote a condensing gas water heater with an EF of 0.80 or more, which is not as available in some markets as others. Such EEMs should, however, become more available over the Plan years.

While all programs have incentives for EEMs at efficiency levels available in the current market, it is not the purpose of the program to provide incentives for EEMs that participants would adopt in the program's absence. In some cases, baseline efficiency levels are clearly defined, such as with insulation measures and the requirements of state codes. In these cases, Black Hills Energy specifically designed programs to provide incentives for EEMs that provide energy savings beyond code. In other cases, such as with boilers, Black Hills Energy designed the incentives to encourage participants to select not merely a higher level of efficiency, but the highest level available (with an AFUE of 95% or greater).

4.3 Impacts

Energy-efficiency programs are designed to reduce the amount of energy consumed while maintaining the customers' quality of life. Therefore, the amount of energy reduced, or impact goals, is a critical driver for the program and the portfolio as a whole. Black Hills Energy began identifying potential impacts for the 2014-2018 Plan during development of the Joint Utility Study by assessing the technical, economic, and market potential. Throughout developing the

[12] The impact evaluations may also rely on a Technical Reference Manual if one is adopted in Iowa.

plan, Black Hills Energy sought to offer programs that would effectively capture the greatest energy savings. To achieve this, we developed programs to target major end uses in the residential and nonresidential sectors where technologies exist to significantly improve energy efficiency.

Because impacts are driven primarily by the amount of participation and the respective savings of the qualifying EEMs, Black Hills Energy tailored those components (taking into account their respective characteristics and constraints) in order to maximize the program's total impacts. The overall portfolio includes programs that capture a wide variety of potential savings. Programs were designed to maximize participation given best practice marketing and incentive designs. In addition to ensuring participation while efficiently using budget resources, Black Hills Energy targeted incentives to promote the adoption of EEMs that maximize savings and minimize lost opportunities.

In addition, since many of the EEMs promoted by Black Hills Energy will save the customer on cooling and heating costs, the analysis of these measures includes secondary electric benefits. For example, a customer that installs high R-value ceiling insulation in their single family home is expected to save approximately 70 therms and 92 kWh annually, assuming the house has central air conditioning. The participant benefits include the cooling savings, adjusted for the saturation of central air conditioning for homes with gas furnaces.[13]

The participation goals for each program are discussed in the program descriptions sections of the following chapters. The annual projected Plan impacts are summarized in the Conclusion/Request for Plan Approval chapter.

4.4 Participation

Establishing a participation goal for each program required consideration of numerous factors, including the number of eligible participants, the available budget, and past program performance.[14]

Black Hills Energy based the estimated number of eligible participants on the most recent Iowa energy-efficiency potential study. These estimates flow from long-term customer growth forecasts, including new construction. Black Hills Energy used end-use saturations, fuel shares, measure lives, and decay functions to determine the number of end-use appliances in existing living units and the number of those in need of replacement during each year of the forecast.

Black Hills Energy developed each program budget to balance best practices, including the share of technology costs paid directly by participants compared to the incentive subsidy. Incentives

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[13] Since Black Hills Energy is a gas-only utility in Iowa, electric benefits from the Joint Utility Study were identified and used. The Joint Utility Study also provides data to Interstate Power and Light Company and MidAmerican Energy Company in Iowa.

[14] Unless otherwise stated, participation is expressed in this Plan as the number of measures installed per year (rather than the number of customers who participate per year).

need to be sufficiently large to encourage participation, yet small enough to maximize available resources. Similarly, marketing and administrative budgets should be adequate to promote and operate the programs, but not be so large they negatively impact cost-effectiveness.

Finally, in setting participation goals, Black Hills Energy assessed the historical program performance in Iowa and other states to understand which programs met or exceeded their goals and which fell short. Given similar incentive and outreach structures, we expect to achieve participation consistent with these other efforts.

4.5 Eligibility

When appropriate, participation eligibility has been broadly defined to ensure programs are as inclusive as possible. For most residential programs, eligible participants include customers living in every type of residential structure, including single family, multifamily, and manufactured homes. Although the low-income programs have specific income requirements, low-income customers are not precluded from participating in the other residential programs. The only limitations on low-income customer participation in general residential programs are in circumstances when the customer recently participated in a program, such as having a residential evaluation, and repeated participation would not render sufficient savings to justify the expense.

Programs for the nonresidential sector tend to be concentrated on smaller commercial facilities, although the new Nonresidential Evaluation Program does target mid-sized facilities. Larger commercial and industrial facilities have unique needs and are generally served through the Nonresidential Custom Program.

4.6 Training

Black Hills Energy is committed to trade ally education and training, and plans to coordinate, where appropriate, with both Alliant Energy and MidAmerican Energy Company on relevant training sessions. The training sessions will be offered to all active and interested trade allies including, but not limited to, HVAC dealers and contractors, plumbing and mechanical contractors, retail outlets, home builders, real estate developers, and home energy raters. The trainings will be on a variety of topics, such as:

- Proper sizing and installation of HVAC equipment
- New construction practices/programs
- Sales and marketing
- 2014-2018 utility programs
- Building Operator Certification

4.7 Marketing

Effective marketing and outreach is critical to reaching customers. Black Hills Energy is committed to continuing to raise customer awareness of energy efficiency and of the various opportunities customers may take advantage of through participation in Black Hills Energy's programs. On the residential side, Black Hills Energy will employ a cross-sector campaign to maximize overlap in interest from customers. However, specific programs may be highlighted throughout the year to encourage greater participation. Similarly, Black Hills Energy will implement cross-sector marketing and outreach campaigns for nonresidential programs. Black Hills Energy will leverage its internal capabilities by drawing on marketing and communications staff to support the development and creation of outreach materials. In addition, Black Hills Energy will work with an advertising agency to identify best practice outreach strategies that are relevant for Black Hills Energy's customers and programs. Tactics that may be used include bill inserts, direct mail, brochures, billboards, radio and print ads, online ads, and the company Website. Black Hills Energy will track marketing activities at the program level.

4.8 Delivery Mechanism

The primary mechanism for program delivery is customers' purchasing high-efficiency equipment and/or services directly from existing market actors (contractors, equipment dealers, and retailers). Consequently, the successful promotion and administration of programs requires the inclusion of trade allies. Targeting trade allies and arming them with program information and promotional materials will increase both trade ally and customer awareness of Black Hills Energy's energy-efficiency programs.

Although the emphasis continues to be the customer incentives, several programs include strategies that encourage cooperation with trade allies, other utilities, and state and local agencies. For example, Black Hills Energy reserved portions of some programs' budget to conduct training and informational outreach activities with trade allies, including dealers and providers of maintenance services. These activities are intended to keep the key trade allies apprised of any changes in the various programs, which will allow them to assist customers and ensure they maintain high-efficiency equipment in their stock. In addition, Black Hills Energy will offer a trade ally/dealer spiff, or incentive, for certain specific measures (e.g., integrated space and water heaters). These incentives give trade allies a financial reward for promoting the high-efficiency or quality installation of equipment to their customers.

4.9 Budgets

Program budgets were developed to cover all aspects of the program, and are divided into the following areas of expenditure:

- Administration: Budget for Black Hills Energy to oversee programs
- Marketing: Budget for Black Hills Energy to market programs
- Program Delivery: Budget for third-party implementers

- Evaluation Delivery: Budget for project evaluation and delivery of energy-efficiency kits
- Customer Incentives: Budget for customer incentives
- Dealer Incentives: Budget for contractor/dealer spiffs
- EM&V: Budget for third-party vendors to evaluate programs

In general, incentives are the greatest program expenditure, which are principally for customers. Black Hills Energy will seek opportunities to minimize administrative and marketing costs through coordinated delivery and marketing of the programs. In addition, a cross-program administrative, marketing, and training budget category is included to cover broad initiatives and expenditures.

4.10 Cost-Effectiveness Calculations

Within all of the Plan tables that include cost-effectiveness results, costs represent the present value of the future stream of administrative and incentive costs, discounted at the appropriate rates for the different tests. Administrative costs are escalated by 2.5% per year to account for inflation. The sources for these inputs were detailed in the Black Hills Energy Data chapter.

The program benefits are the present value of the future stream of avoided costs for each year of measure life, again discounted at the appropriate rates for the different tests. Detailed results for the cost-effectiveness analysis are presented in Appendix G: Detailed Cost-Effectiveness Results, including the yearly values for all costs and benefits.

5. Residential Programs

Introduction

This chapter describes Black Hills Energy's proposed portfolio of residential energy-efficiency programs. The tables below provide an overview of the residential sector programs, budget, FTE, energy savings, and cost-effectiveness results.

Table 5. Residential Programs

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

Table 6. Residential Sector Budget*

Program	2014	2015	2016	2017	2018	TOTAL
Residential Evaluation Program	$706,700	$697,000	$697,300	$697,600	$697,900	$3,496,500
Residential Prescriptive Program	$2,377,800 ~~$2,378,500~~	$2,480,100 ~~$2,480,800~~	$2,585,900 ~~$2,586,700~~	$2,697,000 ~~$2,697,800~~	$2,812,100 ~~$2,813,000~~	$12,952,900 ~~$12,956,800~~
Residential New Construction Program	$483,800	$506,800	$530,500	$555,800	$584,200	$2,660,900

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Table 7. Residential Sector FTE

	FTE
Program Admin	0.84
Marketing	0.33
TOTAL	1.17

Table 8. Residential Sector Energy Savings*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Residential Sector Savings (Dekatherms)	70,081	72,017	73,783	75,867	78,021	369,770
Residential Sector Peak Savings (Peak Dekatherms)	742	763	783	806	829	3,924

* Individual results may not sum to total due to rounding.

Table 9. Residential Sector Cost-Effectiveness Results*

Cost-Effectiveness Test	Benefits (NPV)	Costs (NPV)	Net Benefits	B/C Ratio
Utility Cost Test	$23,339,256	$16,058,358	$7,280,898	1.45
Participant Cost Test	$35,963,195	$35,166,034	$797,161	1.02
Ratepayer Impact Test	$23,339,256	$39,698,152	-$16,358,897	0.59
Societal Cost Test	$42,753,800	$41,581,796	$1,172,004	1.03

* Individual results may not sum to total due to rounding.

The remaining sections of this chapter provide details on each residential program, including a description of services, delivery and promotion activities, key trade allies, eligible measures and incentives, participation targets, energy and peak savings, outside service (when appropriate), and evaluation overview.

R.1 Residential Evaluation Program

Program Description

The Residential Evaluation Program has four components for single families: 1) a free online evaluation, 2) a free walkthrough 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 multifamily evaluation. Both the single family and multifamily evaluators provide recommendations to customers about ways 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.

Single Family Online Evaluation

The online evaluation is a new component of the Residential Evaluation Program. This is an ideal first step for customers who are just getting started making their home energy efficient. This component does not require a co-pay, is easily accessible from any online source, provides general recommendations, and introduces customers to savings opportunities that include residential incentives offered by Black Hills Energy.

Single Family Walkthrough Evaluation

The walkthrough evaluation is the backbone of Black Hills Energy's Residential Evaluation Program, in which customers receive a free on-site walkthrough evaluation of their home by an energy professional. Customers also receive a number of free direct install measures and a report with high-level personalized recommendations. These recommendations highlight savings opportunities offered by Black Hills Energy.

Single Family Tier I Comprehensive Evaluation

Black Hills Energy designed the Tier I comprehensive evaluation based on the HPwES pilot program. Black Hills Energy is expanding this style of comprehensive evaluation across the Iowa service territory. Customers receive an on-site comprehensive evaluation of their home, including a series of diagnostics tests such as a blower door test and/or infrared scan. These tests inform the creation of a detailed and personalized report with comprehensive recommendations. Similar to the walkthrough evaluation, these recommendations highlight savings opportunities offered by Black Hills Energy. Customers also receive the same free direct install measures as provided in the walkthrough evaluation. However, unlike the walkthrough, the customer is required to pay a modest co-pay to cover part of the diagnostic testing.

Single Family Tier II Comprehensive Evaluation (and Test-Out)

The Tier II comprehensive evaluation provides the same services as those in Tier I, but also includes test-out diagnostics. The customer pays a modest co-pay for this diagnostic testing, which confirms that the installed upgrades have achieved the intended goals. For example, the blower door test will confirm that air leakage has been reduced after the recommended infiltration measures have been installed.

Multifamily Evaluation

The multifamily evaluation is a new component of the Residential Evaluation Program, in which Black Hills Energy offers multifamily landlords an on-site evaluation of the common areas by an energy professional, for a modest co-pay. The evaluation results in a high-level report with itemized recommendations. Similar to the single family evaluations, these recommendations highlight savings opportunities offered by Black Hills Energy. Landlords also receive free direct install kits for the building manager to install in each tenant unit.

Program Delivery and Promotional Activities

Black Hills Energy promotes the Residential Evaluation Program through bill inserts, the company Website, and various paid media sources such as newspaper and online advertising, billboards, and radio. In addition, participating energy professionals inform customers of the program as they promote their own services throughout the service territory. Furthermore, customers who contact Black Hills Energy's call center, especially those calling regarding high bills, are referred to the program.

For all on-site evaluations, the following areas are assessed:

- Insulation levels
- Infiltration levels
- Equipment efficiency and operating condition
- Behavior-related factors influencing energy consumption

In addition to the assessments above, the comprehensive evaluations also include diagnostic testing[15] that quantifies and more precisely identifies specific areas of air leakage and low insulation. As discussed above, the distinguishing feature of the Tier II comprehensive evaluation is the test-out feature, in which the home's performance is assessed after the customer installs the recommended measures. The test-out provides quantifiable validation of the home improvements.

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[15] This diagnostic testing is a blower door test and/or infrared scan.

All on-site evaluations include free direct installation measures (see the Eligible Measures and Incentives section below for a list of qualifying measures). For the single family on-site evaluations, the energy evaluator either directly installs these measures or they provide instructions to the customer on how to install the measures. For the multifamily evaluation, the evaluator provides free direct install kits for the individual tenant units to the landlord, who in turn has them installed by the building manager.

Target Market

All residential customers are eligible to participate in the online evaluation. For the on-site evaluations, residential customers who have not received a Black Hills Energy-sponsored on-site evaluation[16] in the past five years and who live in a home at least 10 years old are eligible to participate (Table 10). Targeted customers include those with above-average energy consumption and those who contact Black Hills Energy with high bill concerns.

Table 10. R.1 Residential Evaluation Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	All
Building Type	Single family; multifamily
Building Vintage	Existing; > 10 years old (on-site evaluation)
Geography	Iowa territory

Trade Ally Targets

The program will be delivered by selected energy professionals. All evaluators must be certified by the Building Performance Institute. Additional trade allies include installation contractors, such as for HVAC and insulation measures. These trade allies promote the program as part of their general promotion of Black Hills Energy's savings opportunities.

Eligible Measures and Incentives

Evaluators who conduct on-site evaluations offer participating customers the following energy-efficiency measures at no cost:

- Faucet aerators
- Outlet gaskets
- Hot water pipe insulation

[16] This was formerly called an audit.

- Low-flow showerheads
- Low-cost infiltration measures

On average, the value of these free direct install measures is $30.

Table 11 outlines the program offerings and corresponding co-pays. The proposed incentive column in Table 11 represents the value of the measure, and costs are born by Black Hills Energy. For this program, the incentive does not represent a rebate received.

Table 11. R.1 Residential Evaluation Program Measure Summary

Measure Name	Measure Description	Base Equipment Being Replaced	Customer Cost	Proposed Incentive
Single Family Evaluations				
Online Evaluation	Online evaluation	No evaluation		
Walkthrough Evaluation	Walkthrough evaluation, including the installation of faucet aerators, hot water pipe insulation, low-flow showerheads, and an energy-saving infiltration kit (includes outlet gaskets and other measures)	No evaluation; existing conditions		$200
Tier 1	Comprehensive whole-house evaluation including diagnostic testing	No evaluation	$100	$300
Tier 2	Comprehensive whole-house evaluation including diagnostic testing and test-out	No evaluation	$200	$500
Multifamily Evaluations				
Evaluation of Common Areas	Walkthrough evaluation	No evaluation	$800	$800
Kits	Faucet aerators, outlet gaskets, hot water pipe insulation, low-flow showerheads, and low-cost infiltration measures	No evaluation		cost of kit

Participation

As a new online service, Black Hills Energy has made no projections for the amount of interest in the online evaluation. Based on historical trends, the walkthrough evaluation is projected to have 2,500 participants per year. Because the comprehensive evaluations are new to the majority of the Black Hills Energy's service territory,[17] the Tier I comprehensive evaluation is projected to have 75 participants per year and the Tier II comprehensive evaluation is projected to have five participants per year. Since the multifamily evaluation component is also new, and because of the rural nature of the majority of Black Hills Energy's service territory, this component is projected to have five participants (multifamily buildings) per year. In addition, 60 multifamily

[17] Black Hills Energy offered a HPwES pilot program during the 2009-2013 program cycle, but it was limited to the Council Bluffs and Decorah areas.

kits containing direct install measures are anticipated to be provided in 2014 , growing to 73 kits in 2018.

Table 12 presents the cumulative expected participation for all four on-site residential evaluation components.

Table 12. R.1 Residential Evaluation Program 2014-2018 Participation Goals

Program Year	Participation*
2014	2,645
2015	2,648
2016	2,652
2017	2,655
2018	2,659
TOTAL	13,259

* The table does not include participation projections for the online evaluation.

Energy and Peak Energy Savings

Table 13 provides the projected savings from the Residential Evaluation Program (approximately 28,000 Dth). These savings are entirely from the direct installation measures provided to customers as part of the on-site evaluations.

Table 13. R.1 Residential Evaluation Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	5,503	5,510	5,517	5,524	5,532	27,587
Annual Peak Energy Savings (Peak Dekatherms)	60	60	60	60	60	301

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy will contract with eligible evaluators to provide customers with on-site evaluation services, including direct installation of free measures, diagnostic testing,[18] and reporting. Black Hills intends to engage trade allies to perform the evaluations through a third-party subcontracting process.

[18] Diagnostic testing is only part of the Tier I and Tier II comprehensive evaluation components.

Budget

Black Hills Energy will cover the entire cost of all direct install measures and walkthrough evaluations.[19] Customers who participate in the Tier I comprehensive evaluation will be required to pay a $100 co-pay; Black Hills Energy will cover the remaining cost of approximately $300. Customers who opt for the Tier II comprehensive evaluation will be required to pay a $200 co-pay; Black Hills Energy will cover the remaining cost of approximately $500. Customers who participate in the multifamily evaluation will be required to pay an $800 co-pay; Black Hills Energy will cover the remaining costs, which is approximately an additional $800 per site.

The proposed budget for the Residential Evaluation Program is shown in Table 14.

Table 14. R.1 Residential Evaluation Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$66,200	$33,100	$38,000	$529,600	N/A	N/A	$39,700	$706,700
2015	$66,200	$33,100	$28,000	$529,900	N/A	N/A	$39,700	$697,000
2016	$66,300	$33,100	$28,000	$530,100	N/A	N/A	$39,800	$697,300
2017	$66,300	$33,100	$28,000	$530,400	N/A	N/A	$39,800	$697,600
2018	$66,300	$33,200	$28,000	$530,700	N/A	N/A	$39,800	$697,900

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. The impact evaluation of the Residential Evaluation Program will be concentrated on two areas of savings:

1. Savings achieved by participants of on-site evaluations through the installation of free low-cost measures and the adoption of behavioral changes made in response to evaluation recommendations.

2. Savings achieved through the adoption of major measures recommended through the evaluation process. These savings may be identified or tracked through referrals and through participation in Black Hills Energy's Residential Prescriptive Program.

Engineering estimates will be the primary mode of assessing program savings. However, some short-term monitoring and/or billing analysis may be conducted to validate the engineering

[19] The walkthrough evaluation and corresponding leave-behind measures have a monetary value of approximately $200 per home.

estimates. Savings measures through the Tier II comprehensive evaluation will also be used to inform, evaluate, and potentially adjust the engineering savings estimate.

Process Evaluation. The process evaluation will be concentrated on determining customer satisfaction with various program aspects, including but not limited to:

- Evaluation process
- Ease of scheduling the evaluation
- Evaluation recommendations
- Value of the information provided in the evaluation report
- Ease of installation and use of low-cost measures (i.e., free direct installation measures)

The process evaluation will also provide insight into the likelihood that evaluation participants follow through with the recommended upgrades and implement additional measures. Data collected through participating customer and evaluator surveys and/or interviews will be the primary basis for the process evaluation.

R.2 Residential Prescriptive Program

Program Description

Through the Residential Prescriptive Program, Black Hills Energy provides incentives to customers who improve the efficiency of their home through installing measures including, but not limited to, high-efficiency furnaces, boilers, water heaters, and setback thermostats; early replacement of water heaters; furnace maintenance; innovative space and water heating technologies; high-efficiency clothes washers;[20] and envelope measures such as roof, wall, and foundation insulation and infiltration.[21]

Program Delivery and Promotional Activities

Black Hills Energy conducts targeted promotional activities with customers and relevant trade allies. Direct marketing to customers includes bill inserts, direct mail, the company Website, and various paid media sources such as newspaper and online advertising, billboards, and radio. Black Hills Energy also provides relevant trade allies with marketing materials, such as program brochures.

Many measures in the Residential Prescriptive Program are dependent on strong trade ally relationships. For example, water heaters are most commonly replaced only after the existing unit has failed, and thus are an immediate need purchase. Therefore, it is crucial that trade allies are aware of the saving opportunities offered by Black Hills Energy incentives. We provide dealer spiffs for such measures, which were structured to encourage trade allies to stock higher efficiency units and actively promote such units to customers.

Customers interested in having envelope measures installed are required to participate in an on-site evaluation through the Residential Evaluation Program. In addition, the on-site evaluator must have recommended early replacement of the customer's water heater. Upon receiving a recommendation for qualifying envelope measures or furnace or water heater replacement, customers are eligible to apply for the corresponding incentive by submitting documentation or proof-of-purchase of the completed work.

Target Market

Residential customers with gas space and/or water heating are eligible to participate in the Residential Prescriptive Program. Black Hills Energy will make a special effort to target rental units through the multifamily evaluation component of the Residential Evaluation Program, as well as customers living in older housing where insulation levels may need to be improved or

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[20] Customers must have natural gas water heating to be eligible for the clothes washer incentive.

[21] Customer must have natural gas heating as their primary heating source and received an on-site evaluation to be eligible for envelope measure incentives.

increased. Customer eligibility parameters for the Residential Prescriptive Program are presented in Table 15.

Table 15. R.2 Residential Prescriptive Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	All
Building Type	All
Building Vintage	All
Geography	Iowa territory

Trade Ally Targets

Black Hills Energy works with the following critical trade allies to deliver the Residential Prescriptive Program:

- HVAC dealers and contractors
- Insulation contractors
- Plumbers and mechanical contractors
- Appliance dealers
- Retail outlets

As discussed in the Program Delivery and Promotional Activities section above, trade allies are an essential element to program success. To support these trade allies and keep them informed of program opportunities and changes, Black Hills Energy offers periodic trade ally meetings, personal communications, and informal and formal training opportunities (e.g., Manual J training to ensure the quality installation of HVAC measures). In addition, Black Hill Energy is actively exploring developing a comprehensive trade ally program to further support these critical partners.

Eligible Measures and Incentives

Table 16 and Table 17 list each of the eligible measures and corresponding incentive levels.

Table 16. R.2 Residential Prescriptive Program Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.2 Residential Prescriptive				
Quality Install Furnace/Boiler	Quality installation of furnace and/or boiler	Standard install		$150
Furnace	96% AFUE or greater	Federal standard 78% AFUE	$600	
Furnace	94% to 95.9% AFUE	Federal standard 78% AFUE	$400	
Boiler	95% AFUE or greater	Federal standard 82% AFUE	$600	
Gas Fireplace	70% AFUE or greater, intermittent ignition, heat rated, thermostatic control with blower	60% AFUE	$250	
Duct Sealing	8 CFM/100 square feet of CFA	Existing 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	Standard boiler 82% AFUE and water heater EF = 0.59	$375	$175
Multizone Thermostat	Individual room temperature control for major occupied rooms	Programmable thermostat with central control only	$450	$60
Furnace/Boiler Maintenance	Furnace and/or boiler maintenance	Unmaintained furnace/boiler	$50	
Setback Thermostat	5-1-1, 5-2, or 7-day (customer installation)	Manual thermostat	Up to $20	
Setback Thermostat	5-1-1, 5-2, or 7-day (professional installation)	Manual thermostat	Up to $50	
Wi-Fi Programmable Thermostat	Wi-Fi programmable thermostat	Manual thermostat	$50	
Furnace Maintenance and Setback Thermostat	Furnace maintenance and setback thermostat (professional installation)	Unmaintained furnace; manual thermostat	$150	
Boiler Maintenance and Setback Thermostat	Boiler maintenance and setback thermostat (professional installation)	Unmaintained furnace; manual thermostat	$150	

Table 17. R.2 Residential Prescriptive Program Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
R.2 Residential Prescriptive (continued)				
Insulation (ceiling)	R-49	Average existing insulation (R-15.7)	70% up to $750	
Insulation (2x4 wall)	R-13	Average existing insulation (R-2.1)	70% up to $750	
Insulation (2x6 wall)	R-20 or R-13 w/ R-5 sheathing	Average existing insulation (R-2.1)	70% up to $750	
Insulation (basement wall)	R-15	Average existing insulation (R-2.1)	70% up to $750	
Insulation (foundation)	R-15	Average existing insulation (R-2.1)	70% up to $750	
Insulation (floor)	R-30*	Average existing insulation (R-1.8)	70% up to $750	
Insulation (rim and band joist)	R-10	No rim and band joist insulation	70% up to $750	
Infiltration Control	7.0 ACH 50	Existing infiltration (10.0 ACH 50)	70% up to $200	
Thermal Door	ENERGY STAR door (R-4.8 or U-0.20)	Standard code door (R-2.9)	$10	
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
Water Heater	Replacement before end of life (storage), minimum EF = 0.67	Standard water heater (federal standard)	$425	$10 or $60**
Clothes Washer	ENERGY STAR clothes washer	Standard clothes washer (federal standard)	$50	
Residential Prescriptive Bundle				
Rebate Bundle	10% bonus incentive on top of rebate package if minimum of three residential prescriptive measures are installed within the program year	N/A	10% of total incentives received	

* IA code is R-30 or insulation to fill the cavity (R-19 minimum).
** The amount of the dealer spiff depends on the efficiency level of the water heater installed.

As part of the QA/QC process, Black Hills Energy will require 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 an ENERGY STAR-qualified equipment.

Black Hills Energy offers financing for the full cost of qualifying heating systems at a competitive interest rate. Therefore, customers may choose to finance their qualifying heating system in lieu of receiving an incentive.

In addition, participants must have a blower door test to confirm the proper installation of infiltration measures prior to submitting the rebate application, and those customers receiving the duct sealing rebate must confirm proper sealing with a duct blaster test. Customers who participate in the Tier II comprehensive evaluation component of the Residential Evaluation Program could have already had these tests performed as part of the evaluation, and thus quality installation is already confirmed. Furthermore, to ensure quality installation compliance, the dealer spiff for those units will be contingent on receiving documentation showing proper installation practice and/or proof that the contractor completed a training course. Contractors submitting applications for quality installation spiffs must either use the Save software or be North American Technician Excellence (NATE) certified.

Participation

Projected participation for the five-year program cycle is approximately 61,000, as shown in Table 18.

Table 18. R.2 Residential Prescriptive Program 2014-2018 Participation Goals*

Program Year	Participation
2014	11,279
2015	11,705
2016	12,148
2017	12,605
2018	13,081
TOTAL	60,814

* Individual results may not sum to total due to rounding.

Energy and Peak Energy Savings

Table 19 provides the projected savings from the Residential Prescriptive Program. (Approximately 291,000 Dth).

Table 19. R.2 Residential Prescriptive Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	55,331	56,787	58,094	59,678	61,331	291,222
Annual Peak Energy Savings (Peak Dekatherms)	581	597	612	629	647	3,066

* Individual results may not sum to total due to rounding.

Outside Services

No outside services are required for implementing this program.

Budget

The total budget for the Residential Prescriptive Program is shown in Table 20. The budget projection assumes that approximately half of the trade allies will take advantage of spiffs during the five-year program cycle.

Table 20. R.2 Residential Prescriptive Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$26,400	$105,700	N/A	N/A	$2,078,900	$34,700	$132,100	$2,377,800
2015	$27,600	$110,200	N/A	N/A	$2,140,800	$63,700	$137,800	$2,480,100
2016	$28,700	$114,900	N/A	N/A	$2,205,300	$93,300	$143,700	$2,585,900
2017	$30,000	$119,900	N/A	N/A	$2,273,600	$123,700	$149,800	$2,697,000
2018	$31,200	$125,000	N/A	N/A	$2,345,000	$154,700	$156,200	$2,812,100

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. Black Hills Energy will assess the program impacts by using engineering estimates and data collected through program tacking efforts. We will determine baseline usage characteristics through surveying a sample of program participants. We will design this survey to collect information including, but not limited to:

- Age and efficiency of existing equipment (e.g., furnace, boiler, water heater)
- Efficiency, make, and model of new equipment
- Baseline conditions of the home
- Size and type of dwelling
- Number and age of occupants
- Usage characteristics (e.g., number and length of showers, use of hot water for laundry)

Black Hills Energy will validate the engineering estimates primarily through a pre- and post-billing analysis and on-site inspections of a sample of program participants. The analysis will

include a comparison of weather-normalized consumption before and after the installation of the new equipment. We will compare these energy-saving estimates to engineering estimates and adjust them, as necessary.

Process Evaluation. As part of the process evaluation, Black Hills Energy may conduct customer, trade ally, and retailer surveys. Participating customer surveys will be employed to assess topics such as whether the program is sufficiently addressing market barriers, how customers became aware of the program, and customer satisfaction. Trade ally surveys will be used to determine their level of interest and engagement in the program. In addition, we may also conduct retailer surveys to determine if they are providing sufficient stock of high-efficiency qualifying measures.

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 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. Due to the increased efficiency levels of current and expected codes and standards, Black Hills Energy has simplified the program to keep the portfolio cost-effective, while maintaining the framework of support for builders and encouraging the construction of high-efficiency new homes.

Program Delivery and Promotional Activities

This program has been very successful historically. Therefore, Black Hills Energy will continue to reach out to private sector trade allies to maintain these critical relationships, through phone, mail, e-mail, in-person visits, and a presence at industry meetings and events. Black Hills Energy emphasizes targeted, education-oriented marketing materials for customers that stimulate increased demand for energy-efficient new homes. For trade allies interested in participating, Black Hills Energy's outreach efforts also include training sessions and document preparation and submission assistance.

Builders are required to submit a proof of code compliance to be eligible for program participation. Based on Black Hills Energy's experience and the experience of other similar program sponsors, Black Hills Energy will convey that the inspections are viewed as partnership-building events rather than policing activities, and will give builders the opportunity to resolve any issues identified during the inspections.

Target Market

The program targets builders constructing new residential facilities that use natural gas for primary space heating within Black Hills Energy's Iowa service territory. While the majority of participating buildings are expected to be single family detached homes, duplex and triplex homes are also eligible (Table 21).

Table 21. R.3 Residential New Construction Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	All
Building Type	1-3 unit homes
Building Vintage	New
Geography	Iowa territory

Trade Ally Targets

Black Hills Energy works with the following critical trade allies:

- Home builders
- Real estate developers
- Real estate firms
- Home energy raters

Eligible Measures and Incentives

Qualifying homes must include the equipment specified in Table 22. In addition, builders may also apply for additional rebates under the Residential Prescriptive Program, such as high-efficiency clothes washers.

Table 22. R.3 Residential New Construction Program Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive
Quality Install Furnace	Quality installation of furnace	Standard installation	$1,000
Wall Insulation	Wall insulation R20+ R5	Code insulation (R-20)	
Doors	ENERGY STAR U-Factor = 0.2	Door U-Factor = 0.35	
Furnace	96% AFUE	Federal standard 78% AFUE	
Drain Water Heat Recovery	Power pipe system	No drain water heat recovery	
Water Heater	0.67 EF storage (ENERGY STAR)	Federal standard EF = 0.59	

Participation

Because Black Hills Energy has streamlined the Residential New Construction Program, all participation is through a prescriptive path (see Table 22 above). Table 23 presents the participation targets for the five-year program cycle.

Table 23. R.3 Residential New Construction Program 2014-2018 Participation Goals

Program Year	Participation
2014	450
2015	473
2016	495
2017	519
2018	543
TOTAL	2,480

Energy and Peak Energy Savings

Table 24 provides the projected savings from the Residential New Construction Program (Approximately 51,000 Dth).

Table 24. R.3 Residential New Construction Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	9,247	9,720	10,172	10,665	11,158	50,961
Annual Peak Energy Savings (Peak Dekatherms)	101	106	111	117	122	557

* Individual results may not sum to total due to rounding.

Outside Services

No outside services are required for implementing this program.

Budget

The budget for the Residential New Construction Program is shown in Table 25.

Table 25. R.3 Residential New Construction Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$5,600	$5,600	N/A	N/A	$450,000	N/A	$22,500	$483,800
2015	$5,600	$5,600	N/A	N/A	$473,000	N/A	$22,500	$506,800
2016	$5,900	$5,900	N/A	N/A	$495,000	N/A	$23,700	$530,500
2017	$6,200	$6,200	N/A	N/A	$518,700	N/A	$24,800	$555,800
2018	$6,800	$6,800	N/A	N/A	$543,400	N/A	$27,200	$584,200

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. Black Hills Energy will track the number of participating homes and perform on-site verifications for approximately 20% of projects. Based on the prescriptive specifications, we will estimate the per-participant consumption and savings. We may perform some short-term monitoring and/or billing analysis for a sample of participating homes to validate the savings estimates.

Process Evaluation. The primary focus of the process evaluation will be to determine market changes attributable to the program. For example, through participating customer and builder surveys, Black Hills Energy will assess program elements such as changes in the recognition and value of owning an energy-efficient home, the demand for energy-efficient new construction, the effectiveness of the rebates to promote participation, and the success of efforts working with trade allies.

6. Nonresidential Programs

Introduction

This chapter describes Black Hills Energy's proposed portfolio of nonresidential energy-efficiency programs. These programs are available to all customers subject to energy-efficiency program cost recovery through *Rider No. 3, Energy Efficiency Cost Recovery Gas Rates*. The tables below provide an overview of the nonresidential sector programs, budget, FTE, energy savings, and cost-effectiveness results.

Table 26. Nonresidential Sector Programs

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

Table 27. Nonresidential Sector Budgets*

Program	2014	2015	2016	2017	2018	TOTAL
NR.1 Nonresidential Evaluation Program	$96,700	$101,500	$106,600	$111,900	$117,500	$534,300
NR.2 Nonresidential Prescriptive Program	$785,900	$826,000	$874,800	$919,200	$965,800	$4,371,700
NR.3 Nonresidential Custom Program	$52,200	$54,800	$57,600	$60,900	$64,000	$289,500
NR.4 Nonresidential New Construction Program	$216,900	$217,100	$217,400	$217,600	$217,900	$1,086,800

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Table 28. Nonresidential Sector FTE

	FTE
Program Admin	0.63
Marketing	0.17
TOTAL	0.80

Table 29. Nonresidential Sector Energy Savings

Program	2014	2015	2016	2017	2018	TOTAL
Nonresidential Sector Savings (Dekatherms)	30,759	31,778	33,062	32,809	33,912	162,321
Nonresidential Sector Peak Savings (Peak Dekatherms)	317	327	339	336	347	1,666

* Individual results may not sum to total due to rounding.

Table 30. Nonresidential Sector Cost-Effectiveness*

Test	Benefits (NPV)	Costs (NPV)	Net Benefits	B/C Ratio
Utility Cost Test	$9,861,945	$5,271,274	$4,590,672	1.87
Participant Cost Test	$13,539,692	$7,849,758	$5,689,934	1.72
Ratepayer Impact Test	$9,861,945	$15,215,353	-$5,353,407	0.65
Societal Cost Test	$16,862,729	$9,927,843	$6,934,887	1.70

* Individual results may not sum to total due to rounding.

The remaining sections provide details on each nonresidential program, including a description of services, delivery and promotion activities, key trade allies, eligible measures and incentives, participation targets, energy and peak savings, outside services (when appropriate), and an evaluation overview.

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 about ways they can reduce their energy consumption, highlighting Black Hills Energy savings opportunities.

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.

Small Commercial Evaluation

The small commercial evaluation promotes energy-efficiency to small business customers (those with a facility equal to or less than 25,000 square feet), with on-site analysis conducted by an energy professional who identifies energy-efficiency opportunities and makes recommendations for systems such as, but not limited to, the following:

- Space heating controls and operating characteristics
- Water heating
- Thermal envelope
- Commercial cooking

Large Commercial Evaluation

The large commercial evaluation will include exactly the same services as the small commercial evaluation, but promotes energy-efficiency to large business customers (those with a facility larger than 25,000 square feet).

Industrial Sector Outreach

To help increase awareness and provide training and education for industrial customers, Black Hills Energy offers on-site evaluation of industrial facilities, which is conducted in partnership with the DOE Advanced Manufacturing Office (AMO).

The DOE AMO offers two main areas of support for industrial energy-efficiency programs:

1. **Industrial Assessment Center**: The Iowa State University center offers free site assessments for small- to medium-sized manufacturing facilities[22] and works with utilities to identify and educate customers.

2. **Training**: The DOE AMO provides best practices training sessions on *Steam Systems* and *Process Heating*. Training options include online classes through AMO's Learning Management System or hands-on training. Black Hills Energy will collaborate with other Iowa IOUs to co-sponsor relevant workshops, where appropriate.

Black Hills Energy has not included program-specific costs or savings for the industrial sector, as the specifics are yet to be determined. However, the cross-program training, marketing, and administration budget includes funding for the training and educational campaigns outlined in this Plan.

Program Delivery and Promotional Activities

The Nonresidential Evaluation Program is delivered through local energy professionals. Customers contact Black Hills Energy to schedule an evaluation, and are charged a nominal $50 fee for a small commercial evaluation and $500 for a large commercial evaluation. As part of the evaluation, customers may receive free low-cost measures.

Black Hills Energy promotes the commercial evaluation program components through bill inserts and targeted marketing to specific segments of the commercial customer base. For example, marketing and outreach may include presentations to relevant trade associations or publications. The program will also be promoted through the Black Hills Energy Website, bill inserts, and other media outlets as appropriate.

Black Hills Energy promotes the industrial sector program component to industrial customers through similar pathways as the commercial evaluations, and through materials and efforts that were discussed in the Industrial Sector Outreach component description above.

Target Market

Customers with facilities fewer than or equal to 25,000 square feet will be eligible to receive the small commercial evaluation, while customers with facilities over 25,000 square feet will be eligible for the large commercial evaluation. All Black Hills Energy's customers with industrial facilities are eligible for the industrial sector outreach program component. Black Hills Energy specifically targets commercial customers for the program with more intensive natural gas consumption, such as restaurants. Table 31 shows program customer eligibility parameters.

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[22] These manufacturing facilities have sales less than $100 million and energy costs between $100,000 and $2.5 million.

Table 31. NR.1 Nonresidential Evaluation Program Customer Eligibility Parameters

Customer Class	Nonresidential general service and interruptible gas rate
Customer Status	All
Building Type	Commercial; industrial
Building Vintage	Existing
Geography	Iowa territory

Trade Ally Targets

The program will be delivered by selected energy professionals. Additional trade allies include installation contractors, such as for HVAC and insulation. These trade allies promote the program as part of their general promotion of Black Hills Energy's savings opportunities.

Eligible Measures and Incentives

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

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

Participation

Table 32 presents the commercial evaluation participation targets for the five-year program cycle.

Table 32. NR.1 Nonresidential Evaluation Program 2014-2018 Participation Goals*

Program Year	Participation
2014	160
2015	168
2016	176
2017	185
2018	194
TOTAL	884

* This table does not include participation goals for the industrial-sector outreach program component. Individual results may not sum to total due to rounding.

Energy and Peak Energy Savings

Table 33 provides the projected savings.

Table 33. NR.1 Nonresidential Evaluation Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	320	336	353	371	389	1,770
Annual Peak Energy Savings (Peak Dekatherms)	3	3	4	4	4	18

* Individual results may not sum to total due to rounding.

Outside Services

For the commercial evaluation components, Black Hills Energy contracts with eligible energy professionals to provide customers with on-site evaluation services, including direct installation of free measures, diagnostic testing, and reporting. Black Hills intends to engage trade allies to perform the evaluations through a third-party subcontracting process.

For industrial sector outreach, Black Hills Energy works with the DOE and Iowa State University.

Budget

Black Hills Energy will cover the entire cost of all direct install measures. Customers who participate in the small commercial evaluation are required to pay a $50 co-pay, and customers who participate in the large commercial evaluation are required to pay a $500 co-pay.

The total budget for the program is shown in Table 34.

Table 34. NR.1 Nonresidential Evaluation Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$10,600	$16,300	N/A	$65,000	N/A	N/A	$4,900	$96,700
2015	$11,100	$17,100	N/A	$68,300	N/A	N/A	$5,100	$101,500
2016	$11,600	$17,900	N/A	$71,700	N/A	N/A	$5,400	$106,600
2017	$12,200	$18,800	N/A	$75,200	N/A	N/A	$5,600	$111,900
2018	$12,800	$19,800	N/A	$79,000	N/A	N/A	$5,900	$117,500

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. For the program impact evaluation, Black Hills Energy will consider savings achieved through the installation of low-cost measures provided during the evaluation, and from the adoption of behavioral changes made in response to evaluation recommendations.

Process Evaluation. For the process evaluation, Black Hills Energy will focus on the program's effectiveness in achieving participation goals, customers' satisfaction with the evaluation process and recommendations, and the program's effectiveness at encouraging customer awareness and adoption of energy-efficient solutions for their businesses.

The primary data collection activities include:

- Surveys of program participants
- Interviews with program stakeholders and trade allies

NR.2 Nonresidential Prescriptive Program

Program Description

The Nonresidential Prescriptive Program is primarily focused on the small business sector, and Black Hills Energy provides incentives to customers who purchase eligible equipment and to dealers who sell eligible equipment. The eligible equipment includes, but is not limited to, high-efficiency commercial cooking equipment, furnaces and boilers, water heaters, setback thermostats, spa covers, and envelope measures such doors, wall and ceiling insulation, and infiltration.

Program Delivery and Promotional Activities

Black Hills Energy promotes the program through bill inserts and through the commercial evaluation program components of the Nonresidential Evaluation Program. Relevant trade allies also promote the program.

Target Market

The target market for this program is the equipment change-out market: that is, nonresidential customers whose equipment has stopped working and needs to be replaced and/or dealers of high-efficiency equipment. The target market includes nonresidential customers who are replacing units in existing buildings and those who are purchasing the equipment for the first time. In addition, a number of the measures will be targeted to restaurants, including high-efficiency broilers; convection, conveyor, rotisserie, and rotating rack ovens; steam cookers; and fryers.

Table 35. NR.2 Nonresidential Prescriptive Program Customer Eligibility Parameters

Customer Class	Nonresidential general service and interruptible gas rate
Customer Status	All
Building Type	Commercial; industrial
Building Vintage	All
Geography	Iowa territory

Trade Ally Targets

Black Hills Energy works with critical trade allies, including:

- HVAC equipment distributors, dealers, and service providers
- Plumbing and mechanical contractors
- Boiler and water heater distributors and dealers
- Commercial kitchen equipment suppliers
- Insulation installers

Eligible Measures and Incentives

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 will require all space heating equipment to bear the 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. Dealer spiffs are also being offered for commercial kitchen equipment.[23] Table 35 and Table 36 list each of the eligible measures and corresponding incentive levels.

[23] Commercial kitchen equipment dealer spiffs are offered at 10% of the customer incentive, up to $50.

Table 36. NR.2 Nonresidential Prescriptive Program Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
Nonresidential Prescriptive				
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 37. NR.2 Nonresidential Prescriptive Program Measure Summary (continued)

Measure Name	Measure Description	Base Equipment	Proposed Incentive	Dealer Spiff
Nonresidential Prescriptive (continued)				
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

Projected participation for the five-year program cycle is approximately 4,500, as shown in Table 38.

Table 38. NR. 2 Nonresidential Prescriptive Program 2014-2018 Participation Goals

Program Year	Participation
2014	784
2015	839
2016	903
2017	966
2018	1,031
TOTAL	4,522

Energy and Peak Energy Savings

Projected program savings are approximately 125,000 DTh over the course of the five program years (Table 39).

Table 39. NR.2 Nonresidential Prescriptive Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	Total
Annual Energy Savings (Dekatherms)	14,012	14,719	15,674	15,077	15,818	75,301
Annual Peak Energy Savings (Peak Dekatherms)	142	149	157	150	158	755

* Individual results may not sum to total due to rounding.

Outside Services

No outside services are required for implementing this program.

Budget

The program's budget is shown below in Table 40.

Table 40. NR.2 Nonresidential Prescriptive Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$41,400	$41,400	N/A	N/A	$658,600	$3,200	$41,400	$785,900
2015	$43,500	$43,500	N/A	N/A	$689,700	$5,900	$43,500	$826,000
2016	$46,000	$46,000	N/A	N/A	$727,700	$9,000	$46,000	$874,800
2017	$48,400	$48,400	N/A	N/A	$761,900	$12,100	$48,400	$919,200
2018	$50,800	$50,800	N/A	N/A	$797,900	$15,400	$50,800	$965,800

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. Black Hills Energy will assess program impacts using engineering estimates and data collected through program tracking efforts. Baseline usage characteristics will be determined through surveying a sample of program participants. Black Hills Energy will design the program participant survey and on-site measurement and verification to collect the following information:

- Age and efficiency of existing equipment
- Size, type, and operating characteristics of participating facilities
- Attitudes and awareness of efficiency options and behaviors
- Other information impacting participants' energy-use characteristics

Validation of engineering estimates will primarily be accomplished through pre- and post-billing analyses of a sample of program participants. Pre- and post-consumption may be normalized for weather and/or business activity, as appropriate, to allow for comparison. Black Hills Energy will compare these estimates with engineering estimates, and will adjust engineering estimates as necessary.

Process Evaluation. Black Hills Energy will assess the following areas during the process evaluation to support continuous improvement in program implementation:

- Appropriateness of the prescribed incentive levels in encouraging the adoption of high-efficiency technologies
- Efficacy of program implementation procedures and practices

- Trade ally interest and participation in the program, including the success of dealer spiffs
- Success of trade ally training requirements

Primary data collection activities include:

- Surveys of program participants
- Interviews with program stakeholders and trade allies

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. 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 Delivery and Promotional Activities

The program is promoted through Black Hills Energy's existing account management relationships with customers and various trade allies, including engineers and equipment providers. First, potential participants submit an application for consideration. Next, Black Hills Energy evaluates the project based on the same cost-effectiveness criteria used for program analysis. Black Hills Energy then approves or does not approve a project. Then, once the customer provides documentation of project completion, they receive an incentive, which either ensures a two-year payback or covers one-half of the measure's incremental cost, whichever is less, up to $3000.

Target Market

This program's target market is large nonresidential customers. Table 41 presents the program's customer eligibility parameters.

Table 41. NR.3 Nonresidential Custom Program Customer Eligibility Parameters

Customer Class	Nonresidential general service or interruptible gas rate
Customer Status	All
Building Type	Commercial; industrial
Building Vintage	All
Geography	Iowa territory

Trade Ally Targets

Black Hills Energy works with trade allies including, but not limited to, the following:

- Engineering firms qualified to specify custom-efficiency improvements
- Companies specifying, installing, and maintaining control systems

Eligible Measures and Incentives

Because Black Hills Energy conducts individual analysis of each project, any technology for which a customer can demonstrate cost-effective natural gas savings may be considered for eligibility. However, Black Hills Energy expects most program activity to include applications of the following technologies:

- Boiler and furnace retro-commissioning
- Large boilers (> 300 kBtuh)
- 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

Projected participation for the five-year program cycle is 66, as shown in Table 42.

Table 42. NR.3 Nonresidential Custom Program 2014-2018 Participation Goals*

Program Year	Participation
2014	12
2015	13
2016	13
2017	14
2018	15
TOTAL	66

* Individual results may not sum to total due to rounding.

Energy and Peak Energy Savings

Table 43 provides the projected savings.

Table 43. NR.3 Nonresidential Custom Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	5,928	6,224	6,536	6,862	7,206	32,756
Annual Peak Energy Savings (Peak Dekatherms)	62	65	68	72	75	343

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy contracts with Applied Energy Group to provide custom services for nonresidential customers.

Budget

The budget for the Nonresidential Custom Program is shown in Table 44.

Table 44. NR.3 Nonresidential Custom Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$3,600	$2,300	$8,100	N/A	$36,000	N/A	$2,300	$52,200
2015	$3,800	$2,400	$8,500	N/A	$37,800	N/A	$2,400	$54,800
2016	$4,000	$2,500	$8,900	N/A	$39,700	N/A	$2,500	$57,600
2017	$4,200	$2,600	$9,400	N/A	$41,700	N/A	$3,100	$60,900
2018	$4,400	$2,700	$9,800	N/A	$43,800	N/A	$3,300	$64,000

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. Black Hills Energy will assess program impacts using the analysis and engineering estimates developed for specific projects that consider both baseline usage characteristics and the adoption of efficiency measures. Data analysis will include:

- Validation of engineering estimates, which is accomplished primarily through pre-and post-billing analysis of a sample of program participants.
- Short-term metering, which may be conducted based on specific project characteristics or application. Pre- and post-consumption data may be normalized for weather and/or business activity, as appropriate, to allow for comparison with the engineering estimates, and Black Hills Energy will adjust the engineering estimates as necessary.

Process Evaluation. Black Hills Energy will assess the following areas during the process evaluation to support continuous improvement in program implementation:

- Trade ally interest and participation in the program
- Participant satisfaction with the program, trade ally interaction, and equipment performance
- Necessity and effectiveness of technical assistance provided through the program
- Diversity within the participant population (i.e., across various segments of the commercial and industrial customer base)

The primary data collection activities will include:

- Surveys of program participants
- Interviews with program stakeholders and trade allies

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 builder incentives.

Program Delivery and Promotional Activities

Black Hills Energy employs a third-party service provider to assist customers throughout the design and construction process. This program is promoted through account managers to the nonresidential building market, such as architecture and engineering firms, builders, and contractors.

Target Market

The program covers both new construction and major retrofits within the commercial sector, as well as larger multifamily housing and light industrial buildings. Table 45 presents customer eligibility parameters.

Table 45. NR.4 Nonresidential New Construction Program Customer Eligibility Parameters

Customer Class	Nonresidential general service or interruptible gas rate
Customer Status	All
Building Type	Commercial; industrial; multifamily
Building Vintage	New
Geography	Iowa territory

Trade Ally Targets

Black Hills Energy works with critical trade allies, including:

- Architect and engineering firms
- Developers
- Construction firms/building contractors
- Design-to-build contractors

- Mechanical contractors
- Equipment contractors, such as for HVAC and insulation

Eligible Measures and Incentives

Energy-efficiency measures analyzed within this program include building shell/envelope and heating systems. Financial incentives provided through the following three complementary categories are capped at $20,000 for the customer and ranging from $1,000 to $8,500 per project in contractor spiffs:

1. **Energy Design Assistance (EDA)**: Free consulting to help customers identify the optimal mix of cost-effective, energy-efficiency strategies. Provided by third-party consultants using building performance simulation modeling, the analysis includes energy savings, incremental costs, estimated incentives, and paybacks related to design decisions. Black Hills Energy verifies each project's savings following occupancy.

2. **Design Team Incentive**: Based on the project track of the building, this incentive is intended to offset expenses incurred by participating in the EDA process. Black Hills Energy provides the design team incentive following submittal and review of construction documents.

3. **Construction Incentives**: Based on a sliding scale, Black Hills Energy provides this incentive to building owners for implementing strategies resulting in energy savings of at least 15% above the State of Iowa Energy Code. Black Hills Energy provides the construction incentive, and verifies savings following occupancy. The incentive amount will range from $0.60/therm to $1.90/therm for savings ranging from 15% to 60% above baseline.

Participation

Projected participation for the five-year program cycle is 40, as shown in Table 46.

Table 46. NR.4 Nonresidential New Construction Program 2014-2018 Participation Goals

Program Year	Participation
2014	8
2015	8
2016	8
2017	8
2018	8
TOTAL	40

Energy and Peak Energy Savings

Table 47 provides the projected program savings.

Table 47. NR.4 Nonresidential New Construction Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	10,499	10,499	10,499	10,499	10,499	52,493
Annual Peak Energy Savings (Peak Dekatherms)	110	110	110	110	110	550

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy currently contracts with The Weidt Group to provide nonresidential customers with new construction and major renovation services.

Budget

The total budget for the Nonresidential New Construction Program is shown in Table 48.

Table 48. NR.4 Nonresidential New Construction Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$10,000	$10,000	$26,900	N/A	$160,000	N/A	$10,000	$216,900
2015	$10,300	$10,000	$26,900	N/A	$160,000	N/A	$10,000	$217,100
2016	$10,500	$10,000	$26,900	N/A	$160,000	N/A	$10,000	$217,400
2017	$10,800	$10,000	$26,900	N/A	$160,000	N/A	$10,000	$217,600
2018	$11,000	$10,000	$26,900	N/A	$160,000	N/A	$10,000	$217,900

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Impact Evaluation. Black Hills Energy will track the projects to assess the number of participants utilizing various measures to meet targeted performance standards. These data will be gathered from customers and builders along with information on baseline building practices.

Based on savings estimates measured through this program, Black Hills Energy will conduct an engineering review of per-participant consumption and savings estimates. Since the incentives are based on savings estimates, a high level of information will be available for this evaluation effort.

Process Evaluation. Black Hills Energy will assess market changes attributable to the program, such as an increased market share of low energy use buildings and growing recognition and demand for energy-efficient new construction. This will be the primary focus of the process evaluation. Other assessment areas will include:

- The effectiveness of the incentives and other program features in encouraging energy-efficient construction
- The success of efforts working with trade allies
- Potential process enhancements

Primary data collection activities include:

- Surveys of program participants
- Interviews with program stakeholders and trade allies

7. Low-Income Programs

Introduction

This chapter describes Black Hills Energy's proposed portfolio of low-income energy-efficiency programs. The tables below provide an overview of the low-income sector programs, budget, FTE, energy savings, and cost-effectiveness.

Table 49. Low-Income Sector Programs

Low-Income Programs
LI.1 Low-Income Weatherization Program
LI.2 Low-Income Energy Education Program
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program
LI.4 Low-Income Affordable Housing Program
LI.5 Weatherization Team

Table 50. Low-Income Sector Budget*

Program	2014	2015	2016	2017	2018	TOTAL
LI.1 Low-Income Weatherization Program	$598,100	$614,400	$630,600	$641,800	$658,100	$3,142,900
LI.2 Low-Income Energy Education Program	$23,500	$23,500	$23,600	$23,600	$23,600	$117,800
LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program	$14,700	$14,800	$26,900	$27,000	$27,100	$110,500
LI.4 Low-Income Affordable Housing Program	$3,600	$3,600	$3,600	$3,600	$3,700	$18,200
LI.5 Weatherization Team	$15,700	$15,700	$15,800	$15,800	$15,900	$78,900
LI.6 GIAC	$22,000	$22,000	$22,000	$22,000	$22,000	$110,000

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Table 51. Low-Income Sector FTE

	FTE
Program Admin	0.37
Marketing	-
TOTAL	0.37

Table 52. Low-Income Sector Energy Goals

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Low-Income Sector Savings (Dekatherms)	4,217	4,262	4,309	4,339	4,384	21,514
Low-Income Sector Peak Savings (Peak Dekatherms)	47	48	48	48	49	236

* Individual results may not sum to total due to rounding.

Table 53. Low-Income Sector Cost-Effectiveness Results

	Benefits (NPV)	Costs (NPV)	Net Benefits	B/C Ratio
Utility Cost Test	$1,300,390	$3,011,261	-$1,710,870	0.43
Participant Cost Test	$3,860,471	$2,831,316	$1,029,155	1.36
Ratepayer Impact Test	$1,300,390	$4,325,680	-$3,025,290	0.30
Societal Cost Test	$2,210,181	$3,548,500	-$1,338,320	0.62

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

In addition to these programs, Black Hills Energy offers a Low-Income Affordable Housing Program, as well as funding and participation in the Low-Income Weatherization Team.

The remaining sections provide details on each low-income program, including a description of services, delivery and promotion activities, eligible measures and incentives, participation targets, energy and peak savings, outside service (when appropriate), and evaluation overview.

LI.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 throughout Black Hills Energy's service area.

Program Delivery and Promotional Activities

Black Hills Energy coordinates with the IUA, Iowa Department of Human Rights, and the CAAs to deliver and promote the Low-Income Weatherization Program to its low-income customers. In addition, Black Hills Energy markets the availability of weatherization funding on the company Website.

Target Market

The Low-Income Weatherization Program targets a broad range of low-income customers throughout Black Hills Energy's service territory. Table 54 presents the program's customer eligibility parameters.

Table 54. LI.1 Low-Income Weatherization Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	Low-income
Building Type	Single family; multifamily
Building Vintage	Existing
Geography	Iowa territory

Information about eligibility can be obtained from the Iowa Department of Human Rights Website (http://www.state.ia.us/government/dhr/).

Eligible Measures and Incentives

Table 55 lists the measures and incentive for the Low-Income Weatherization Program.

Table 55. LI.1 Low-Income Weatherization Program Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive
LI.1 Weatherization	Infiltration, insulation, equipment, direct install	Existing condition	Cost of project

Participation

Projected participation for the five-year program cycle is approximately 600, as shown in Table 56.

Table 56. LI.1 Low-Income Weatherization Program 2014-2018 Participation Goals

Program Year	Participation
2014	110
2015	113
2016	116
2017	118
2018	121
TOTAL	578

Energy and Peak Energy Savings

Table 57 provides the projected program savings.

Table 57. LI.1 Low-Income Weatherization Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	1,650	1,695	1,740	1,770	1,815	8,670
Annual Peak Energy Savings (Peak Dekatherms)	18	19	19	19	20	95

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy works closely with the Iowa Department of Human Rights, which organizes the federal and utility-sponsored funding for the Low-Income Weatherization Program and distributes allocated funding to the appropriate CAAs. The CAAs deliver the weatherization improvements on behalf of Black Hills Energy.

Budget

The budget for the Low-Income Weatherization Program is shown in Table 58.

Table 58. LI.1 Low-Income Weatherization Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$34,400	N/A	N/A	$550,000	N/A	N/A	$13,800	$598,100
2015	$35,200	N/A	N/A	$565,000	N/A	N/A	$14,100	$614,400
2016	$36,100	N/A	N/A	$580,000	N/A	N/A	$14,500	$630,600
2017	$37,000	N/A	N/A	$590,000	N/A	N/A	$14,800	$641,800
2018	$37,900	N/A	N/A	$605,000	N/A	N/A	$15,100	$658,100

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for the Low-Income Weatherization Program will follow the same protocol implemented in previous years. That is, the IUA contracts with a third-party evaluator (historically this has been Dalhoff Associates, LLC) to estimate savings via billing analysis.

LI.2 Low-Income Energy Education Program

Program Description

Working through the CAAs, Black Hills Energy provides energy education materials and free low-cost measures to customers who qualify for energy assistance. The energy education materials focus on actions customers can take to manage their energy costs and reduce their energy burdens.

Program Delivery and Promotional Activities

Black Hills Energy coordinates with the IUA, Iowa Department of Human Rights, and local CAAs to deliver and promote the Low-Income Energy Education Program. In addition, Black Hills Energy includes information about the program on the company Website.

Target Market

The Low-Income Energy Education Program targets all Black Hills Energy customers who qualify for energy assistance. Table 59 lists the customer eligibility parameters.

Table 59. LI.2 Low-Income Energy Education Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	Low-income
Building Type	Single family; multifamily
Building Vintage	All
Geography	Iowa territory

Eligible Measures and Incentives

The CAAs provide free low-cost measures to customers to help them reduce their household energy burden. These measures include, but are not limited to, the following:

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

Participation

Projected participation for the five-year program cycle is 15,000, as shown in Table 60.

Table 60. LI.2 Low-Income Energy Education Program 2014-2018 Participation Goals

Program Year	Participation
2014	3,000
2015	3,000
2016	3,000
2017	3,000
2018	3,000
TOTAL	15,000

Energy and Peak Energy Savings

Table 61 provides the projected savings.

Table 61. LI.2 Low-Income Energy Education Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	969	969	969	969	969	4,845
Annual Peak Energy Savings (Peak Dekatherms)	11	11	11	11	11	53

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy partners with the Iowa Department of Human Rights and the CAAs to provide valuable energy-efficiency education materials and free low-cost measures to customers who qualify for federal low-income assistance.

Budget

The budget for the Low-Income Energy Education Program is shown in Table 62.

Table 62. LI.2 Low-Income Energy Education Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$1,800	N/A	N/A	$20,400	N/A	N/A	$1,300	$23,500
2015	$1,800	N/A	N/A	$20,400	N/A	N/A	$1,300	$23,500
2016	$1,900	N/A	N/A	$20,400	N/A	N/A	$1,300	$23,600
2017	$1,900	N/A	N/A	$20,400	N/A	N/A	$1,300	$23,600
2018	$2,000	N/A	N/A	$20,400	N/A	N/A	$1,300	$23,600

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for these programs will follow the same protocol implemented in previous years. Namely, program savings are estimated based on deemed savings values and installation rates garnered through surveys.

LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program

Program Description

Black Hills Energy provides low-cost measures and enhanced incentives to owners and developers of affordable multifamily housing.

Program Delivery and Promotional Activities

Black Hills Energy, in coordination with the IUA, will work directly with The Energy Group to deliver and promote the Low-Income Multifamily Efficiency Improvement Initiative Program.

Target Market

The Low-Income Multifamily Efficiency Improvement Initiative Program targets owners and developers of low-income, multifamily properties. Table 63 presents the customer eligibility parameters for the program.

Table 63. LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program Customer Eligibility Parameters

Customer Class	Residential/general service gas rate
Customer Status	Low-income
Building Type	Multifamily
Building Vintage	Existing
Geography	Iowa territory

Eligible Measures and Incentives

Through the Low-Income Multifamily Efficiency Improvement Initiative Program, 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 incents up to five times the annual savings estimate. 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

Projected participation for the five-year program cycle is 8, as shown in Table 64.

Table 64. LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program 2014-2018 Participation Goals

Program Year	Participation
2014	1
2015	1
2016	2
2017	2
2018	2
TOTAL	8

Energy and Peak Energy Savings

Table 65 provides the projected savings.

Table 65. LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	2	2	4	4	4	18
Annual Peak Energy Savings (Peak Dekatherms)	0.02	0.02	0.05	0.05	0.05	0.2

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy and the IUA will contract directly with The Energy Group to deliver the Low-Income Multifamily Efficiency Improvement Initiative Program services.

Budget

The budget for the Low-Income Multifamily Efficiency Improvement Initiative Program is shown in Table 66.

Table 66. LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$2,600	N/A	N/A	$11,400	N/A	N/A	$800	$14,700
2015	$2,600	N/A	N/A	$11,400	N/A	N/A	$800	$14,800
2016	$2,700	N/A	N/A	$22,700	N/A	N/A	$1,500	$26,900
2017	$2,800	N/A	N/A	$22,700	N/A	N/A	$1,500	$27,000
2018	$2,800	N/A	N/A	$22,700	N/A	N/A	$1,500	$27,100

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for these programs will follow the same protocol implemented in previous years. Savings will be based on implementer data of baseline conditions and measures installed.

LI.4 Low-Income Affordable Housing Program

Program Description

Through the Low-Income Affordable Housing Program, Black Hills Energy offers enhanced incentives for residential homes built by non-profit organizations, such as Habitat for Humanity, Community Housing Initiatives, and Community Action Corporations.

Program Delivery and Promotional Activities

Black Hills Energy partners with non-profit organizations to deliver and promote this program. In addition, the program is listed on the company Website.

Target Market

The Low-Income Affordable Housing Program targets developers of low-income housing. Table 67 presents the customer eligibility program parameters.

Table 67. LI.4 Low-Income Affordable Housing Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	Low-income
Building Type	Single family; multifamily
Building Vintage	New
Geography	Iowa territory

Eligible Measures and Incentives

Black Hills Energy provides $1,100 per new home that meets the requirements of the Low-Income Affordable Housing Program. In addition to meeting these requirements, an ENERGY STAR clothes washer and natural gas dryer must also be installed. Black Hills Energy also makes efforts to coordinate this program with the Trees Forever Program by encouraging program participants to identify opportunities for trees to be planted at new construction sites.

Table 68 presents measures and incentive values available through this program.

Table 68. LI.4 Low-Income Affordable Housing Program Measure Summary

Measure Name	Measure Description	Base Equipment	Proposed Incentive
LI.4 Affordable Housing (New Construction)	Infiltration, insulation, equipment	Code-level construction	$1,100

Participation

Projected participation for the five-year program cycle is 15, as shown in Table 69.

Table 69. LI.4 Low-Income Affordable Housing Program 2014-2018 Participation Goals

Program Year	Participation
2014	3
2015	3
2016	3
2017	3
2018	3
TOTAL	15

Energy and Peak Energy Savings

Table 70 provides the projected program savings.

Table 70. LI.4 Low-Income Affordable Housing Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	37	37	37	37	37	186
Annual Peak Energy Savings (Peak Dekatherms)	0.4	0.4	0.4	0.4	0.4	2

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy partners with non-profit organizations such as Habitat for Humanity, Community Housing Initiatives, and Community Action Corporations to aid qualifying families in receiving affordable, energy-efficient homes.

Budget

The budget for the Low-Income Affordable Housing Program is shown in Table 71.

Table 71. LI.4 Low-Income Affordable Housing Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$200	N/A	N/A	N/A	$3,300	N/A	$100	$3,600
2015	$200	N/A	N/A	N/A	$3,300	N/A	$100	$3,600
2016	$200	N/A	N/A	N/A	$3,300	N/A	$100	$3,600
2017	$200	N/A	N/A	N/A	$3,300	N/A	$100	$3,600
2018	$200	N/A	N/A	N/A	$3,300	N/A	$100	$3,700

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for this program will be similar to those performed for the Residential New Construction Program.

Impact Evaluation. Black Hills Energy will track the number of participating homes. Based on the prescriptive specifications, we will estimate the per-participant consumption and savings. We may perform some short-term monitoring and/or billing analysis for a sample of participating homes to validate the savings estimates.

Process Evaluation. The primary focus of the process evaluation will be to determine market changes attributable to the program. The focus will be on those non-profit organizations and their awareness and perceived value in the program.

LI.5 Low-Income Weatherization Team

Program Description

Black Hills Energy's Weatherization Team coordinates volunteers from Black Hills Energy staff, the Iowa Utilities Board staff, and the community to weatherize low-income homes in Iowa communities. Black Hills Energy provides a free energy evaluation of each home, and identifies needed weatherization and/or health and safety improvements prior to volunteer work efforts.

Program Delivery and Promotional Activities

Black Hills Energy coordinates with other utilities, agencies, and organizations to deliver and promote this program.

Target Market

The Weatherization Team targets a broad range of customers including low-income, income limited, elderly, and disabled. Table 72 presents the customer eligibility program parameters.

Table 72. LI.5 Weatherization Team Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	Low-income; income limited; elderly; disabled
Building Type	Residential; multifamily
Building Vintage	Existing
Geography	Iowa territory

Eligible Measures and Incentives

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

Projected participation for the five-year program cycle is 550, as shown in Table 73.

Table 73. LI.5 Weatherization Team 2014-2018 Participation Goals

Program Year	Participation
2014	110
2015	110
2016	110
2017	110
2018	110
TOTAL	550

Energy and Peak Energy Savings

Table 74 provides the projected savings.

Table 74. LI.5 Weatherization Team Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	779	779	779	779	779	3,895
Annual Peak Energy Savings (Peak Dekatherms)	9	9	9	9	9	43

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy partners with the Iowa Utilities Board and the community to perform weatherization improvements for low-income customers across the service area.

Budget

The budget for the Weatherization Team is shown in Table 75.

Table 75. LI.5 Weatherization Team 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	Evaluation	Annual Budget Total
2014	$2,400	N/A	N/A	$12,700	N/A	N/A	$600	$15,700
2015	$2,400	N/A	N/A	$12,700	N/A	N/A	$600	$15,700
2016	$2,500	N/A	N/A	$12,700	N/A	N/A	$600	$15,800
2017	$2,600	N/A	N/A	$12,700	N/A	N/A	$600	$15,800
2018	$2,600	N/A	N/A	$12,700	N/A	N/A	$600	$15,900

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for the Weatherization Team will follow the same protocol implemented in previous years, where savings are estimated based on measures installed.

LI.6 Low-Income Green Iowa AmeriCorps

Program Description

Green Iowa AmeriCorps (GIAC)'s mission is the help Iowans become more energy efficient through residential weatherization, energy education, and community outreach services.[24] 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 will provide support for GIAC staff to perform home evaluations and weatherize homes at no cost to the renter or homeowner.

Program Delivery and Promotional Activities

Black Hills Energy will provide GIAC funding to deliver the weatherization and energy evaluation services.

Target Market

Table 72 presents the customer eligibility program parameters.

Table 76. LI.6 GIAC Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	Low-income; income limited; elderly; veterans, disabled
Building Type	Residential; multifamily
Building Vintage	Existing
Geography	Iowa territory

Eligible Measures and Incentives

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

- Air infiltration improvements, including caulking, and weatherstripping
- Hot water pipe insulation
- Low-flow aerators

[24] http://www.greeniowaamericorps.org/

- Water heater thermostat setback

Participation

Projected participation for the five-year program cycle is 550, as shown in Table 73.

Table 77. LI.6 GIAC 2014-2018 Participation Goals

Program Year	Participation
2014	300
2015	300
2016	300
2017	300
2018	300
TOTAL	1,500

Energy and Peak Energy Savings

Table 74 provides the projected savings.

Table 78. LI.6 GIAC Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	780	780	780	780	780	3,900
Annual Peak Energy Savings (Peak Dekatherms)	9	9	9	9	9	43

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy partners with GIAC to perform evaluations services and weatherization improvements for qualified customers across the service area.

Budget

The budget for GIAC is shown in Table 75.

Table 79. LI.6 GIAC 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	Evaluation	Annual Budget Total
2014	$1,000	N/A	N/A	$20,000	N/A	N/A	$1,000	$22,000
2015	$1,000	N/A	N/A	$20,000	N/A	N/A	$1,000	$22,000
2016	$1,000	N/A	N/A	$20,000	N/A	N/A	$1,000	$22,000
2017	$1,000	N/A	N/A	$20,000	N/A	N/A	$1,000	$22,000
2018	$1,000	N/A	N/A	$20,000	N/A	N/A	$1,000	$22,000

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Evaluation activities for GIAC will follow a similar protocol implemented for the Weatherization Team program, where savings are estimated based on measures installed.

8. Public Purpose Programs

Introduction

This chapter describes Black Hills Energy's proposed portfolio of public purpose energy-efficiency programs. The tables below provide an overview of the public purpose sector programs, budget, FTE, energy savings, and cost-effectiveness results, as appropriate.[25]

Table 80. Public Purpose Sector Programs

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

Table 81. Public Purpose Sector Budget*

Program	2014	2015	2016	2017	2018	TOTAL
PP.1 School-Based Energy Education Program	$81,300	$82,900	$84,600	$86,300	$88,000	$423,000
PP.2 Tree Planting Programs	$141,500	$145,000	$148,600	$152,300	$156,100	$743,500
PP.3 IEC & CGRER	$225,500	$231,100	$236,900	$242,800	$248,900	$1,185,300

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Table 82. Public Purpose Sector FTE

	FTE
Program Admin	0.04
Marketing	-
TOTAL	0.04

[25] Funding-only programs are exempt from cost-effectiveness testing; therefore, the IEC, CGRER, and the tree planting programs are not included in these results.

Table 83. Public Purpose Sector Energy Savings*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Public Purpose Sector Savings (Dekatherms)	3,856	3,940	4,025	4,112	4,201	20,134
Public Purpose Sector Peak Savings (Peak Dekatherms)	42	43	44	45	46	220

* Individual results may not sum to total due to rounding.

Table 84. Public Purpose Sector Cost-Effectiveness Results*

	Benefits (NPV)	Costs (NPV)	Net Benefits	B/C Ratio
Utility Cost Test	$691,369	$356,354	$335,015	1.94
Participant Cost Test	$1,013,356	$330,765	$682,591	3.06
Ratepayer Impact Test	$691,369	$1,063,392	-$372,022	0.65
Societal Cost Test	$949,171	$392,108	$557,062	2.42

* These results represent the cost-effectiveness of the School-Based Energy Education Program. Individual results may not sum to total due to rounding.

The remaining sections provide details on each public purpose sector program including a description of services, delivery and promotion activities, eligible measures and incentives, participation targets, energy and peak savings, outside service (when appropriate), and evaluation overview.

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.

Program Delivery and Promotional Activities

Black Hills Energy promotes the program to school districts and teachers through education associations and other methods, as appropriate.

Target Market

The program targets middle school-aged children (in the fifth through eighth grades) and their households. Table 85 presents the program's customer eligibility parameters.

Table 85. PP.1 School-Based Energy Education Program Customer Eligibility Parameters

Customer Class	Residential gas rate
Customer Status	All
Building Type	Single family; multifamily
Building Vintage	All
Geography	Iowa territory

Eligible Measures and Incentives

LivingWise kits are provided through the program that include a set of low-cost measures to help the energy conservation ideas and concepts resonate with participating students.[26] These measures provide hands-on experience for students to evaluate the impacts of energy-efficiency implementation. For example, a flow meter accompanies the low-flow showerhead, permitting students to quantify their household's use of water before and after installation. Such comparisons provide students with a concrete example of how their actions save energy and help the environment.

[26] The monetary value of the kit and educational materials is approximately $45 per student.

The following measures are provided in the kits distributed to participating students:

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

Participation

Projected participation for the five-year program cycle is nearly 9,000, as shown Table 86.

Table 86. PP.1 School-Based Energy Education Program 2014-2018 Participation Goals

Program Year	Participation
2014	1,700
2015	1,734
2016	1,769
2017	1,804
2018	1,840
TOTAL	8,847

Energy and Peak Energy Savings

Table 87 provides the projected program savings.

Table 87. PP.1 School-Based Energy Education Program Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	TOTAL
Annual Energy Savings (Dekatherms)	3,655	3,728	3,803	3,879	3,956	19,021
Annual Peak Energy Savings (Peak Dekatherms)	40	41	42	42	43	208

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy currently contracts Research Action Programs to deliver the School-Based Energy Education Program. Delivery includes outreach and distribution of the curriculum materials and kit measures.

Budget

The budget for the School-Based Energy Education Program is shown in Table 88.

Table 88. PP.1 School-Based Energy Education Program 2014-2018 Budget*

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	$4,800	N/A	N/A	$76,500	N/A	N/A	N/A	$81,300
2015	$4,900	N/A	N/A	$78,000	N/A	N/A	N/A	$82,900
2016	$5,000	N/A	N/A	$79,600	N/A	N/A	N/A	$84,600
2017	$5,100	N/A	N/A	$81,200	N/A	N/A	N/A	$86,300
2018	$5,200	N/A	N/A	$82,800	N/A	N/A	N/A	$88,000

* Individual results may not sum to total due to rounding. All budgets are rounded to the nearest hundredth. Full details for all program budgets are provided in Appendix G: Detailed Cost-Effectiveness Results.

Program Evaluation

Black Hills Energy designed this program to allow continuous process and impact evaluation through various data collection activities, which students are asked to complete. Students provide information on their household's baseline energy consumption characteristics and adoption of energy-saving behaviors as a result of the energy education. The students' reported installation of measures provides the basis for determining program impacts. The evaluation will include a desk review of the student surveys to make sure they are being used correctly to calculate program impacts. In addition, interviews with educators will be conducted to assess the effectiveness of curriculum materials and the program's fit with other classroom activities.

PP.2 Tree Planting Programs

Program Description

Black Hills Energy provides annual funding for two tree planting programs: 1) Trees Forever and 2) 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 non-profit 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 handled hand-in-hand.

Both programs will distribute energy efficiency informational materials to participants.

Participation

Projected participation (i.e., number of trees planted) for the five-year program cycle is approximately 5,000, as shown in Table 89.

Table 89. PP.2 Tree Planting Programs' 2014-2018 Participation Goals*

Program Year	Participation
2014	950
2015	998
2016	1,047
2017	1,100
2018	1,155
TOTAL	5,249

* Individual results may not sum to total due to rounding.

Energy and Peak Energy Savings

Planting trees provides wind break, which reduces heating requirements. Table 90 lists the projected savings from the Trees Forever and Trees for Kids/Teens programs.

Table 90. PP.2 Tree Planting Programs' Energy Goals*

Type of Savings	2014	2015	2016	2017	2018	Total
Annual Energy Savings (Dekatherms)	201	211	222	233	245	1,113
Annual Peak Energy Savings (Peak Dekatherms)	2	2	2	3	3	12

* Individual results may not sum to total due to rounding.

Outside Services

Black Hills Energy and the non-profit organization, Trees Forever, partner to promote the benefits of tree planting in Iowa communities. Black Hills Energy also works with the Iowa Department of Natural Resources to sponsor Trees for Kids/Teens to teach the importance of planting trees through hands-on landscaping projects at schools.

Budget

The budget for the tree planting programs is shown in Table 91.

Table 91. PP.2 Tree Planting Programs' 2014-2018 Budget

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	N/A	N/A	$141,500	N/A	N/A	N/A	N/A	$141,500
2015	N/A	N/A	$145,000	N/A	N/A	N/A	N/A	$145,000
2016	N/A	N/A	$148,600	N/A	N/A	N/A	N/A	$148,600
2017	N/A	N/A	$152,300	N/A	N/A	N/A	N/A	$152,300
2018	N/A	N/A	$156,100	N/A	N/A	N/A	N/A	$156,100

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

Program Description

The IEC supports various projects that help Iowans throughout the state. The IEC helps homeowners understand how to make their homes more comfortable and energy efficient. To improve the state's competitiveness in the energy conservation market, the IEC invests in initiatives that help Iowa's larger industries and businesses run efficiently to improve productivity and profitability. Working with small businesses, the IEC helps Iowa communities strengthen their local economies and make their environments healthier. Overall, the IEC seeks opportunities to improve the way the state uses energy, lending great value to its businesses and communities.

The CGRER at the University of Iowa is involved in research that is vital to helping Iowa adapt to the increasing need for environmental responsibility. Projects at the CGRER examine the ways global environmental changes affect regional resources. By helping the CGRER maintain its state-of-the-art facilities, Black Hills Energy contributes to Iowa's ability to strategically plan ways to mitigate the long-term costs of environmental change.

Budget

As part of its energy-efficiency portfolio, Black Hills Energy provides funding to the IEC and the CGRER. Funding is allocated for these groups as shown in Table 92.

Table 92. PP.3 Iowa Energy Center and Center for Global & Regional Environmental Research Programs 2014-2018 Budget

Program Year	Administration	Marketing & Training	Program Delivery	Evaluation Delivery	Customer Incentives	Dealer Incentives	EM&V	Annual Budget Total
2014	N/A	N/A	$225,500	N/A	N/A	N/A	N/A	$225,500
2015	N/A	N/A	$231,100	N/A	N/A	N/A	N/A	$231,100
2016	N/A	N/A	$236,900	N/A	N/A	N/A	N/A	$236,900
2017	N/A	N/A	$242,800	N/A	N/A	N/A	N/A	$242,800
2018	N/A	N/A	$248,900	N/A	N/A	N/A	N/A	$248,900

9. Energy-Efficiency Cost Recovery

This chapter outlines the rate impacts associated with the 2014–2018 Energy-Efficiency Plan across the residential and nonresidential customer sectors.

The annual cost to Black Hills Energy for the proposed energy-efficiency programs during this five-year (2014–2018) budget timeframe averages $6.6 million. Table 93 shows the budget breakout for each sector.

Table 93. Average Annual Budget for Energy-Efficiency Programs, 2014-2018

Sector	2014-2018
Residential	$3,822,838
Nonresidential	$1,256,459
Low Income/Public Purpose	$1,186,013
General Administration	$458,456
Total	$6,723,767

To allocate the total program budgets to each sector, we first determined the relative ratio of residential and nonresidential spending. We then allocated both public purpose and general program administration budget to the residential and nonresidential sectors by this associated respective ratio. Finally, we allocated 95% of nonresidential expenditures to the general service class and 5% to the non-general service class. The recovery of these costs through the existing Energy Efficiency Cost Recovery (EECR) factor is shown in Table 94 and Table 95 below.

Table 94. Total Change Relative to Current EECR Contemporaneous Recovery Factor

Average Rate Impact (per therm)	Residential	Commercial & Industrial General Service	Commercial & Industrial Non-General Service
2014-2018 Average EECR Factor	$0.0496	$0.0302	$0.0077
Current EECR Factor	$0.0539	$0.0174	$0.0249
Total Increase Relative to Current Rates	-$0.0043	$0.0127	-$0.0173
Average Annual Consumption Per Customer (therms)	755	3,415	58,560
Average Annual Bill Impact	-$3	$44	-$1,011
Current Customer Charge	$18.2500	$29.0000	$144.3989
Current Volumetric Charge	$0.1164	$0.1164	$0.0347
Average Gas Price Forecast, 2009-2013	$0.6466	$0.6403	$0.6140
Average Annual Bill, no DSM	$795	$2,932	$39,721
Average Annual Bill, including EECR change impact	$792	$2,975	$38,710
Percent Increase	-0.4%	1.5%	-2.5%

Table 95. Total EECR Factor

Average Rate Impact (per therm)	Residential	Commercial & Industrial General Service	Commercial & Industrial Non-General Service
2014-2018 Average EECR Factor	$0.0494	$0.0302	$0.0076
Average Annual Consumption Per Customer (therms)	755	3,415	58,560
Average Annual Bill Impact	$37	$103	$449
Current Customer Charge	$18.2500	$29.0000	$144.3989
Current Volumetric Charge	$0.1164	$0.1164	$0.0347
Average Gas Price Forecast, 2009-2013	$0.6466	$0.6403	$0.6140
Average Annual Bill, no DSM	$795	$2,932	$39,721
Average Annual Bill, including annual EECR amount	$833	$3,035	$40,169
Percent Increase	4.7%	3.5%	1.1%

Using 2012 normalized sales of 102 million therms, the residential customer EECR factor is estimated to decline from its current level of $0.0539 to $0.0496 per therm. The impact of this EECR factor change on average residential customer bills would be a decrease of -$3 per year, or -0.4%. The total impact of the budgeted EECR factor on average residential customer bills is $37 per year, or 4.7% of annual costs.

Normalized sales in the general service, nonresidential class were 52 million therms in 2012. The EECR factor in this class is estimated to rise from its current level of $0.0174 to $0.0302 per therm. The impact of this EECR factor change on average nonresidential general service customer bills would be an increase of $43 per year, or 1.5%. The total impact of the budgeted EECR factor on average bills in this class would be $103 per year, or 3.5% of annual costs.

The non-general service, non-transport EECR factor is estimated to decrease from $0.0249 to $0.0077 per therm. The impact of this EECR factor change on average non-general service commercial customer bills would be a decrease of $1,011 per year, or -2.5%. The total impact of the budgeted EECR factor on their average bills is $449 per year (1.1%).

10. Conclusion/Request for Plan Approval

The proposed energy-efficiency programs presented in this Plan meet the societal cost-effective requirements of the Board. Black Hills Energy therefore requests approval from the Board to implement and recover program costs and revenue losses from the following programs:

- R.1 Residential Evaluation Program
- R.2 Residential Prescriptive Program
- R.3 Residential New Construction Program
- NR.1 Nonresidential Evaluation Program
- NR.2 Nonresidential Prescriptive Program
- NR.3 Nonresidential Custom Program
- NR.4 Nonresidential New Construction Program
- LI.1 Low-Income Weatherization Program
- LI.2 Low-Income Energy Education Program
- LI.3 Low-Income Multifamily Efficiency Improvement Initiative Program
- LI.4 Low-Income Affordable Housing Program
- LI.5 Weatherization Team
- LI.6 GIAC
- PP.1 School-Based Energy Education Program
- PP. 2 Tree Planting Programs

Further, Black Hills Energy requests approval to continue funding the IEC and CGRER, even though this program is not expected to produce direct energy savings. Although the energy savings and value of this program defies easy quantification, Black Hills Energy maintains that the benefit is worthwhile for Iowa, as these research centers provide significant informational and educational benefits to Black Hills Energy's customers and residents of Iowa.

Overall, the portfolio of programs presented in this Plan provides substantial value for Iowa customers in excess of the costs. The net present value of this portfolio for the five-year program cycle, as calculated using the SCT, is $~~65,118,781~~62,989,203. Compared to the net present value

of the programs' cost of $~~59,011,419~~58,991,045, the overall portfolio yields a societal benefit/cost ratio of 1.~~1~~07, which is above the threshold of 1.0.

11. Other Funding Initiatives

In addition to the proposed Plan, Black Hills Energy seeks approval for planning budgets associated with the 2019-2023 program cycle, which would include a joint utility statewide potential study, as well as additional budget to support the development of a technical reference manual for the State of Iowa.[27] Table 96 presents the associated budget for these tasks.

Table 96. Budget for Other Funding Initiatives

2014	2015	2016	2017	2018	Total
$25,000	$25,000	$10,000	$250,000	$90,000	$400,000

[27] This funding is not included in the cost-effectiveness results for the 2014-2018 program cycle.

12. List of Appendices

Appendix A: Volume 1 – Potentials Assessment

Appendix B: Volume 2 – Potentials Assessment: Appendices

Appendix C: Collaborative Presentations

Appendix D: Avoided Cost Methodology

Appendix E: Gas Forecasts

Appendix F: Rate Tariffs

Appendix G: Detailed Cost-Effectiveness Results

Appendix H: Cross-Reference to Board Rules