

**Montana-Dakota Utilities Co.
South Dakota Natural Gas Conservation Portfolio Plan
2018-2020
November 2017**

Market Segment

Montana-Dakota's gas market in South Dakota is comprised of approximately 88 percent residential customers, 12 percent firm general customers and a minimal number of small and large interruptible customers. As of August 31, 2017, Montana-Dakota served 59,230 retail gas customers in South Dakota.

Montana-Dakota designed the portfolio to meet its customer needs in its South Dakota service area. With residential and small commercial customers representing nearly 100 percent of South Dakota customers, the programs are designed to offer applicable rebates for space heating equipment, programmable thermostats and a custom program for commercial customers.

Program Summary

The total cost of the Company's conservation portfolio for the program years 2018 through 2020 is estimated to be \$625,800. The budget is comprised of incentive costs, educational and promotional costs, and administration costs. The program administration costs are made up of direct and allocated costs associated with program management, including the rebate application process. Montana-Dakota will issue checks for all rebates issued to the customer or homebuilder.

The Gas Conservation programs, based on estimated participation rates, are expected to reduce natural gas requirements by 451,350 dk over the life of the installed equipment. A breakdown of participants, program costs, and dk saved over the program life is as follows:

	2018	2019	2020
Incentive	\$186,750	\$194,100	\$201,450
Promotion/Education	5,000	5,000	5,000
Administration	9,000	9,500	10,000
Total Project Costs	\$200,750	\$208,600	\$216,450
Participants	781	812	843
First Year dk Saved	7,717	8,013	8,310
Program Life dk Saved	145,013	150,443	155,894

Natural Gas Program Portfolio Overview

The proposed portfolio offers residential space heating and programmable thermostat rebates. In addition, programs are available to small commercial customers for space

heating and a custom program which offers rebates for projects that do not fall within the parameters of the prescriptive space heating programs is available to all commercial customers. The programs will be administered by Montana-Dakota's Energy Programs Department. The delivery of each program is self-directed by the customers as they are responsible for purchasing and installing the qualifying equipment with the contractor of their choice. In the case of the programmable thermostat, the rebate is also available to residents who self-install the thermostat. The rebate application forms are found on the Company's website and by mail, if requested by the customer. The rebate will be paid only to the customer with the exception for new construction homes where the customer or builder is eligible to receive the rebate. Builder rebates will be capped at 25 for furnaces rebates and programmable thermostat rebates. Below is a description of the programs with the applicable incentive levels and program qualifications.

Residential Space Heating

This program offers rebates to Montana-Dakota residential customers installing high efficiency natural gas furnaces, Energy Star or Wi-Fi enabled thermostats, or participate in residential energy assessments.

Eligible Customers

This program shall be available to the following Montana-Dakota residential gas customers served under Residential Rate 60:

- Existing single-family homes.
- Existing multi-family homes where space heating systems serve only one unit.
- New single-family homes and multi-family homes where heating systems serve only one unit.

Programs

1. The high efficiency furnace program is available to customers with new construction that install a qualifying furnace or to customers with existing dwellings that convert to natural gas heating or replace an existing furnace. The new furnace must be rated at a minimum AFUE of 95% in order to qualify for the rebate.
2. The thermostat program is available in two tiers. The Tier 1 program is available to new construction and existing dwellings installing an Energy Star rated programmable thermostat. The Tier 2 program is now available to new construction and existing dwellings installing a Wi-Fi enabled thermostat. The Tier 2 program offers a larger rebate to compensate for higher energy savings and to offset the higher incremental cost associated with the Wi-Fi enabled units.
3. Montana-Dakota plans to continue to offer an Energy Assessment program to all South Dakota residential natural gas customers. The program is offered through two third-party contractors, one that covers Rapid City and the surrounding areas and one that covers our service territory in central South Dakota. Montana-Dakota plans to continue to partner with Black Hills Energy to share the cost of Energy Assessments in the Rapid City area when the participating customer is a customer of both companies and has natural gas heating. This program is an indirect program which does not provide specific energy savings, however an effective energy assessment program can be a useful tool for customer education and awareness and serve as an

informational program that leads to additional participation in other direct impact programs offered by the Company.

Program Incentives

Measures and associated incentive levels for this program are:

Measure	Incentive level
Furnace 95% AFUE and above New or Replacement	\$300 per Unit
Programmable thermostats – Tier 1 Energy Star Programmable Thermostat	\$15 per Unit
Programmable thermostats – Tier 2 Wi-Fi enabled Thermostat	\$60 per Unit
Energy Assessment	\$50 customer copay required for energy assessment with a \$500 value

Commercial Heating Programs

This program offers prescriptive rebates to Montana-Dakota commercial customers that install high efficiency natural gas space heating equipment.

Eligible Customers

This program is available to Montana-Dakota customers that are served under General Service Rates 70 and 72.

Program

1. The high efficiency furnace program is available to customers with new construction that install a qualifying furnace or to customers with existing dwellings that convert to natural gas heating or replace an existing furnace. The new furnace must be rated at a minimum AFUE of 95% in order to qualify for the rebate.

Program Incentives

Measures and associated incentive levels for this program are:

Measure	Incentive level
Furnace 95% AFUE and above New or Replacement	\$300 per Unit

Commercial Custom Program

This program offers rebates to Montana-Dakota’s commercial customers that install energy conservation measures not provided for in the prescriptive rebate listed above due to the variability in the energy savings and cost of the project. The Company will review each custom project individually and offer a rebate based on the amount of energy savings provided by the measure. Each custom project must pass the Benefit/Cost Test with a TRC of greater than 1.00 to qualify for a rebate. Preapproval by the Company is required on all custom projects prior to the start of the project.

The customer is responsible for submitting the rebate application and supporting documentation with a complete description of the proposed project including the equipment being installed, modified and/or replaced. Project descriptions must include engineering calculations with assumptions of energy savings. Preapproval is required prior to the start of the project. Measurement and verification of the energy savings may be required, which may include pre- and post-measurement of energy consumption. The Custom program rebate will be paid only to the customer.

Eligible Customers

This program is available to Montana-Dakota customers that are served under General Service Rates 70 and 72.

Program Incentives

The incentive levels for this program are project specific.

Other requirements under this program are:

- Equipment installed must be more efficient than the industry standard
- Simple Payback must be greater than 18 Months
- Rebate cannot exceed 50% of the incremental cost of the equipment
- Rebate will be based on the amount of energy saved
- Weatherization is not eligible for a rebate

Portfolio Summary

The following table summarizes the program participation, expense and dk savings over the life of the installed equipment. The total cost of each program includes incentive costs, promotional and administration costs. The promotional and administrative costs are allocated to each program based on anticipated participation.

Montana-Dakota Utilities Co.
Gas Utility - South Dakota
Conservation Portfolio Summary
2018 - 2020 Program Years

<u>Programs</u>	<u>Total Participants</u>	<u>Total Energy Reduction</u>	<u>Total Cost</u>	<u>Lifetime Cost/Dk</u>
Conservation Programs				
Residential Program				
Furnaces - 95+% AFUE - New	630	56,700	\$203,118	\$3.58
Furnaces - 95+% AFUE - Replacement	900	331,200	290,170	0.88
Programmable Thermostats - Tier 1	300	7,500	4,837	0.64
Programmable Thermostats - Tier 2	390	14,430	25,148	1.74
Residential Energy Assessments	150	0	72,543	
	<u>2,370</u>	<u>409,830</u>	<u>\$595,816</u>	<u>\$1.45</u>
Commercial Program				
Furnaces - 95+% AFUE - New	15	1,360	\$4,836	\$3.56
Furnaces - 95+% AFUE - Replacement	48	17,660	15,476	0.88
Custom Efficiency	3	22,500	9,672	0.43
	<u>66</u>	<u>41,520</u>	<u>\$29,984</u>	<u>\$0.72</u>
Total Programs	<u>2,436</u>	<u>451,350</u>	<u>\$625,800</u>	<u>\$1.39</u>

Benefit Cost Test

Montana-Dakota is proposing to continue the application of Rate 90 and the Company's portfolio will include five residential, three commercial programs and an education and outreach plan. The Company's focus is on offering programs that provide the opportunity to be implemented in the near-term time frame and provide cash incentives to lower the upfront costs of purchasing energy efficiency equipment and make energy efficiency measures more cost effective to customers.

The programs were evaluated using five different cost-effectiveness tests:

- Participant Test considers the economic impact of a program on the participating customers.
- Utility Test considers the impact on the utility.
- Societal Cost Test includes environmental externalities and considers the impact on the "society" (both the participating and non-participating customers).
- Ratepayer Impact Measure (RIM) Test includes quantifiable benefits and costs of a given program and considers its impact on ratepayers.
- Total Resource Cost Test (TRC) reflects the total benefits and costs to all customers (both the participants and non-participants).

The following section explains the process of evaluating the programs from each of the five perspectives. The inputs utilized in the Benefit Cost test are provided in Attachment B, pages 58 - 59. The primary inputs are the cost of gas, non-gas fuel cost (electric), average dk saved per participant, and the incremental cost for purchasing the installed

equipment. The cost of gas inputs reflect Montana-Dakota's projected South Dakota retail rates projected for the 2017-2018 heating season escalated by 3.5% per year. The average dk saved per participant is based on the deemed database discussed further below and the incremental cost is derived from average costs of both the equipment removed and the newly installed equipment.

Participant Test

The Participant Test is a measure of the quantifiable benefits and costs brought about by a customer's participation in a Demand Side Management (DSM) program. For purposes of evaluating the merits of a particular DSM program, quantifiable benefits include any incentives received by a participant and the reduction in a participant's gas bill through reduced requirements. Quantifiable costs include any costs the customer incurs in order to participate in a DSM program, such as increased appliance costs or the availability of a back-up fuel source. The merits of the DSM program are evaluated on the NPV of the annual benefits and costs over the years in the analysis horizon. The NPV determination is based on the utility discount rate and assumes the cash flows occur at the end of the year.

The following represents a simplified look at the equations used to evaluate the participant net benefit:

$$\text{Net Benefit} = \text{Total Annual Benefits} - \text{Total Annual Costs}$$

where:

$$\begin{aligned} \text{Total Annual Benefits} &= \text{Decatherm Savings (dk)} \\ &\quad + \text{Incentive} \\ &\quad + \text{Other Savings} \\ \text{Total Annual Costs} &= \text{Direct Costs} + \text{Other Costs} \end{aligned}$$

A benefit/cost ratio greater than 1.00 for the Participant Test indicates the DSM program will result in savings to the participant over the life of the program.

Ratepayer Test

The Ratepayer Test is a measure of the quantifiable benefits and costs the utility incurs as a result of customer participation in a DSM program. For purposes of evaluating the merits of a particular DSM program, quantifiable benefits include any reduction in natural gas requirements, along with a reduction in variable operation and maintenance costs. Quantifiable costs to the utility include lost margin, incentive, and administrative costs. The merits of the DSM program are evaluated on the NPV of the annual benefits and costs over the years in the analysis horizon. The NPV determination is based on the utility discount rate and assumes the cash flows occur at the end of the year. The following represents a simplified look at the equations used to evaluate the utility net benefit:

$$\text{Net Benefit} = \text{Annual Cost of Energy Saved} - \text{Annual Project Costs}$$

where:

$$\begin{aligned} \text{Annual Cost of Energy Saved} &= \text{Decatherm Savings (dk)} \\ &\quad + \text{O\&M Savings} \end{aligned}$$

$$\text{Annual Project Costs} = \text{Total Project Costs}$$

A benefit/cost ratio greater than 1.00 for the Ratepayer Test indicates the DSM program will reduce overall rates.

Societal Cost Test

The Societal Cost Test measures the net costs of a DSM program as a resource option based on the total costs of the program (both the participants' costs and the utility's costs). This test also includes a factor for environmental externalities. This test is a summation of the benefit and cost terms in the Participant Test and the Ratepayer Test. The merits of the DSM program are evaluated on the NPV of the annual benefits and costs over the years in the analysis horizon. The NPV determination is based on the utility discount rate and assumes the cash flows occur at the end of the year. The annual costs are discounted at the utility discount rate. The following represents a simplified look at the equations used to evaluate the total cost net benefit:

$$\text{Net Benefit} = \text{Annual Cost of Energy Saved} - \text{Annual Project Costs}$$

where:

$$\begin{aligned} \text{Annual Cost of Energy Saved} &= \text{Decatherm Savings (dk)} \\ &+ \text{O\&M Savings} \\ &+ \text{Avoided Environmental Damage} \\ \text{Annual Project Costs} &= \text{Total Project Costs} \end{aligned}$$

A benefit/cost ratio greater than 1.00 for the Societal Cost Test indicates the DSM program is beneficial to both the utility and its ratepayers on a societal cost basis.

Utility Test

The Utility Test is a measure of the quantifiable benefits and costs placed on ratepayers, due to changes in the utility's revenues and operating costs as a result of the DSM program. The Utility Test includes the same benefits and costs as the Ratepayer Test. The merits of the DSM program are evaluated on the NPV of the annual benefits and costs over the years in the analysis horizon. The NPV determination is based on the utility discount rate and assumes the cash flows occur at the end of the year. The annual costs are discounted at the utility discount rate. The following represents a simplified look at the equations used to evaluate the ratepayer net benefit:

$$\text{Net Benefit} = \text{Annual Cost of Energy Saved} - \text{Annual Project Costs}$$

where:

$$\begin{aligned} \text{Annual Cost of Energy Saved} &= \text{Decatherm Savings (dk)} \\ &+ \text{O\&M Savings} \\ \text{Annual Project Costs} &= \text{Total Project} \end{aligned}$$

A benefit/cost ratio greater than 1.00 for the Utility Test indicates the cost of energy saved is greater than the cost of saving the energy.

Total Resource Cost Test (TRC)

The Total Resource Cost Test (TRC) reflects the total benefits and costs to all customers (participants and non-participants) in the utility service territory. The key

difference between the TRC and utility test is that the TRC does not include program incentives, which are considered zero net transfers in a regional perspective. Instead the TRC includes the net measures costs and net avoided costs.

The merits of the DSM program are evaluated on the NPV of the net annual benefits and costs over the years in the analysis horizon. The NPV determination is based on the utility discount rate and assumes the cash flows occur at the end of the year. The annual costs are discounted at the utility discount rate. The following represents a simplified look at the equations used to evaluate the total cost net benefit:

$$\text{Net Benefit} = \text{Annual Cost of Energy Saved} - \text{Annual Project Costs}$$

where:

$$\text{Annual Cost of Energy Saved} = \text{Decatherm (dk)} \\ + \text{O\&M Savings}$$

$$\text{Annual Project Costs} = \text{Total Project Costs net of incentive costs}$$

A benefit/cost ratio greater than 1.00 for the TRC Test indicates the DSM program is beneficial to all customers both participating and non-participating.

While Montana-Dakota typically views programs as favorable when the benefit/cost ratio resulting from TRC tests are greater than or equal to 1.00, the Company also takes into consideration other factors before selecting a program to include in its portfolio. Other factors may include applicability to customer base, market transformation, composition of the portfolio, and behavior change. All programs included in the Company's portfolio result in TRC results of 1.00 or greater as summarized in Attachment B, page 3.

The table below summarizes the Total Resource Cost test ratios. The program modeling and summary of all benefit/cost ratios is detailed in Attachment B.

Program	Class	TRC Result
Total Portfolio		1.17
Furnace (95+%) – New	Residential	1.49
Furnace (95+%) – Replacement	Residential	1.16
Programmable Thermostats – Tier 1	Residential	2.95
Programmable Thermostats – Tier 2	Residential	1.27
Residential Energy Assessments	Residential	N/A
Furnace (95+%) – New	Commercial	1.51
Furnace (95+%) – Replacement	Commercial	1.16
Custom	Commercial	1.64

A summary of the proposed portfolio, versus the current portfolio, is included in the table below.

Residential Programs			
Program	Current Program	New Program	Change
Residential Space Heating – High-Efficiency Furnace (95+%) - Replacement	\$300 cash incentive for the purchase of a replacement furnace with an AFUE rating of 95+%	No	No change
Residential Space Heating – High-Efficiency Furnace (95+%) - New	\$300 cash incentive for the purchase of a furnace with an AFUE rating of 95+% on new installation	No	No change
Programmable Thermostats – Tier 1	\$15 cash incentive for the purchase of an Energy Star Programmable Thermostat	No	Modified Program (changed incentive from \$20 to \$15)
Programmable Thermostats – Tier 2	\$60 cash incentive for purchase of a Wi-Fi enabled thermostat	Yes	Program added
Residential Energy Assessments	\$50 customer copay required for energy assessment with a \$500 value	No	No Change

Commercial Programs			
Program	Current Program	New Program	Change
Commercial Space Heating – High-Efficiency Furnace – New (95+%)	\$300 cash incentive for the purchase of a furnace with an AFUE rating of 95+% on new installation	No	No change
Commercial Space Heating – High-Efficiency Furnace – Replacement (95+%)	\$300 cash incentive for the purchase of a replacement furnace with an AFUE rating of 95+%	No	No change
Commercial Custom	Cash incentive levels are project specific and do not fall within the prescribed measures	No	No change

Promotion and Education

The goal of Montana-Dakota’s conservation program promotional plan is to maximize customer program awareness and participation in the most economical manner. The promotional plan strives to balance the cost of the advertising/promotional measures with the expected results. Montana-Dakota’s promotional plan for the South Dakota conservation programs will focus on awareness and increasing participation of these energy saving programs. The Company will utilize newspaper inserts, billboard

advertising, dealer and builder meetings and bill inserts as tools related to marketing strategy:

- Montana-Dakota included a budget of \$5,000 annually for three years for this program, which is included in the total portfolio cost and benefit/cost analysis

Deemed Database

Demand-side management portfolios include demand-side resource designs and evaluation criteria, cost information, and other assumptions that vary by program. The majority of the information utilized to determine energy savings associated with a program is derived from the Technical Reference Manual (TRM) that was developed for the state of Minnesota by Franklin Energy Services, an independent third party, and is used by utilities in Minnesota as part of their Conservation Improvement Programs. Montana-Dakota adjusted the Minnesota TRM to reflect weather data specific to Montana-Dakota's South Dakota service area. Utilizing TRM allows Montana-Dakota to use a deemed savings approach to calculate energy saving and perform evaluation, measurement, and verification (EM&V) for prescriptive measures. The deemed savings approach to EM&V allows Montana-Dakota to keep program costs low while providing an appropriate level of verification for prescriptive measures.

The TRM uses generally accepted engineering algorithms, along with developed operating data and defined program parameters to determine the savings of each efficiency measure. The program parameters include baseline efficiency standards, high-efficiency standards, and incremental costs.

From each prescriptive rebate application, the Company will input equipment specific information such as equipment type and size and operating hours into the TRM database spreadsheet to calculate the dk savings for that measure. Attachment A provides examples of the calculated dk savings for each program and an electronic version of the TRM database will be provided to the Commission Staff upon request. The examples provided in Attachment A reflect the same equipment used in the technical assumptions for the Benefit/Cost model. For example, Attachment A, page 1 provides the dk savings for a residential furnace retrofit. The inputs into the calculation are the furnace size of 75,000 British Thermal Units (BTU) and 95 percent efficiency and the calculated savings is 18.4 MMBTU. One MMBTU is equivalent to one dk. Montana-Dakota chose these specific equipment types to model in the Benefit/Cost analysis as they are common sizes typically installed and representative of savings to be achieved through the portfolio.

Custom projects will be reviewed individually and the energy savings will be provided by the contractor from a credible source such as manufacturer data. Montana-Dakota will review and approve the energy calculations for each custom project.

Program Reporting

Montana-Dakota is proposing to file a report with the Company's annual CTA filings each year that will include the following components:

- Budget versus actual expenditures
- Natural gas savings
- Participation summary
- Program year actual benefit/cost analyses