



**Black Hills Power, Inc. d/b/a Black Hills
Energy**

**Energy Efficiency Solutions Status Report
Program Year 2015**

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Executive Summary

Black Hills Power, Inc. d/b/a Black Hills Energy (“BHP” or the “Company”) is a South Dakota corporation regulated by the South Dakota Public Utilities Commission (the “Commission”) that provides electricity to approximately 70,000 customers in western South Dakota, northern Wyoming and southeastern Montana. BHP is wholly owned subsidiary Black Hills Corporation, which provides natural gas and electricity to more than 1.2 million customers throughout the Midwest region of the United States.

This report presents a status report of Program Year 2015 (“PY2015”), which ran from September 1, 2015 through August 31, 2016, for BHP’s Commission approved Energy Efficiency Solution Plan. BHP’s Energy Efficiency Solutions portfolio is composed of residential and non-residential programs (i.e. commercial and industrial). Each program has been designed to address the needs of various customer types. The programs include:

Residential

- Residential Lighting
- Appliance Recycling
- Residential High Efficiency HVAC
- Whole House Efficiency
- Residential Audits
- School-Based Education
- Weatherization

Commercial & Industrial (C&I)

- Prescriptive
- Custom

PORTFOLIO SUMMARY

Overall results for PY2015 shows that BHP spent approximately 103 percent of total budget and achieved 96 percent of the Company’s energy savings goal and 97 percent of the Company’s demand savings goal. Table ES1 presents projected budgets and actual expenditures by sector in PY2015. Any costs that can be directly assignable to a program are included within Residential and Non-Residential. The Goal’s presented in the tables below represent the goals that were originally approved in the plan and include four measures that were eliminated since they did not pass the cost-effectiveness test (TRC test).

The costs associated with Marketing/Training/General Administration were designed into the Residential and Commercial & Industrial Programs. For ease of administration, BHP established two work orders associated with Cross Marketing & Training and General Administration – these dollars are allocated back to the two categories (Residential and Commercial & Industrial Programs) when the Energy Efficiency Solutions Adjustment (EESA) is established.

TABLE ES1: PY2015 PORTFOLIO SUMMARY OF ACTUAL SPEND VS PROJECTED BUDGET BY SECTOR

Sector	PY2015 Goal	PY2015 Actual	% of Budget
Residential	\$246,642	\$157,187	64%
Commercial & Industrial	\$518,661	\$494,858	95%
Cross Marketing & Training	\$39,646	\$107,682	272%
General Administration	\$0	\$66,144	0%
Total	\$804,949	\$825,870	103%

Table ES2 provides detailed goal and actual expenditures for PY2015 by program.

TABLE ES2: PY2015 PORTFOLIO SUMMARY OF PROGRAM BUDGET VS ACTUAL EXPENDITURES BY PROGRAM

	PY2015 Budget	PY2015 Expenditures	% of Budget
Residential Programs			
Residential Lighting	\$31,635	\$29,786	94%
Residential Appliance Recycling	\$23,999	\$12,748	53%
Residential HVAC	\$57,661	\$21,292	37%
Whole House Efficiency	\$32,288	\$9,044	28%
Residential Audit	\$25,263	\$6,425	25%
School-Based Energy Education	\$66,150	\$69,731	105%
Weatherization	\$9,647	\$8,161	85%
C&I Programs			
Prescriptive	\$242,915	\$295,247	122%
Custom	\$275,746	\$199,611	72%
Cross Marketing & Training	\$39,646	\$107,682	272%
General Administration	\$0	\$66,144	0%
Total	\$804,949	\$825,870	103%

Tables ES3 presents PY2015 goal and actual energy savings by sector.

TABLE ES3: PY2015 ENERGY SAVINGS (KWH) BY SECTOR

	PY2015 Goal	PY2015 Actual	% of Goal
Residential Programs	1,115,044	1,084,419	97%
C&I Programs	4,683,170	4,480,341	96%
Total	5,798,214	5,564,760	96%

Table ES4 provides PY2015 goal and actual energy savings by program.

TABLE ES4: PY2015 ENERGY SAVINGS (kWh) BY PROGRAM

	PY2015 Goal	PY2015 Actual	% of Budget
Residential Programs			
Residential Lighting	152,004	103,730	68%
Residential Appliance Recycling	81,400	95,939	118%
Residential HVAC	193,824	169,565	87%
Whole House Efficiency	90,540	15,725	17%
Residential Audit	79,400	127,490	161%
School-Based Energy Education	476,397	539,920	113%
Weatherization	41,480	32,050	77%
C&I Programs			
Prescriptive	2,740,190	2,940,069	107%
Custom	1,942,980	1,540,273	79%
Total	5,798,214	5,564,760	96%

Table ES5 presents PY2015 goal and actual demand savings by sector.

TABLE ES5: PY2015 DEMAND SAVINGS (kW) BY SECTOR

	PY2015 Goal	PY2015 Actual	% of Goal
Residential Programs	181	132	73%
C&I Programs	1,066	1,073	101%
Total	1,247	1,206	97%

Table ES6 presents PY2015 goal and actual demand savings by program.

TABLE ES6: PY2015 DEMAND SAVINGS (kW) BY PROGRAM

	PY2015 Goal	PY2015 Actual	% of Budget
Residential Programs			
Residential Lighting	18	12	68%
Residential Appliance Recycling	9	11	117%
Residential HVAC	69	32	47%
Whole House Efficiency	23	4	17%
Residential Audit	8	13	168%
School-Based Energy Education	48	54	113%
Weatherization	6	5	85%
C&I Programs			
Prescriptive	584	700	120%
Custom	482	373	77%
Total	1,247	1,206	97%

Table ES7 provides the PY2015 sector-level and overall portfolio cost-effectiveness results. The common costs for Cross Marketing & Training and General Administration are factored in at the portfolio-level.

TABLE ES7: TOTAL PORTFOLIO COST-EFFECTIVENESS RESULTS

Sector	TRC	UCT	SCT	PCT	RIM
Residential Programs	1.52	1.96	1.88	11.09	0.29
C&I Programs	1.34	3.18	1.65	3.48	0.40
Portfolio	1.21	2.28	1.49	4.02	0.36

Residential Programs

BHP's residential energy efficiency solutions programs serve residential customers, encouraging investment in energy efficient measures such as lighting, water heating, heating and cooling equipment and whole house efficiency.

Residential Lighting

The program's primary objective is to secure energy savings by incentivizing the purchase of ENERGY STAR® qualified lighting and appliances.

- ENERGY STAR Lighting Fixtures and Advanced Power Strips
 - Mail-in rebates were available to residential customers for the purchase of ENERGY STAR® Lighting Fixtures and Advanced Power Strips. Rebates were mailed to the customer upon receipt and approval of the rebate application.
- Residential LED
 - BHP set up an Online Store for residential customers to purchase 3 types of LED bulbs (6 watt LED equivalent to a 40 watt incandescent, 11 watt LED equivalent to a 60 watt incandescent and 9.5 watt LED flood equivalent to a 65 watt incandescent PAR type) at a reduced price. Customers then picked up their bulbs at their local BHP's customer service office. Limitations were set on the number of bulbs that could be purchased at the reduced price of 50% in order to allow more customers to participate.

There were 1,403 bulbs sold to BHP customers through the Online Store. The Online Store sales started off slow, however the activity greatly increased after BHP found a better source and the discount was passed along to the customer. Customers like the BHP sponsored Online Store and there are two advantages: 1.) The quality of LED bulb is better than some of the deeply discounted LEDs offered at retail stores and 2.) BHP only offers the three main type of lights used in homes with only one color option – warm white (2,700k type) which simplifies the customer's decision.

- BHP worked with two local hardware stores where residential customers would receive a 33% discount (up to \$7.50/bulb) on the purchase of LED bulbs. This was set up on a trial basis in the month of August. Customers received the discounted price at the check-out register and BHP was sent the bill for the sponsored price.

There were 1,626 bulbs sold. The advantages of this option for distributing LEDs is that customers could purchase any type of LED bulb and there was no rebate form or invoice needed. A disadvantage is that the customers purchasing the LEDs were not necessarily BHP customers.

ENERGY STAR Refrigerators were removed from the program beginning in PY2015. However, there were some applications received at the beginning of PY2015 that were process and reflected in the table below.

Table 1 compares the program goals to actual program performance.

TABLE 1: RESIDENTIAL LIGHTING PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
LED	3,000	3,029	101%
ENERGY STAR LED Fixture	500	168	34%
Advanced Power Strip	10	0	0%
ENERGY STAR Refrigerators	0	31	0%
Expenditures	\$31,635	\$29,786	94%
Energy Impacts (kWh)	152,004	103,730	68%
Demand Impacts (kW)	17.9	12.2	68%

In PY2015, BHP achieved 101 percent of the participation goal for LEDs. BHP achieved 68 percent of the energy and demand savings goals on 94 percent of budgeted expenditures.

Table 2 presents cost-effectiveness analysis results, based on program activity. The program experienced higher than expected costs associated with setting up an Online Store. This cost will not be experienced in subsequent years so the administrative costs are coming down. BHP has also seen significant changes in the costs associated with LEDs. The TRC is expected to improve after the work that has been set up in the first year of offering the program.

TABLE 2: RESIDENTIAL LIGHTING PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	0.77
Utility Cost Test	1.17
Societal Cost Test	0.96
Participant Test	3.93
Ratepayer Impact Measure Test	0.26

Residential Appliance Recycling

The program's goal is to remove inefficient refrigerators and freezers from the electric system and dispose of them in an environmentally safe and responsible manner. Refrigerators/freezers must be between 10 and 30 cubic feet in size and in operating condition. Customers received a \$50 rebate per qualifying unit recycled, limited to two rebates per customer.

Table 3 compares the program goals to actual program performance.

TABLE 3: RESIDENTIAL REFRIGERATOR RECYCLING PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
Refrigerator Recycle	40	71	178%
Freezer Recycle	25	4	16%
Expenditures	\$23,999	\$12,748	53%
Energy Impacts (kWh)	81,400	95,939	118%
Demand Impacts (kW)	9.4	10.9	117%

In PY2015, BHP achieved 178 percent of the participation goal for refrigerator recycling and 16 percent for freezer recycling. Overall, BHP achieved 118 percent of the energy savings goals on 53 percent of budgeted expenditures. The Goal's shown in Table 3 represent the goals that were originally approved in the plan and included one measure (ENERGY STAR Refrigerators) which was eliminated since this measure did not pass the cost-effectiveness test. There continues to be an interest in recycling refrigerators and freezers.

Table 4 presents cost-effectiveness analysis results, based on program activity.

TABLE 4: RESIDENTIAL REFRIGERATOR RECYCLING PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.71
Utility Cost Test	2.14
Societal Cost Test	2.12
Participant Test	12.07
Ratepayer Impact Measure Test	0.29

Residential High Efficiency HVAC

The objective of the program is to encourage residential customers to purchase and install energy efficient HVAC equipment and water heaters. Customers were eligible to receive the following:

Measure	Rebate
Air Source Heat Pump (1-5 tons, SEER ≥15 & HSPF ≥8.5)	\$75 per ton
Early Replacement Air Source Heat Pump (1-5 tons, SEER ≥15 & HSPF ≥8.5)	\$200 per ton
Electric Furnace to Heat Pump Replacement (1-5 tons, SEER ≥15 & HSPF ≥8.5)	\$1,500 per system
Ductless Mini-Split HP/AC SEER ≥19	\$50 per ton
Heat Pump Water Heater (EF≥2.0)	\$5/tank gallon
Electric Storage Water Heater (EF ≥ 0.95)	\$1.75/tank gallon
Electric Storage Water Heater (EF<0.95)	\$1.25/tank gallon
Geothermal Heat Pump (1-5 tons, EER ≥21)	\$200 per ton
Early Replacement Geothermal Heat Pump (1-5 tons, EER ≥21)	\$300 per ton

The table below compares program goals to actual program performance.

TABLE 5: RESIDENTIAL HIGH EFFICIENCY HVAC PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
Air Source Heat Pump	50	13	26%
Air Source Heat Pump, Early Retirement	5	3	60%
Air Source Heat Pump, Replace Furnace	3	4	133%
Ductless Mini-Split HP	5	8	160%
Heat Pump Water Heater	12	4	33%
Electric Water Heater EF ≥ 0.95	10	52	520%
Electric Water Heater EF<0.95	10	11	110%
Geothermal Heat Pump	12	3	25%
Geothermal Heat Pump, Early Retirement	5	1	20%
Expenditures	\$57,661	\$21,292	37%
Energy Impacts (kWh)	193,824	169,565	87%
Demand Impacts (kW)	68.9	32.3	47%

In PY2015, BHP achieved about 87 percent of energy savings goal on only 37 percent of budgeted expenditures. Participation was highest among electric water heater measures, followed by HVAC. The Goal's shown in Table 5 represents the goals that were originally approved in the plan and included two measures (Central Air Conditioner and Ductless Mini-Split AC) which were eliminated since these measures did not pass the cost-effectiveness test. The number of air source heat pumps and geothermal heat pumps installed in homes are slowing down – this is primarily due to the competition of natural gas.

Table 6 presents cost-effectiveness analysis results, based on program activity.

TABLE 6: RESIDENTIAL HIGH EFFICIENCY HVAC PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.63
Utility Cost Test	3.73
Societal Cost Test	1.99
Participant Test	5.15
Ratepayer Impact Measure Test	0.32

Whole House Efficiency Program

The program encourages whole-house improvements to existing homes by offering comprehensive home energy audits. Customers will receive a home energy audit, air sealing, and low-cost, easy-to-install measures at \$50 per audit. The home energy audit will identify efficiency improvements and provide information on BHP energy efficiency programs.

Measures offered through the program will include:

- Air sealing
- Hot Water Pipe Insulation
- Water Heater Tank Wrap
- Residential Kit: LEDs, faucet aerator, low flow showerhead

Table 7 compares the program goals to actual program performance.

TABLE 7: WHOLE HOUSE EFFICIENCY AUDIT PROGRAM PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	100	17	17%
Expenditures	\$32,288	\$9,044	28%
Energy Impacts (kWh)	90,540	15,725	17%
Demand Impacts (kW)	23.0	4.0	17%

In PY2015, BHP achieved 17 percent of participation and energy savings of goals. About 28 percent of budget was spent.

Table 8 presents cost-effectiveness analysis results, based on program activity. The program experienced higher costs (\$532/home) compared to the amount (\$322.88/home) that was designed into the program. The program was designed to have lower program costs through a cost sharing arrangement with Montana-Dakota Utilities (MDU). This cost sharing program did not get underway until recently - the 3rd party contractor completed 12 audits in late August and September 2016 at a cost of \$213.26/home. BHP expects the cost-effectiveness to improve now with the lower program costs.

TABLE 8: WHOLE HOUSE EFFICIENCY PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	0.71
Utility Cost Test	0.71
Societal Cost Test	0.87
Participant Test	n/a
Ratepayer Impact Measure Test	0.24

Residential Audit Program

The objective of the program is to encourage energy education and conservation. The program will provide customers access to a free online tool to analyze their home's energy use and educational materials regarding energy efficiency and conservation. In addition, BHP will offer the option to receive a Residential Kit that contains easy to install measures (LEDs, outlet gaskets, faucet aerator and low flow showerhead) at no cost to the customer.

Table 9 compare the program goals to actual program performance.

TABLE 9: RESIDENTIAL EVALUATION PROGRAM PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	400	610	153%
Expenditures	\$25,263	\$6,425	25%
Energy Impacts (kWh)	79,400	127,490	161%
Demand Impacts (kW)	8.0	13.4	168%

In PY2015, BHP achieved 153 percent of the participation goal, 161 percent of the energy savings goal, and 168 percent of the demand savings goal. About 25 percent of budget was spent.

The online audit program was very successful. There were two items that contributed to the increased participation: 1.) The program was modified to include a free weatherization kit included with each online completed audit. Each kit includes 3 LED light bulbs, outlet gaskets, low flow shower head and low flow faucet aerator. 2.) Online audits were heavily promoted throughout the year. This effort included reach-out campaigns to BHP/BHCorp employees, home show events, community and civic groups. TV and radio advertising of online audits was also a big part of the program. BHP benefited by modifying previously developed ads that were run in other BHCorp areas with energy efficiency programs. Finally, social media advertising/promotion was started that seems to be making a difference.

Table 10 presents cost-effectiveness analysis results, based on program activity.

TABLE 10: RESIDENTIAL EVALUATION PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	6.60
Utility Cost Test	6.60
Societal Cost Test	8.19
Participant Test	n/a
Ratepayer Impact Measure Test	0.32

School-Based Energy Education Program

The program seeks long-term energy savings through enhanced education and awareness of energy efficiency among 5th grade students within BHP's service territory. Students will participate in a classroom lesson plan and receive a kit of low-cost energy savings measures at no cost. The kits will help ideas and concepts to resonate with participating students, providing hands-on methods for the students to understand energy and conservation.

Table 11 compares the program goals to actual program performance.

TABLE 11: SCHOOL-BASED EDUCATION PROGRAM PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	1,200	1,360	113%
Expenditures	\$66,150	\$69,731	105%
Energy Impacts (kWh)	476,397	539,920	113%
Demand Impacts (kW)	48.0	54.4	113%

The School-Based Energy Education Program continues to be very popular among schools within BHP's service territory. The PY2015 program participation was 113 percent of goal and expenditures were 105 percent of goal. The energy and demand savings were 113 percent of the goals.

BHP receives very complimentary comments from participating students, teachers and parents. The goals were increased due to the high interest in the program. The program offers student guides and workbooks, teacher's folders, and kits to educate participants on the wise use of energy.

Table 12 presents cost-effectiveness analysis results, based on program activity.

TABLE 12: SCHOOL-BASED EDUCATION PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.51
Utility Cost Test	1.51
Societal Cost Test	1.88
Participant Test	n/a
Ratepayer Impact Measure Test	0.28

Weatherization Program

The program's long-term goal is to deliver long-term energy savings and bill reductions to low-income customers. The program delivers weatherization measures to low income homeowners and renters, at no cost to the participant. Home efficiency is improved through the installation of energy saving measures, such as caulking, weather stripping, pipe insulation and receipt of Residential Kit containing easy to install measures.

Table 13 compares the program goals to actual program performance.

TABLE 13: WEATHERIZATION PROGRAM PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	25	25	100%
Expenditures	\$9,647	\$8,161	85%
Energy Impacts (kWh)	41,480	32,050	77%
Demand Impacts (kW)	5.9	5.0	85%

The program was successful in PY2015, spending most of the entire budget and achieving the participation goals. The program is offered to eligible low-income customers, therefore energy and demand savings associated with the program are secondary to the program goal of helping customers manage their energy use.

Table 14 presents cost-effectiveness analysis results, based on program activity.

TABLE 14: WEATHERIZATION PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.59
Utility Cost Test	1.59
Societal Cost Test	1.96
Participant Test	n/a
Ratepayer Impact Measure Test	0.28

Combined Residential Program Portfolio Cost-Effectiveness

Table 15 shows the cost-effectiveness of the residential programs.

TABLE 15: COMBINED RESIDENTIAL PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.52
Utility Cost Test	1.96
Societal Cost Test	1.88
Participant Test	11.09
Ratepayer Impact Measure Test	0.29

Commercial & Industrial Programs

BHP's Commercial & Industrial energy efficiency programs encourage the purchase and installation of energy efficient equipment by providing incentives to lower the cost of purchasing efficient equipment for commercial and industrial facilities.

Commercial Prescriptive Rebate Program

The program provides pre-qualified prescriptive rebates for new construction and retrofits. The rebated measures, including lighting, HVAC equipment, and motors are proven technologies that are readily available with known performance characteristics. The same customer can participate in more than one measure in the same year. A \$25,000 incentive cap is imposed per facility per program year. Multiple rebate applications for different measures may be submitted.

The table below compares the program goals to actual program performance.

TABLE 16: COMMERCIAL PRESCRIPTIVE PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
C&I Lighting	6,500	19,546	301%
C&I HVAC	24	0	0%
C&I Motors	10	2	20%
Expenditures	\$242,915	\$295,247	122%
Energy Impacts (kWh)	2,740,190	2,940,069	107%
Demand Impacts (kW)	583.6	700.2	120%

In PY2015, BHP spent approximately 122 percent of the budget and achieved 107 percent of the energy savings goal and 120 percent of the demand savings goal. A significant majority of the program impacts are attributed to lighting measures and the conversion of lighting to LEDs

Table 17 presents results from the cost-effectiveness analysis, based on program activity.

TABLE 17: COMMERCIAL PRESCRIPTIVE PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.10
Utility Cost Test	2.98
Societal Cost Test	1.36
Participant Test	2.87
Ratepayer Impact Measure Test	0.39

Commercial Custom Rebate Program

The program offers rebates to commercial and industrial customers that install equipment that does not qualify for a prescriptive rebate. Applications must be pre-approved by BHP before equipment is purchased and installed to ensure they produce a Benefit-Cost Test of 1.0 or higher and have an incremental payback greater than two years. Incentives will be the lesser of the following:

- A buy-down to a two year payback; or
- 50% of the incremental cost

The same customer can participate in more than one measure in the same year. A \$25,000 incentive cap is imposed per facility per program year. Multiple rebate applications for different measures may be submitted.

The table below compares the program goals to actual program performance.

TABLE 18: COMMERCIAL CUSTOM PROGRAM PY2015 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	45	47	104%
Expenditures	\$275,746	\$199,611	72%
Energy Impacts (kWh)	1,942,980	1,540,273	79%
Demand Impacts (kW)	482.0	373.1	77%

The program spent approximately 72 percent of the budget in PY2015. The program achieved 79 percent of the energy savings goal. LED lighting conversions was the main activity seen by this program. Additional projects included geothermal heat pump systems and variable speed drives.

Table 19 presents cost-effectiveness analysis results, based on program activity.

TABLE 19: COMMERCIAL CUSTOM PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.87
Utility Cost Test	3.48
Societal Cost Test	2.28
Participant Test	4.91
Ratepayer Impact Measure Test	0.40

Combined Commercial Program Portfolio Cost-Effectiveness

Table 20 shows the cost-effectiveness of the commercial programs.

TABLE 20: COMBINED COMMERCIAL PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2015
Total Resource Cost Test	1.34
Utility Cost Test	3.18
Societal Cost Test	1.65
Participant Test	3.48
Ratepayer Impact Measure Test	0.40

