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

Energy Efficiency Solutions Status Report Program Year 2017

Prepared by:
Applied Energy Group
211 Broad Street, Suite 206 · Red Bank, NJ 07701
Tel (732) 945-9941 · Fax (732) 945-9942
www.appliedenergygroup.com

Table of Contents

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, north-eastern Wyoming and southeastern Montana. BHP is a wholly owned subsidiary of 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 2017 ("PY2017"), which ran from September 1, 2017 through August 31, 2018, for BHP's Commission approved Energy Efficiency Solution Plan. BHP's Energy Efficiency Solutions portfolio is composed of residential and non-residential programs. 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
- School-Based Education

Commercial & Industrial (C&I)

- Prescriptive
- Custom

PORTFOLIO SUMMARY

Overall results for PY2017 show that BHP spent approximately 87 percent of the total budget and achieved 81 percent of the energy savings goal and 77 percent of the demand savings goal. Table ES1 presents projected budgets and actual expenditures by sector for PY2017. Any costs that can be directly assignable to a program are included within the Residential and Non-Residential programs. The goals presented in the tables below represent the goals that were originally approved in the plan. The difference between the actual savings attained and the budget spent is largely attributed to differences in program design of the Plan compared to actual measures installed.

Two programs were removed from the portfolio for PY2017, Residential Audit Program and the Weatherization Program, due to low program participation and low program goal achievement. Portfolio budget was reallocated into programs that better resonate with the Black Hills Power customers.

For ease of administration, BHP established two work orders associated with Cross Marketing & Training and General Administration – these dollars were allocated back to the two categories (Residential and Commercial & Industrial Programs) of the Energy Efficiency Solutions Adjustment (EESA) rate(s). The General Administration budget includes all administrative costs that were included in the original plan design for each measure. The Cross Marketing & Training budget comprised of all the marketing costs included in the original plan design for each measure plus additional Cross Marketing & Training costs for the entire Energy Efficiency Solutions plan.

Table ES1 provides an overall summary of PY2017 sector goals and actual sector expenditures.

TABLE ES1: PY2017 PORTFOLIO SUMMARY OF ACTUAL SPEND VS PROJECTED BUDGET BY SECTOR

Sector	PY2017 Goal	PY2017 Actual	% of Budget
Residential	$139,239	$100,372	72%
Commercial & Industrial	$536,903	$489,114	91%
Cross Marketing & Training	$116,514	$86,649	74%
General Administration	$57,841	$64,209	111%
Total	**$850,496**	**$740,345**	**87%**

Table ES2 provides PY2017 sector budgets and actual sector expenditures. The General Administration sector budget was over by 11%. A variety of factors attributed to this which include: oversight of the anticipated funding needs for the programs, unplanned expenses for additional outreach efforts and attendance at multiple events, and an increase in application analysis. There were a variety of applications that were analyzed but did not pass the incremental payback requirements of two years or greater or did not pass the societal benefit-to-cost ratio of one or higher. The rebate applications that did not pass still had funding used towards their analysis which contributed towards being over budget in the General Administration sector budget. The School-Based Energy Education budget was over by 14 percent due to an increase of additional kits by the Sturgis School District.

TABLE ES2: PY2017 PORTFOLIO SUMMARY OF PROGRAM BUDGET VS ACTUAL EXPENDITURES BY PROGRAM[1]

	PY2017 Budget	PY2017 Expenditures	% of Budget
Residential Programs			
Residential Lighting	$33,550	$7,645	23%
Residential Appliance Recycling	$13,104	$11,960	91%
Residential HVAC	$19,086	$3,540	19%
Whole House Efficiency	$10,350	$5,045	49%
School-Based Energy Education	$63,150	$72,182	114%
C&I Programs			
Prescriptive	$97,049	$76,345	79%
Custom	$439,854	$412,770	94%
Cross Marketing & Training	$116,514	$86,649	74%
General Administration	$57,841	$64,209	111%
Total	**$850,496**	**$740,345**	**87%**

Tables ES3 provides PY2017 sector energy saving goals and actual energy savings.

TABLE ES3: PY2017 ENERGY SAVINGS (KWH) BY SECTOR

	PY2017 Goal	PY2017 Actual	% of Goal
Residential Programs	879,538	628,145	71%
C&I Programs	4,220,505	3,526,951	84%
Total	**5,100,043**	**4,155,096**	**81%**

[1] Program expenditures include rebates to BHP customers and depending on the program, include only some funds spent for marketing and advertising. See Exhibit 3 for details on Community Outreach and Events.

Table ES4 provides PY2017 energy saving goals and actual energy savings by program.

TABLE ES4: PY2017 ENERGY SAVINGS (KWH) BY PROGRAM

	PY2017 Goal	PY2017 Actual	% of Goal
Residential Programs			
Residential Lighting	162,335	52,067	32%
Residential Appliance Recycling	105,515	95,941	91%
Residential HVAC	103,883	23,632	23%
Whole House Efficiency	31,406	19,408	62%
School-Based Energy Education	476,400	437,097	92%
C&I Programs			
Prescriptive	1,369,360	857,026	63%
Custom	2,851,145	2,669,925	94%
Total	**5,100,043**	**4,155,096**	**81%**

Table ES5 provides PY2017 demand saving goals and actual demand savings by sector.

TABLE ES5: PY2017 DEMAND SAVINGS (KW) BY SECTOR

	PY2017 Goal	PY2017 Actual	% of Goal
Residential Programs	96.7	63.5	66%
C&I Programs	1,038.4	814.9	78%
Total	**1,135.1**	**878.4**	**77%**

Table ES6 provides PY2017 demand saving goals and actual demand savings by program.

TABLE ES6: PY2017 DEMAND SAVINGS (KW) BY PROGRAM

	PY2017 Goal	PY2017 Actual	% of Goal
Residential Programs			
Residential Lighting	14.3	4.5	32%
Residential Appliance Recycling	12.0	10.9	91%
Residential HVAC	18.6	1.7	9%
Whole House Efficiency	3.8	2.3	60%
School-Based Energy Education	48.0	44.0	92%
C&I Programs			
Prescriptive	347.7	206.0	59%
Custom	690.7	608.9	88%
Total	**1,135.1**	**878.4**	**77%**

Table ES7 provides PY2017 sector cost-effectiveness and overall portfolio cost-effectiveness results.

TABLE ES7: TOTAL PORTFOLIO COST-EFFECTIVENESS RESULTS

Sector	TRC	UCT	SCT	PCT	RIM
Residential Programs	0.89	1.02	1.22	16.95	0.18
C&I Programs	1.21	2.17	1.61	5.09	0.27
Portfolio	**1.02**	**1.57**	**1.36**	**5.52**	**0.25**

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

Table 1 provides the Residential Lighting program participation goals compared to actual program participation.

TABLE 1: RESIDENTIAL LIGHTING PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
LED	4,000	1,819	45%
ENERGY STAR LED Fixture	500	542	108%
Expenditures	$33,550	$7,645	23%
Energy Impacts (kWh)	162,335	52,067	32%
Demand Impacts (kW)	14.3	4.5	32%

BHP achieved 32 percent of its energy and demand savings goals on 23 percent of budgeted expenditures. To increase participation in PY2018 there will be more promotion of the LED lightbulb and fixture programs through local hardware and retail stores, community events and bill inserts. A bill insert was sent to promote the appliance recycling program in July of 2017 and the response was overwhelming and the expectation is the same for the LED bill insert for PY2018.

Table 2 provides the Residential Lighting program cost-effectiveness analysis results, based on program activity.

TABLE 2: RESIDENTIAL LIGHTING PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	0.90
Utility Cost Test	1.55
Societal Cost Test	1.23
Participant Test	5.18
Ratepayer Impact Measure Test	0.19

Residential Lighting – Highlights and Challenges

LED Bulbs

The Residential Lighting program provides a rebate-after-receipt program for Energy Star rated LED bulbs purchased through any retail outlet, including big box chain stores. BHP customers receive a rebate, up to $5/bulb after turning in their receipts and BHP has verified their account status. A proof a purchase is required with the rebate application submission. There is a limit of 40 bulbs per customer.

The impact of the rebate-after-receipt option has been positive for BHP customers due to the flexibility of where bulbs can be purchased. Customers have additional options to replace other types of incandescent bulbs. BHP has included additional bill messaging to remind each customer that only "Energy Star" rated bulbs qualify for a rebate-after-receipt. By sponsoring "Energy Star" rated bulbs, BHP can assure better quality and longer life for each rebated LED bulb.

Energy Star LED Fixtures

BHP's customers have the option to turn in receipts and receive a rebate of up to $10/fixture for purchasing "Energy Star" LED fixtures. The activity associated with the "Energy Star" rated fixtures increased in PY2017 and BHP exceeded its participation goal by 8% for "Energy Star" fixtures. BHP expected the participation rate to increase in PY2017 from the previous year because customers are experiencing more fixture options and the costs of "Energy Star" fixtures are going down.

Residential Appliance Recycling

The Residential Appliance Recycling program goal is to remove inefficient refrigerators and freezers from the electric system and dispose of them in an environmentally safe and responsible manner. Recycled refrigerators and/or 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 over the life of the program. The two rebate cap is for each service location and BHP monitors this activity through our rebate processing software - VisionDSM.

Table 3 provides the Residential Refrigerator Recycling program goals compared to actual program performance.

TABLE 3: RESIDENTIAL REFRIGERATOR RECYCLING PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
Refrigerator Recycle	75	59	79%
Freezer Recycle	8	18	225%
Expenditures	$13,104	$11,960	91%
Energy Impacts (kWh)	105,515	95,941	91%
Demand Impacts (kW)	12.0	10.9	91%

In PY2017, BHP achieved 79 percent of the participation goal for refrigerator recycling and 225 percent for freezer recycling. Overall, BHP achieved 91 percent of its energy savings goals on 91 percent of budgeted expenditures.

Table 4 provides the Residential Refrigerator Recycling cost-effectiveness analysis results, based on program activity.

TABLE 4: RESIDENTIAL REFRIGERATOR RECYCLING PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	1.23
Utility Cost Test	1.59
Societal Cost Test	1.69
Participant Test	12.46
Ratepayer Impact Measure Test	0.19

Residential Appliance Recycling – Highlights and Challenges

In PY2017, there continued to be an interest in recycling refrigerators and freezers. Freezers out performed refrigerators when comparing to the planned goals. One challenge that BHP experienced in PY2017 was a delay between the time the contractor picked up the refrigerator and/or freezer from customers in the Black Hills area compared to customer expectations. Due to the costs associated with pickups, BHP controls the costs by having the contractor schedule the area trips when there are multiple refrigerators and/or freezers to be picked up in one area. This practice was implemented since the start of the program in 2011. BHP discusses the five to six week potential lead time in refrigerator and/or freezer pickups with each customer when scheduling occurs.

Residential High Efficiency HVAC

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

Measure	Rebate
Electric Furnace to Heat Pump Replacement (1-5 tons, SEER ≥15 & HSPF ≥8.5)	$1,500 per system
Central Air Conditioner ≥15, EER ≥12.5	$60 per ton

Table 5 provides Residential High Efficiency HVAC program goals compared to actual program performance.

TABLE 5: RESIDENTIAL HIGH EFFICIENCY HVAC PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
Heat Pump SEER ≥15 Replace Electric Furnace	6	2	33%
CAC SEER ≥15	50	3	6%
Expenditures	$19,086	$3,540	19%
Energy Impacts (kWh)	103,883	23,632	23%
Demand Impacts (kW)	18.6	1.7	9%

In PY2017, BHP achieved 23 percent of energy savings goal on 19 percent of budgeted expenditures. Central air conditioners (SEER 15 and above) were added as a measure option in PY2017. With of rise of competition with natural gas, cooling options to pair with natural gas heating systems is expected to

pick up. Participation was seen in two measures Heat Pump SEER ≥15 Replace Electric Furnace and CAC SEER ≥15. The percentage differences between expenditures and energy/demand impacts is primarily due to the portfolio mix of actual participation rate compared to the original goals.

Table 6 provides Residential High Efficiency HVAC cost-effectiveness analysis results, based on program activity.

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

Test	PY2017
Total Resource Cost Test	0.81
Utility Cost Test	2.15
Societal Cost Test	1.09
Participant Test	4.10
Ratepayer Impact Measure Test	0.20

Residential High Efficiency HVAC – Highlights and Challenges

There were a variety of challenges faced during PY2017 which results in lower participation than expected. Most of the HVAC equipment rebate applications that were submitted did not meet the energy efficiency parameters of the program. In addition, residential customers called inquiring about the HVAC rebate programs *after* the equipment was already installed. In all cases, the equipment installed was just below the program requirement. Providing training to the HVAC contractors about the details of the rebate program parameters will allow contractors to better educate their customers on the rebates that are available in the Black Hills area.

Previously, the majority of the outreach and education for this particular program came from the Electro-Technology Expo, which had over 300 attendees, and various home show events throughout BHP's service territory. For PY2018, one-on-one training will be given to the HVAC contractors in an effort to increase program participation.

Whole House Efficiency Program

The Whole House Efficiency program encourages whole house improvements to existing homes, by offering comprehensive home energy audits. Customers received a whole house energy audit, air sealing, and other low-cost, easy-to-install measures at a cost of $50 per audit. The whole house energy audit identified efficiency improvements and provided the customer with information on other 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 provides the Whole House Efficiency Audit program goals compared to actual program performance.

TABLE 7: WHOLE HOUSE EFFICIENCY AUDIT PROGRAM PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	30	20	67%
Expenditures	$10,350	$5,045	49%
Energy Impacts (kWh)	31,406	19,408	62%
Demand Impacts (kW)	3.8	2.3	60%

In PY2017, BHP achieved 67 percent of its participation goal, 62 percent of its energy savings of goals and 60 percent of its demand savings goal, while 49 percent of the budget was spent.

Table 8 provides the Whole House Efficiency program cost-effectiveness analysis results, based on program activity. The program was designed to have lower program costs through a cost sharing arrangement with Montana-Dakota Utilities ("MDU"). A third-party contractor completed 20 where the cost was split between BHP and MDU for electric and gas homes. Zero audits were performed on propane heated and total electric homes due to not having access to an available contractor to complete the audits. For PY2018 a contractor is now in place to complete home energy audits for propane heated and total electric homes.

TABLE 8: WHOLE HOUSE EFFICIENCY PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	1.01
Utility Cost Test	1.01
Societal Cost Test	1.37
Participant Test	n/a
Ratepayer Impact Measure Test	0.18

Whole House Efficiency Program – Highlights and Challenges

The biggest challenge with this segment of the rebate program is access to contractors who are able to take on the number of customers who are requesting audits. The program would have exceeded goal but due to time constraints from the contractor, the remaining audits were moved into PY2018. Currently, BHP is working on obtaining an additional contractor to complete the audits in order to keep up with the demand.

In PY2017, the Whole House Efficiency program experienced lower than anticipated participation. However, the Company has received feedback from participating customers which has been positive. The reports provide the customer with valuable information to correct problems that would improve their home efficiency. Our auditors also took the time to promote other programs such as LED lighting. This program is also promoted at area home shows and other community events.

School-Based Energy Education Program

The School-Based Energy Education program seeks long-term energy savings through enhanced education and awareness of energy efficiency among fifth grade students within BHP's service territory. Students participated in a classroom lesson plan and each student received a kit of low-cost energy savings measures at no cost. The kits are designed to help each student understand energy efficiency ideas and concepts, provide each student with hands-on methods related to energy and conservation. The kit included: high efficiency showerhead, kitchen faucet aerator, filter tone alarm, a CFL light bulb, a

night light, a measuring tape, a refrigerator digital temperature and other items associated with the student's homework assignment.

Table 11 provides the School-Based Education program goals compared to actual program performance.

TABLE 11: SCHOOL-BASED EDUCATION PROGRAM PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	1,200	1,101	92%
Expenditures	$63,150	$72,182	114%
Energy Impacts (kWh)	476,400	437,097	92%
Demand Impacts (kW)	48.0	44.0	92%

In PY2017, BHP captured 92 percent of participation, energy and demand savings while spending 114 percent of budgeted dollars. BHP received requests for additional kits and the extra cost associated with those kits caused the Total Resource Cost to go below 1.0.

Table 12 provides the School-Based program cost-effectiveness analysis results, based on program activity.

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

Test	PY2017
Total Resource Cost Test	0.82
Utility Cost Test	0.82
Societal Cost Test	1.12
Participant Test	n/a
Ratepayer Impact Measure Test	0.17

School-Based Education Program – Highlights and Challenges

The School-Based Energy Education Program continues to be very popular program among schools within BHP's service territory. BHP receives positive comments from participating students, teachers and parents.

Combined Residential Program Portfolio Cost-Effectiveness

Table 15 provides the Combined Residential program cost-effectiveness of all residential programs.

TABLE 15: COMBINED RESIDENTIAL PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	0.89
Utility Cost Test	1.02
Societal Cost Test	1.22
Participant Test	16.95
Ratepayer Impact Measure Test	0.18

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

Table 16 provides the Commercial Prescriptive Rebate program goals compare to actual program performance.

TABLE 16: COMMERCIAL PRESCRIPTIVE PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation			
Lighting (Per Bulb)	3,030	4,957	164%
Expenditures	$97,049	$76,345	79%
Energy Impacts (kWh)	1,369,360	857,026	63%
Demand Impacts (kW)	347.7	206.0	59%

In PY2017, BHP spent approximately 78 percent of its budget and achieved 63 percent of its energy savings goal and 59 percent of its demand savings goal. Program impacts are only attributed to lighting measures and the conversion to LEDs.

Table 17 provides the Commercial Prescriptive Rebate program cost-effectiveness analysis, based on program activity.

TABLE 17: COMMERCIAL PRESCRIPTIVE PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	1.33
Utility Cost Test	2.63
Societal Cost Test	1.78
Participant Test	5.35
Ratepayer Impact Measure Test	0.28

Commercial Prescriptive Rebate Program – Highlights and Challenges

This program helped increase the awareness of LED lighting and the associated savings. There are still many BHP customers needing LED lights so the program will continue to be very visible in the public. Many of the area equipment suppliers are promoting LED lighting, thus BHP is able to eliminate the need to spend additional marketing dollars to promote this program. Most of BHP's efforts are spent with trade ally education and outreach. To enhance the offerings to customers, BHP added a heat pump water heater to the portfolio in PY2017.

The challenges that were experienced in the program were primarily when customers did not realize the anticipated energy savings in their electric bills. Some of these customers are counting on the energy savings to contribute to the payback of the LED system. The lighting estimator can assure project savings if they take the time to verify the working conditions of the existing lights, hours of operation in different parts of the building and LED replacement options. BHP has developed a worksheet to document the savings and the associated hours of operation of the lighting equipment to support payback calculations.

The percentage differences between expenditures and energy/demand impacts is primarily due to the mix of actual participation rate compared to the original goals.

In PY2017, this program experienced some significant changes from the previous year with the adoption of the new Energy Efficiency Program. Many of the items that were previously Prescriptive Rebates are now included in the Custom Rebate Program.

Commercial Custom Rebate Program

The Commercial Customer Rebate program offers rebates to commercial and industrial customers that install equipment outside of any prescriptive approved measure. Applications must be pre-approved by BHP before equipment is purchased and installed to ensure the installed equipment produces a TRC benefit-cost test of 1.0 or higher and have incremental payback greater than two years. Incentives were the lesser of the following:

- A buy-down to a two-year payback; or
- 50 percent 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.

Table 18 provides the Commercial Custom Rebate program goals compared to actual program performance.

TABLE 18: COMMERCIAL CUSTOM PROGRAM PY2017 SUMMARY

	Goal	Actual	% Goal Achieved
Participation	87	78	90%
Expenditures	$439,854	$412,770	94%
Energy Impacts (kWh)	2,851,145	2,669,925	94%
Demand Impacts (kW)	690.7	608.9	88%

In PY2017, the program spent approximately 94 percent of the approved budget. The program achieved 94 percent of its energy savings goal. LED lighting conversions were the main activity seen by this program.

Table 19 provides the Commercial Customer program cost-effectiveness analysis results, based on program activity.

TABLE 19: COMMERCIAL CUSTOM PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	1.19
Utility Cost Test	2.09
Societal Cost Test	1.58
Participant Test	5.03
Ratepayer Impact Measure Test	0.27

Commercial Custom Rebate Program – Highlights and Challenges

LED lighting drove participation in this program. BHP's trade allies have embraced the Commercial Custom Rebate program for the same reasons mentioned in the Commercial Prescriptive Program. Continued internal account manager education will provide customers the opportunity for greater participation in the C&I Custom Program in the coming years.

Combined Commercial Program Portfolio Cost-Effectiveness

Table 20 provides the Combined Commercial program cost-effectiveness.

TABLE 20: COMBINED COMMERCIAL PROGRAM COST-EFFECTIVENESS RESULTS

Test	PY2017
Total Resource Cost Test	1.21
Utility Cost Test	2.17
Societal Cost Test	1.61
Participant Test	5.09
Ratepayer Impact Measure Test	0.27