Memorandum

To: Commissioners and Advisors

From: Dave Jacobson, Steve Wegman, Sara Greff

RE: NG05-016   Montana-Dakota Utilities Co. application for approval of
     Natural Gas Conservation Programs and Conservation Tracking Adjustment

December 19, 2005

The application by Montana-Dakota Utilities Co. (MDU) in Docket NG05-016 can
be summarized as a request for approval of six individual programs which can be
separated into two basic categories. Two of the programs are informational in
nature (Customer Conservation Starter Kits and Residential / Small General
Service On-Line Energy Audit). The other four programs would offer cash
rebates to existing MDU gas customers when replacing older less efficient
furnaces, boilers and/or water heaters or when purchasing a programmable
thermostat. MDU has supported its application by including a summary of the
results of a cost / benefit analysis and has requested recovery of both the direct
costs of the program and also the estimated lost distribution revenues which they
expect to be realized through implementation of the program. Attached to this
memorandum is a more detailed explanation of the cost benefit analysis,
submitted by MDU per response to Staff data request. Staff would offer the
following discussion for the Commission to consider when deciding on MDU's
application.

Programs of this nature were promoted and adopted by some states during the
1970s and early 1980s when high rates of inflation and certain energy shortages
concerned the nation. Much of this activity was aimed at electric service where
the avoidance of building generating plants and in particular large base load
plants was the goal of Demand Side Management (DSM) activities. Many states
required utilities to perform Integrated Resource Planning (IRP) studies which
mandated that utilities not only consider supply side options when planning to
meet the energy needs of customers but also demand response programs which
might offset the need for additional resources. After natural gas was deregulated
in the mid 1980s, less emphasis was placed on gas conservation because of the
gas supply bubble which had emerged and forecasts of abundant gas supply for
the foreseeable future. With natural gas, there was no generating plant addition
issue and the associated rate shock of substantial increases in rate base.

While much of the documentation of former DSM programs has been lost over
time, those who were involved in those programs do recall certain issues that
arose with respect to their effectiveness. As stated, DSM programs were not
necessarily focused on gas service. MDU was required by other state
jurisdictions to perform IRP studies and as recalled by Staff, those studies

showed that gas conservation programs were not cost effective at that time. Considering the current supply and price of natural gas however, DSM may warrant consideration. While the direct connection of having MDU avoid building generation plants and subsequently putting them into rates, is not evident with gas conservation, one can argue that such programs may help overall in balancing supply and demand nationwide. However the primary goal of gas conservation efforts at this time should be viewed as customer relief from current dramatically increased commodity prices.

Each of MDU's proposed programs raises certain issues which the Commission may wish to consider when deciding whether to approve, modify or reject them. Following are staff comments on each program.

Informational Programs
These programs differ from the rebate programs in that they are not evaluated using the DSM computer cost/benefit analysis. They are simply informational in nature and have no reduction in gas usage associated with them for purposes of MDU recovering lost distribution revenues.

1. Customer Conservation Starter Kits.
    This program offers a booklet produced by the Department of Energy on energy saving practices and a sample outlet gasket and switch plate gasket. Potential issues include the availability of the DOE information to customers outside of being provided by MDU and the actual utilization of such information by customers. The effectiveness of supplying a sample of gaskets may also be questioned. The cost of this program to SD Residential and Firm General Service customers is estimated at $15,296 per year.

2. Residential / Small General Service On-Line Energy Audit
    This program would offer an on-line energy audit service for customers through a link on MDU's website. Alternatively for those without computer access, a mail in option is available. It is difficult to determine the potential effectiveness of this program without having examined its content and execution via computer. Estimated cost to Residential and Firm General Service South Dakota customers is $12,275 for the first year and $2,665 each year thereafter.

Furnace, Boiler, Water Heater and Programmable Thermostat Rebates
These programs offer cash incentives to replace existing natural gas appliances with high efficiency models as compared to standard models These proposed programs have been subjected to computer model cost benefit testing analysis which MDU has summarized in its application. Further detail of the analysis is attached to this memorandum. It should be noted that since the initial filing, MDU has revised the cost/benefit analysis for the programmable thermostat program (as described in the attached information), but the result of the analysis still yields

a positive benefit. MDU has submitted expected volumetric reductions in sales with these programs and these programs would be the major basis for cost recovery including all of the lost distribution revenues. Of course there are significant assumptions made when undergoing such analysis, not the least of which is the cost of natural gas. Information on this subject alone seems to change on nearly a daily basis.

Because all of these programs are similar, they can all be addressed in the same discussion. Many questions or issues have historically been associated with programs of this type. A primary concern has always been the basic premise of recovering costs from the entire population of core customers for the benefit of a few. In many cases where such programs are allowed, assistance is directed to those showing the most need, in other words low income customers. However this also can significantly increase administrative costs or necessitate third party administration (Dept of Social Services).

Other more specific issues have also arisen. For instance, what is the appropriate amount of rebate considering the difference between a standard model appliance and the high efficiency model. MDU has stated that for a high efficiency furnace, this difference is typically $470. They would offer a rebate of $150. One may question whether the amount of the rebate is enough to incent all customers of MDU to buy the high efficiency model or will lower income customers still be forced to buy the standard model. Also, would higher income customers purchase the more efficient furnace anyway, despite the rebate, therefore undermining its effectiveness? Certainly in some cases this would occur.

Another complimentary issue to the above discussion involves the Energy Efficiency Tax Incentives that were included in the Energy Policy Act of 2005. These tax incentives could actually "fill in the gap" remaining after the MDU rebate in the above discussed example where the MDU rebate alone was not a sufficient incentive, for those customers having enough income to generate the tax savings.

Increased minimum standards dictated by federal legislation are also a possible consideration. At the current time however, increased minimum standards for furnaces, boilers and water heaters do not appear to be on the horizon as explained in the following exerpt from the American Council for an Energy-Efficient Economy.

- In 1989 and 1991, the first Bush Administration issued improved standards for refrigerators, clothes washers and dryers, and dishwashers, and began work on several additional standards, laying the groundwork for the Clinton Administration to set new standards for refrigerators, room air conditioners, ballasts, clothes washers, water heaters, and residential central air conditioners and heat pumps. Recently, the new Bush Administration reaffirmed the Clinton clothes washer and water heater standards but

announced its intention to weaken the new air conditioner standard to a Seasonal Energy Efficiency Ratio (SEER) of 12, down from SEER 13.

Another potential issue, which MDU has addressed in response to Staff data requests, is the application of the rebate program through outside contractors. MDU has stated they plan to work with such contractors in their service area in promoting and utilizing the rebate programs.

MDU has estimated the cost of these rebate programs collectively to be $201,830 for the first year, $127,920 the second year and $91,620 in year number three for South Dakota customers.

In summary, Staff has attempted to provide additional information to the Commission for their consideration in making a decision in this docket. This issue involves consideration of several factors, some of which may be somewhat subjective or of differing significance to the Commission, including the effectiveness of the program and its societal impacts. Commission Staff understands that the above discussion, and discussion at the Commission meeting may precipitate further inquiries from the Commission and Advisors and if that is the case, stands by to pursue further information on the subject.

MONTANA-DAKOTA
UTILITIES CO.
A Division of MDU Resources Group, Inc.

400 North Fourth Street
Bismarck, ND 58501
(701) 222-7900

December 16, 2005

Mr. Dave Jacobson
South Dakota Public Utilities Commission
State Capitol Building
500 East Capitol
Pierre, SD 57501-5070

Re: Natural Gas Conservation Programs &
Conservation Tracking Adjustment
Docket No. NG05-016

Dear Mr. Jacobson:

Enclosed please find Montana-Dakota Utilities Co.'s responses to the South Dakota
Public Utilities Commission Staff's first data request in the above referenced docket.

Should you have any questions concerning this matter, please contact me.

Please acknowledge receipt by stamping or initialing the duplicate copy of this letter
attached hereto and returning the same in the enclosed self-addressed, stamped
envelope.

Sincerely,

Donald R. Ball
Assistant Vice President –
Regulatory Affairs

1. **Please provide a detailed description of former conservation programs administered by MDU. Provide any reports or analysis describing the cost and effectiveness of those programs and explain why those program(s) were terminated.**

Response:

Montana-Dakota has not administered any formal conservation programs in the last 20 years. In the early 1980's, Montana-Dakota offered on-site residential energy audits and provided a booklet titled "Common Sense Conservation" along with outlet gaskets to customers. These items were offered to customers in order to provide educational tools to combat rising energy prices. Montana-Dakota was not able to measure the results of the programs offered because it is not possible to determine how many conservation measures were implemented as a result of these programs. The programs were terminated due to staffing requirements associated with the on-site audit program.

2. **Provide a detailed description of the Rate Payer, Societal, Participant and Utility tests described on page 2 of the filing and a copy of that analysis.**

Response:

Please see Attachment A for a copy of the analysis. The conservation Model's benefit-cost comparison provides an indication of the program benefits and costs and its impact on the gas system. The programs were evaluated against four different cost-effectiveness tests:
1. Ratepayer Impact Test (Revenue Requirements Test)
2. Societal Test
3. Cost Comparison Test
4. Participant Test

Subsequent to the Company's original filing dated November 11, 2005, it was discovered that the savings assigned to the programmable thermostat had been overstated. The savings of 15% assigned in the original filing represented the total energy savings i.e., gas savings associated with space heating and electric savings associated with air conditioning. The savings associated with space heating only are 5%. This change has been reflected in the program tests and provided in Attachment B. As shown, the programmable thermostat is still a cost effective program that produces significant energy savings.

The *Cost Comparison Test* (Table 1) compares the cost of energy saved to the total cost of saving that amount of energy. The annual cost of annual energy saved is comprised of the commodity cost of gas savings associated with the reduction in gas requirements, the variable operation and maintenance cost savings and the reduction in demand associated with capacity reductions. This total cost energy saved is compared to the costs associated with reaching those savings which in the case of the programs proposed here are the rebate costs, administrative costs and the lost distribution margin. A benefit/cost ratio greater than one indicates the cost of energy saved is greater than the cost of saving the energy.

The *Ratepayer Impact (Revenue Requirements) Test* (Table 2) includes all of the quantifiable benefits and costs of a given program and its impact on all ratepayers. The total costs saved (commodity, demand and variable O&M) are compared to the total increase in the revenue requirement caused by the costs of the program. A ratio greater than one indicates the program will reduce overall rates, while a ratio less than one

implies the program will cause these rates to increase. The results of this test for each program evaluated are as follows:

The *Societal Test* (Table 3) measures the net costs of a conservation program based on its total costs, including both the participant's and the utility's costs as well as the avoided environmental externalities. This total decrease in costs is compared to the total of the cost of the program and the cost to the participant. A positive net change or a benefit/cost ratio greater than 1 indicates that society as a whole will benefit from the program. The results of this test for each program evaluated are as follows:

The *Participant Test* (Table 4) considers the economic impact of a program that accrues directly to the participating customers. The total cost to the participants (cost of installing the measure plus participant's share of the cost of the program) is compared to the total annual benefits received in the form of rebates and the cost of gas saved by implementing the conservation measure. A ratio greater than one indicates the program will result in savings to the participant.

ATTACHMENT A
(BLACK HILLS)

Demand-Side Management　　　　　　　Cost-Effectiveness Analysis

Company:　　**Montana-Dakota Utilities Co.**
Project:　　　**SD Space Heating Furnace**

Input Data

1) Retail Rate ($/dk) =	$11.11	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.38	Incentive Costs =	$108,150
Escalation Rate =	1.40%	Total Utility Project Costs =	$111,400
3) Demand Cost ($/Unit/Yr) =	$10.83	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$64,950
		Total Utility Project Costs =	$68,200
5) Variable O&M ($/dk) =	$0.05	Third Year Costs	$46,450
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$470.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales (dk) =	3,035,759	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	12.00%
8) Total Customers =	36,459		
Growth Rate =	2.40%	20) Avg. Consumption (dk/Part.) =	57
9) Utility Discount Rate =	8.92%	21) Avg. dk/Part. Saved (First Year Program) =	6.9
		21a) Avg. dk/Part. Saved (Second Year Program) =	6.9
10) Social Discount Rate (T-Bill) =	4.97%		
		22) Number of Participants (First Year Program) =	721
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	433
		22b) Number of Participants (Third Year Program) =	288
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$150
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$150
13) Effective Fed & State Income 1	39.39%		
14) Net Operating Income Before ⁻	1.00%		
as % Total Operating Income			

Demand-Side Management
Cost-Effectiveness Analysis

Summary Information

Company:	**Montana-Dakota Utilities Co.**
Project:	**SD Space Heating Furnace**

Cost Summary

Utility Cost per Participant (First Year) =	$154.51
Utility Cost per participant (Second Year) =	$157.51
Total Energy Reduction (dk)	147,260
Societal Cost per dk	$4.05
Cost per Participant per dk (First Year) =	$90.51
Cost per Participant per dk (Second Year) =	$90.94

Test Results

	NPV	B/C
Cost Comparison Test	$304,201	1.74
Revenue Requirements Test	$517,765	3.65
Societal Benefit Test	$153,077	1.26
Participant Test	$563,996	1.87

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heating Furnace**

		Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
t	Year	Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Savings (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	4,975	$8.50	$252	49.75	$10.98	$43,087	$111,400	12,897	$124,297	($81,210)
2	2007	7,963	8.62	409	79.63	11.13	69,928	68,200	20,931	89,131	(19,203)
3	2008	9,950	8.74	519	99.50	11.29	88,603	46,450	26,521	72,971	15,632
4	2009	9,950	8.86	526	99.50	11.45	89,844	0	26,893	26,893	62,951
5	2010	9,950	8.99	533	99.50	11.61	91,102	0	27,269	27,269	63,833
6	2011	9,950	9.11	541	99.50	11.77	92,377	0	27,651	27,651	64,726
7	2012	9,950	9.24	548	99.50	11.93	93,670	0	28,038	28,038	65,632
8	2013	9,950	9.37	556	99.50	12.10	94,982	0	28,430	28,430	66,551
9	2014	9,950	9.50	564	99.50	12.27	96,312	0	28,829	28,829	67,483
10	2015	9,950	9.63	572	99.50	12.44	97,660	0	29,232	29,232	68,428
11	2016	9,950	9.77	580	99.50	12.62	99,027	0	29,641	29,641	69,386
12	2017	9,950	9.91	588	99.50	12.79	100,414	0	30,056	30,056	70,357
13	2018	9,950	10.04	596	99.50	12.97	101,819	0	30,477	30,477	71,342
14	2019	9,950	10.18	604	99.50	13.15	103,245	0	30,904	30,904	72,341
15	2020	9,950	10.33	613	99.50	13.34	104,690	0	31,336	31,336	73,354
16	2021	4,975	10.47	311	49.75	13.52	53,078	0	15,888	15,888	37,190
Total =		147,260			1,473		$1,419,838	$226,050	$424,994	$651,044	$768,794
NPV =							713,485	195,720	213,564	409,284	304,201

Total NPV = $304,201
Benefit/Cost Ratio =   1.74

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and
to revenue requirements as a direct result of the

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heating Furnace**

		Decreases				Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$42,288	$252	$546	$43,087	$111,400	$111,400	($68,313)
2007	68,633	409	886	69,928	68,200	68,200	1,728
2008	86,962	519	1,123	88,603	46,450	46,450	42,153
2009	88,179	526	1,139	89,844	0	0	89,844
2010	89,414	533	1,155	91,102	0	0	91,102
2011	90,665	541	1,171	92,377	0	0	92,377
2012	91,935	548	1,187	93,670	0	0	93,670
2013	93,222	556	1,204	94,982	0	0	94,982
2014	94,527	564	1,221	96,312	0	0	96,312
2015	95,850	572	1,238	97,660	0	0	97,660
2016	97,192	580	1,255	99,027	0	0	99,027
2017	98,553	588	1,273	100,414	0	0	100,414
2018	99,933	596	1,291	101,819	0	0	101,819
2019	101,332	604	1,309	103,245	0	0	103,245
2020	102,750	613	1,327	104,690	0	0	104,690
2021	52,094	311	673	53,078	0	0	53,078
Total =	$1,393,528	$8,312	$17,998	$1,419,838	$226,050	$226,050	$1,193,788
NPV =	700,264	4,177	9,044	713,485	195,720	195,720	517,765

Total NPV = $517,765
Benefit/Cost Ratio =   3.65

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)   (E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)   (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Fac (G) = (D) - (F)
   x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heating Furnace**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environmental Damage Cost (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants' Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$42,288	$252	$546	$1,480	$44,567	$111,400	$338,870	$108,150	$342,120	($297,553)
2007	68,633	409	886	2,431	72,359	68,200	203,510	64,950	206,760	(134,401)
2008	86,962	519	1,123	3,116	91,720	46,450	135,360	43,200	138,610	(46,890)
2009	88,179	526	1,139	3,197	93,041	0	0	0	0	93,041
2010	89,414	533	1,155	3,281	94,382	0	0	0	0	94,382
2011	90,665	541	1,171	3,366	95,743	0	0	0	0	95,743
2012	91,935	548	1,187	3,453	97,124	0	0	0	0	97,124
2013	93,222	556	1,204	3,543	98,525	0	0	0	0	98,525
2014	94,527	564	1,221	3,635	99,947	0	0	0	0	99,947
2015	95,850	572	1,238	3,730	101,390	0	0	0	0	101,390
2016	97,192	580	1,255	3,827	102,854	0	0	0	0	102,854
2017	98,553	588	1,273	3,926	104,340	0	0	0	0	104,340
2018	99,933	596	1,291	4,028	105,848	0	0	0	0	105,848
2019	101,332	604	1,309	4,133	107,378	0	0	0	0	107,378
2020	102,750	613	1,327	4,241	108,931	0	0	0	0	108,931
2021	52,094	311	673	2,175	55,253	0	0	0	0	55,253
Total =	$1,393,528	$8,312	$17,998	$53,563	$1,473,402	$226,050	$677,740	$216,300	$687,490	$785,912
NPV =	700,264	4,177	9,044	35,271	748,756	195,720	587,440	187,481	595,679	153,077

Total NPV = $153,077
Benefit/Cost Ratio = 1.26

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4)
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Fac
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

5

Table 4
Participant Test

This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heating Furnace**

		Benefits						Costs					Annual
Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Benefits Less Costs (M)
2006	0.0193	$108,150	4,975	$11.26	49.75	$10.98	$164,195	$338,870	$0	$2,151	$249	$341,270	($177,075)
2007	0.0302	64,950	7,963	11.42	79.63	11.13	155,919	203,510	$0	2,059	632	206,200	(50,281)
2008	0.0295	43,200	9,950	11.58	99.50	11.29	158,463	135,360	$0	1,369	782	137,511	20,952
2009	0.0288	0	9,950	11.74	99.50	11.45	116,876	0	$0	0	774	774	116,101
2010	0.0281	0	9,950	11.91	99.50	11.61	118,511	0	$0	0	767	767	117,744
2011	0.0275	0	9,950	12.07	99.50	11.77	120,169	0	$0	0	759	759	119,410
2012	0.0268	0	9,950	12.24	99.50	11.93	121,851	0	$0	0	752	752	121,099
2013	0.0262	0	9,950	12.41	99.50	12.10	123,556	0	$0	0	744	744	122,812
2014	0.0256	0	9,950	12.59	99.50	12.27	125,285	0	$0	0	737	737	124,548
2015	0.0250	0	9,950	12.76	99.50	12.44	127,039	0	$0	0	730	730	126,309
2016	0.0244	0	9,950	12.94	99.50	12.62	128,816	0	$0	0	723	723	128,094
2017	0.0238	0	9,950	13.12	99.50	12.79	130,619	0	$0	0	716	716	129,903
2018	0.0233	0	9,950	13.31	99.50	12.97	132,447	0	$0	0	709	709	131,738
2019	0.0227	0	9,950	13.49	99.50	13.15	134,301	0	$0	0	702	702	133,599
2020	0.0222	0	9,950	13.68	99.50	13.34	136,180	0	$0	0	695	695	135,485
2021	0.0217	0	4,975	13.88	49.75	13.52	69,043	0	0	0	344	344	68,699
		147,260					$2,063,270	$677,740	$0	$5,579		$694,133	$1,369,137
							$1,215,090	639,822	0	5,196		651,094	563,996

$563,996
1.87

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

6

Demand-Side Management Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

Input Data

1) Retail Rate ($/dk) =	$11.11	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.38	Incentive Costs =	$10,100
Escalation Rate =	1.40%	Total Utility Project Costs =	$13,350
3) Demand Cost ($/Unit/Yr) =	$10.83	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$6,100
		Total Utility Project Costs =	$9,350
5) Variable O&M ($/dk) =	$0.05	Thrid Year Costs	$7,250
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$500.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales dk =	3,035,759	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	6.00%
8) Total Customers =	36,459		
Growth Rate =	2.40%	20) Avg. Consumption (dk/Part.) =	57
9) Utility Discount Rate =	8.92%	21) Avg. dk/Part. Saved (First Year Program) =	3.4
		21a) Avg. dk/Part. Saved (Second Year Program) =	3.4
10) Social Discount Rate =	4.97%		
		22) Number of Participants (First Year Program) =	101
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	61
		22b) Number of Participants (Third Year Program) =	40
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$100
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$100
13) Effective Fed & State Income Ta:	39.39%		
14) Net Operating Income Before Ta as % Total Operating Income	1.00%		

7

Cost-Effectiveness Analysis

Summary Information

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

Cost Summary

Utility Cost per Participant (First Year) = $132.18
Utility Cost per participant (Second Year) = $153.28

Total Energy Reduction (dk)   10,166
Societal Cost per dk $9.42

Cost per Participant per dk (First Year) = $185.93
Cost per Participant per dk (Second Year) = $192.14

Test Results

	NPV	B/C
Cost Comparison Test	$8,764	1.22
Revenue Requirements Test	$23,508	1.91
Societal Benefit Test	($44,101)	0.54
Participant Test	($6,671)	0.93

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

t	Year	Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
		Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Savings (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	343	$8.50	$17	3.43	$10.98	$2,974	$13,350	890	$14,240	($11,266)
2	2007	551	8.62	28	5.51	11.13	4,837	9,350	1,448	10,798	(5,961)
3	2008	687	8.74	36	6.87	11.29	6,116	7,250	1,831	9,081	(2,965)
4	2009	687	8.86	36	6.87	11.45	6,202	0	1,856	1,856	4,345
5	2010	687	8.99	37	6.87	11.61	6,288	0	1,882	1,882	4,406
6	2011	687	9.11	37	6.87	11.77	6,376	0	1,909	1,909	4,468
7	2012	687	9.24	38	6.87	11.93	6,466	0	1,935	1,935	4,530
8	2013	687	9.37	38	6.87	12.10	6,556	0	1,962	1,962	4,594
9	2014	687	9.50	39	6.87	12.27	6,648	0	1,990	1,990	4,658
10	2015	687	9.63	39	6.87	12.44	6,741	0	2,018	2,018	4,723
11	2016	687	9.77	40	6.87	12.62	6,835	0	2,046	2,046	4,789
12	2017	687	9.91	41	6.87	12.79	6,931	0	2,075	2,075	4,857
13	2018	687	10.04	41	6.87	12.97	7,028	0	2,104	2,104	4,925
14	2019	687	10.18	42	6.87	13.15	7,127	0	2,133	2,133	4,993
15	2020	687	10.33	42	6.87	13.34	7,226	0	2,163	2,163	5,063
16	2021	343	10.47	21	3.43	13.52	3,664	0	1,097	1,097	2,567
Total =		10,166				102	$98,017	$29,950	$29,339	$59,289	$38,728
NPV =							49,258	25,750	14,744	40,494	8,764

Total NPV = $8,764
Benefit/Cost Ratio = 1.22

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and increases to revenue requirements as a direct result of the project.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

		Decreases				Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$2,919	$17	$38	$2,974	$13,350	$13,350	($10,376)
2007	4,748	28	61	4,837	9,350	9,350	(4,513)
2008	6,003	36	78	6,116	7,250	7,250	(1,134)
2009	6,087	36	79	6,202	0	0	6,202
2010	6,172	37	80	6,288	0	0	6,288
2011	6,258	37	81	6,376	0	0	6,376
2012	6,346	38	82	6,466	0	0	6,466
2013	6,435	38	83	6,556	0	0	6,556
2014	6,525	39	84	6,648	0	0	6,648
2015	6,616	39	85	6,741	0	0	6,741
2016	6,709	40	87	6,835	0	0	6,835
2017	6,803	41	88	6,931	0	0	6,931
2018	6,898	41	89	7,028	0	0	7,028
2019	6,995	42	90	7,127	0	0	7,127
2020	7,092	42	92	7,226	0	0	7,226
2021	3,596	21	46	3,664	0	0	3,664
Total =	$96,200	$574	$1,242	$98,017	$29,950	$29,950	$68,067
NPV =	48,345	288	624	49,258	25,750	25,750	23,508

Total NPV = $23,508
Benefit/Cost Ratio = 1.91

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost   (E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5) (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction F (G) = (D) - (F)
    x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environmental Damage Costs (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants' Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$2,919	$17	$38	$102	$3,076	$13,350	$50,500	$10,100	$53,750	($50,674)
2007	4,748	28	61	168	5,005	9,350	30,500	6,100	33,750	(28,745)
2008	6,003	36	78	215	6,331	7,250	20,000	4,000	23,250	(16,919)
2009	6,087	36	79	221	6,422	0	0	0	0	6,422
2010	6,172	37	80	226	6,515	0	0	0	0	6,515
2011	6,258	37	81	232	6,609	0	0	0	0	6,609
2012	6,346	38	82	238	6,704	0	0	0	0	6,704
2013	6,435	38	83	245	6,801	0	0	0	0	6,801
2014	6,525	39	84	251	6,899	0	0	0	0	6,899
2015	6,616	39	85	257	6,999	0	0	0	0	6,999
2016	6,709	40	87	264	7,100	0	0	0	0	7,100
2017	6,803	41	88	271	7,202	0	0	0	0	7,202
2018	6,898	41	89	278	7,306	0	0	0	0	7,306
2019	6,995	42	90	285	7,412	0	0	0	0	7,412
2020	7,092	42	92	293	7,519	0	0	0	0	7,519
2021	3,596	21	46	150	3,814	0	0	0	0	3,814
Total =	$96,200	$574	$1,242	$3,698	$101,714	$29,950	$101,000	$20,200	$110,750	($9,036)
NPV =	48,345	288	624	2,435	51,693	25,750	87,555	17,511	95,794	(44,101)

Total NPV = ($44,101)
Benefit/Cost Ratio = 0.54

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4) x Der
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Factor (
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

11

Table 4
Participant Test

This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Space Heat Boilers**

Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Annual Benefits Less Costs (M)
	Benefits						Costs						
2006	0.0027	$10,100	343	$11.26	3.43	$10.98	$13,968	$50,500	$0	$36	$2	$50,539	($36,571)
2007	0.0042	6,100	551	11.42	5.51	11.13	12,391	30,500	$0	40	6	30,546	(18,155)
2008	0.0041	4,000	687	11.58	6.87	11.29	11,954	20,000	$0	30	8	20,038	(8,083)
2009	0.0040	0	687	11.74	6.87	11.45	8,066	0	$0	0	8	8	8,058
2010	0.0039	0	687	11.91	6.87	11.61	8,178	0	$0	0	7	7	8,171
2011	0.0039	0	687	12.07	6.87	11.77	8,293	0	$0	0	7	7	8,286
2012	0.0038	0	687	12.24	6.87	11.93	8,409	0.	$0	0	7	7	8,402
2013	0.0037	0	687	12.41	6.87	12.10	8,527	0	$0	0	7	7	8,520
2014	0.0036	0	687	12.59	6.87	12.27	8,646	0	$0	0	7	7	8,639
2015	0.0035	0	687	12.76	6.87	12.44	8,767	0	$0	0	7	7	8,760
2016	0.0034	0	687	12.94	6.87	12.62	8,890	0	$0	0	7	7	8,883
2017	0.0033	0	687	13.12	6.87	12.79	9,014	0	$0	0	7	7	9,007
2018	0.0033	0	687	13.31	6.87	12.97	9,141	0	$0	0	7	7	9,134
2019	0.0032	0	687	13.49	6.87	13.15	9,269	0	$0	0	7	7	9,262
2020	0.0031	0	687	13.68	6.87	13.34	9,398	0	$0	0	7	7	9,392
2021	0.0030	0	343	13.88	3.43	13.52	4,765	0	0	0	3	3	4,762
			10,166				$147,676	$101,000	$0	$106		$101,211	$46,466
							$88,848	95,362	0	98		95,519	(6,671)

($6,671)
0.93

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

12

Demand-Side Management   Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilities Co.**
Project: **SD Water Heating Equipment**

Input Data

1) Retail Rate ($/dk) =	$11.11	
Escalation Rate =	1.40%	
2) Commodity Cost ($/dk) =	$8.38	
Escalation Rate =	1.40%	
3) Demand Cost ($/Unit/Yr) =	$10.83	
Escalation Rate =	1.40%	
4) Peak Reduction Factor =	1.00%	
5) Variable O&M ($/dk) =	$0.05	
Escalation Rate =	1.40%	
6) Environmental Damage Factor =	$0.2900	
Escalation Rate =	2.60%	
7) Total Sales dk =	3,035,759	
Growth Rate =	1.00%	
8) Total Customers =	36,459	
Growth Rate =	2.40%	
9) Utility Discount Rate =	8.92%	
10) Social Discount Rate =	4.97%	
11) General Input Data Year =	2005	
12) Project Analysis Year 1 =	2006	
12a) Project Analysis Year 2 =	2007	
13) Effective Fed & State Income 1	39.39%	
14) Net Operating Income Before ⁻	1.00%	

15) Utility Project Costs (First Year)		
Administrative Costs =		$3,250
Direct Operating Costs =		$0
Incentive Costs =		$5,940
Total Utility Project Costs =		$9,190
15a) Utility Project Costs (Second Year)		
Administrative Costs =		$3,250
Direct Operating Costs =		$0
Incentive Costs =		$4,440
Total Utility Project Costs =		$7,690
Third Year Costs		$7,690
16) Direct Participant Costs ($/Part.) =		$60.00
17) Other Participant Costs (Annual $/Part.) =		$0.00
Escalation Rate =		1.40%
18) Project Life (Years) =		10
19) Avg. Energy Reduction (Project) =		5.00%
20) Avg. Consumption (MCF/Part.) =		25
21) Avg. dk/Part. Saved (First Year Program) =		1.3
21a) Avg. dk/Part. Saved (Second Year Program) =		1.3
22) Number of Participants (First Year Program) =		198
22a) Number of Participants (Second Year Program) =		148
22b) Number of Participants (Third Year Program) =		148
23) Incentive/Participant (First Year Program) =		$30
23a) Incentive/Participant (Second Year Program) =		$30

Cost-Effectiveness Analysis

Summary Information

Company:	**Montana-Dakota Utilities Co.**
Project:	**SD Water Heating Equipment**

Cost Summary

Utility Cost per Participant (First Year) =	$46.41
Utility Cost per participant (Second Year) =	$51.96
Total Energy Reduction (dk)	6,230
Societal Cost per dk	$5.38
Cost per Participant per dk (First Year) =	$81.86
Cost per Participant per dk (Second Year) =	$86.12

Test Results

	NPV	B/C
Cost Comparison Test	$3,521	1.11
Revenue Requirements Test	$13,941	1.67
Societal Benefit Test	$2,879	1.09
Participant Test	$35,295	2.27

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Water Heating Equipment**

t	Year	Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
		Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Saving (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	257	$8.50	$13	2.57	$10.98	$2,229	$9,190	667	$9,857	($7,628)
2	2007	450	8.62	23	4.50	11.13	3,950	7,690	1,182	8,872	(4,922)
3	2008	642	8.74	33	6.42	11.29	5,719	7,690	1,712	9,402	(3,683)
4	2009	642	8.86	34	6.42	11.45	5,799	0	1,736	1,736	4,063
5	2010	642	8.99	34	6.42	11.61	5,880	0	1,760	1,760	4,120
6	2011	642	9.11	35	6.42	11.77	5,962	0	1,785	1,785	4,178
7	2012	642	9.24	35	6.42	11.93	6,046	0	1,810	1,810	4,236
8	2013	642	9.37	36	6.42	12.10	6,131	0	1,835	1,835	4,295
9	2014	642	9.50	36	6.42	12.27	6,216	0	1,861	1,861	4,356
10	2015	642	9.63	37	6.42	12.44	6,303	0	1,887	1,887	4,417
11	2016	385	9.77	22	3.85	12.62	3,830	0	1,146	1,146	2,683
12	2017	0	9.91	0	0.00	12.79	0	0	0	0	0
13	2018	0	10.04	0	0.00	12.97	0	0	0	0	0
14	2019	0	10.18	0	0.00	13.15	0	0	0	0	0
15	2020	0	10.33	0	0.00	13.34	0	0	0	0	0
16	2021	0	10.47	0	0.00	13.52	0	0	0	0	0
Total =		6,230			62		$58,066	$24,570	$17,380	$41,950	$16,115
NPV =							34,813	20,872	10,420	31,292	3,521

Total NPV = $3,521
Benefit/Cost Ratio =   1.11

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before
     Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and
to revenue requirements as a direct result of th

Company: **Montana-Dakota Utilities Co.**
Project: **SD Water Heating Equipment**

		Decreases			Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$2,188	$13	$28	$2,229	$9,190	$9,190	($6,961)
2007	3,877	23	50	3,950	7,690	7,690	(3,740)
2008	5,613	33	72	5,719	7,690	7,690	(1,971)
2009	5,691	34	74	5,799	0	0	5,799
2010	5,771	34	75	5,880	0	0	5,880
2011	5,852	35	76	5,962	0	0	5,962
2012	5,934	35	77	6,046	0	0	6,046
2013	6,017	36	78	6,131	0	0	6,131
2014	6,101	36	79	6,216	0	0	6,216
2015	6,187	37	80	6,303	0	0	6,303
2016	3,759	22	49	3,830	0	0	3,830
2017	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0
Total =	$56,990	$340	$736	$58,066	$24,570	$24,570	$33,496
NPV =	34,168	204	441	34,813	20,872	20,872	13,941

Total NPV = $13,941
Benefit/Cost Ratio =   1.67

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity C (E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reducti (G) = (D) - (F)
    x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **SD Water Heating Equipment**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environment Damage Cost (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$2,188	$13	$28	$77	$2,306	$9,190	$11,880	$5,940	$15,130	($12,824)
2007	3,877	23	50	137	4,088	7,690	8,880	4,440	12,130	(8,042)
2008	5,613	33	72	201	5,920	7,690	8,880	4,440	12,130	(6,210)
2009	5,691	34	74	206	6,005	0	0	0	0	6,005
2010	5,771	34	75	212	6,092	0	0	0	0	6,092
2011	5,852	35	76	217	6,180	0	0	0	0	6,180
2012	5,934	35	77	223	6,269	0	0	0	0	6,269
2013	6,017	36	78	229	6,359	0	0	0	0	6,359
2014	6,101	36	79	235	6,451	0	0	0	0	6,451
2015	6,187	37	80	241	6,544	0	0	0	0	6,544
2016	3,759	22	49	148	3,978	0	0	0	0	3,978
2017	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0
Total =	$56,990	$340	$736	$2,125	$60,191	$24,570	$29,640	$14,820	$39,390	$20,801
NPV =	34,168	204	441	1,571	36,384	20,872	25,266	12,633	33,504	2,879

Total NPV = $2,879
Benefit/Cost Ratio =   1.09

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage I
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x
        Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

Table 4

Participant Test

This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **SD Water Heating Equipment**

		Benefits					Costs						
Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Annual Benefits Less Costs (M)
2006	0.0053	$5,940	257	$11.26	2.57	$10.98	$8,839	$11,880	$0	$49	$4	$11,932	($3,093)
2007	0.0091	4,440	450	11.42	4.50	11.13	9,578	8,880	$0	70	11	8,960	617
2008	0.0088	4,440	642	11.58	6.42	11.29	11,878	8,880	$0	68	15	8,963	2,915
2009	0.0086	0	642	11.74	6.42	11.45	7,542	0	$0	0	15	15	7,527
2010	0.0084	0	642	11.91	6.42	11.61	7,648	0	$0	0	15	15	7,633
2011	0.0082	0	642	12.07	6.42	11.77	7,755	0	$0	0	15	15	7,740
2012	0.0080	0	642	12.24	6.42	11.93	7,863	0	$0	0	15	15	7,849
2013	0.0079	0	642	12.41	6.42	12.10	7,973	0	$0	0	14	14	7,959
2014	0.0077	0	642	12.59	6.42	12.27	8,085	0	$0	0	14	14	8,071
2015	0.0075	0	642	12.76	6.42	12.44	8,198	0	$0	0	14	14	8,184
2016	0.0073	0	385	12.94	3.85	12.62	4,981	0	$0	0	8	8	4,973
2017	0.0071	0	0	13.12	0.00	12.79	0	0	$0	0	0	0	0
2018	0.0070	0	0	13.31	0.00	12.97	0	0	$0	0	0	0	0
2019	0.0068	0	0	13.49	0.00	13.15	0	0	$0	0	0	0	0
2020	0.0066	0	0	13.68	0.00	13.34	0	0	$0	0	0	0	0
2021	0.0065	0	0	13.88	0.00	13.52	0	0	0	0	0	0	0
			6,230				$90,341	$29,640	$0	$186		$29,966	$60,375
							$63,075	27,519	0	170		27,780	35,295

$35,295
2.27

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

18

Demand-Side Management   Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

Input Data

1) Retail Rate ($/dk) =	$11.11	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.38	Incentive Costs =	$41,020
Escalation Rate =	1.40%	Total Utility Project Costs =	$44,270
3) Demand Cost ($/Unit/Yr) =	$10.83	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$3,250
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$24,620
		Total Utility Project Costs =	$27,870
5) Variable O&M ($/dk) =	$0.05	Third Year	$19,650
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$60.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales dk =	3,035,759	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	5.00%
8) Total Customers =	36,459		
Growth Rate =	2.40%	20) Avg. Consumption (dk/Part.) =	57
9) Utility Discount Rate =	8.92%	21) Avg. dk/Part. Saved (First Year Program) =	2.9
		21a) Avg. dk/Part. Saved (Second Year Program) =	2.9
10) Social Discount Rate =	4.97%		
		22) Number of Participants (First Year Program) =	2,051
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	1,231
		22b) Number of Participants (Third Year Program) =	820
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$20
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$20
13) Effective Fed & State Income Tax Rate =	39.39%		
14) Net Operating Income Before Taxes	1.00%		

Cost-Effectiveness Analysis

Summary Information

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

Cost Summary

Utility Cost per Participant (First Year) =	$21.58
Utility Cost per participant (Second Year) =	$22.64
Total Energy Reduction (dk)	176,059
Societal Cost per dk	$1.26
Cost per Participant per dk (First Year) =	$28.13
Cost per Participant per dk (Second Year) =	$28.50

Test Results

	NPV	B/C
Cost Comparison Test	$518,338	2.55
Revenue Requirements Test	$773,667	10.75
Societal Benefit Test	$673,619	4.04
Participant Test	$1,026,992	4.96

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

		Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
t	Year	Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Saving (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	5,948	$8.50	$302	59.48	$10.98	$51,514	$44,270	15,419	$59,689	($8,176)
2	2007	9,518	8.62	489	95.18	11.13	83,586	27,870	25,020	52,890	30,697
3	2008	11,896	8.74	620	118.96	11.29	105,933	19,650	31,708	51,358	54,574
4	2009	11,896	8.86	629	118.96	11.45	107,416	0	32,152	32,152	75,263
5	2010	11,896	8.99	638	118.96	11.61	108,920	0	32,602	32,602	76,317
6	2011	11,896	9.11	647	118.96	11.77	110,444	0	33,059	33,059	77,386
7	2012	11,896	9.24	656	118.96	11.93	111,991	0	33,522	33,522	78,469
8	2013	11,896	9.37	665	118.96	12.10	113,559	0	33,991	33,991	79,568
9	2014	11,896	9.50	674	118.96	12.27	115,148	0	34,467	34,467	80,682
10	2015	11,896	9.63	684	118.96	12.44	116,760	0	34,949	34,949	81,811
11	2016	11,896	9.77	693	118.96	12.62	118,395	0	35,439	35,439	82,956
12	2017	11,896	9.91	703	118.96	12.79	120,053	0	35,935	35,935	84,118
13	2018	11,896	10.04	713	118.96	12.97	121,733	0	36,438	36,438	85,295
14	2019	11,896	10.18	723	118.96	13.15	123,438	0	36,948	36,948	86,490
15	2020	11,896	10.33	733	118.96	13.34	125,166	0	37,465	37,465	87,700
16	2021	5,948	10.47	371	59.48	13.52	63,459	0	18,995	18,995	44,464
Total =		176,059			1,761		$1,697,514	$91,790	$508,109	$599,899	$1,097,615
NPV =							853,014	79,347	255,329	334,676	518,338

Total NPV = $518,338
Benefit/Cost Ratio = 2.55

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

21

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and i
to revenue requirements as a direct result of the

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

	Decreases				Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$50,559	$302	$653	$51,514	$44,270	$44,270	$7,244
2007	82,037	489	1,060	83,586	27,870	27,870	55,716
2008	103,970	620	1,343	105,933	19,650	19,650	86,283
2009	105,425	629	1,362	107,416	0	0	107,416
2010	106,901	638	1,381	108,920	0	0	108,920
2011	108,398	647	1,400	110,444	0	0	110,444
2012	109,915	656	1,420	111,991	0	0	111,991
2013	111,454	665	1,439	113,559	0	0	113,559
2014	113,015	674	1,460	115,148	0	0	115,148
2015	114,597	684	1,480	116,760	0	0	116,760
2016	116,201	693	1,501	118,395	0	0	118,395
2017	117,828	703	1,522	120,053	0	0	120,053
2018	119,478	713	1,543	121,733	0	0	121,733
2019	121,150	723	1,565	123,438	0	0	123,438
2020	122,846	733	1,587	125,166	0	0	125,166
2021	62,283	371	804	63,459	0	0	63,459
Total =	$1,666,059	$9,937	$21,518	$1,697,514	$91,790	$91,790	$1,605,724
NPV =	837,208	4,993	10,813	853,014	79,347	79,347	773,667

Total NPV = $773,667
Benefit/Cost Ratio =   10.75

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost ((E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5) (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction F (G) = (D) - (F)
   x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Total Demand Savings (C)	Avoided Environment: damage Cos (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$50,559	$302	$653	$1,770	$53,284	$44,270	$123,060	$41,020	$126,310	($73,026)
2007	82,037	489	1,060	2,906	86,492	27,870	73,860	24,620	77,110	9,382
2008	103,970	620	1,343	3,726	109,659	19,650	49,200	16,400	52,450	57,209
2009	105,425	629	1,362	3,823	111,239	0	0	0	0	111,239
2010	106,901	638	1,381	3,922	112,842	0	0	0	0	112,842
2011	108,398	647	1,400	4,024	114,469	0	0	0	0	114,469
2012	109,915	656	1,420	4,129	116,119	0	0	0	0	116,119
2013	111,454	665	1,439	4,236	117,795	0	0	0	0	117,795
2014	113,015	674	1,460	4,346	119,495	0	0	0	0	119,495
2015	114,597	684	1,480	4,459	121,220	0	0	0	0	121,220
2016	116,201	693	1,501	4,575	122,970	0	0	0	0	122,970
2017	117,828	703	1,522	4,694	124,747	0	0	0	0	124,747
2018	119,478	713	1,543	4,816	126,550	0	0	0	0	126,550
2019	121,150	723	1,565	4,941	128,379	0	0	0	0	128,379
2020	122,846	733	1,587	5,070	130,236	0	0	0	0	130,236
2021	62,283	371	804	2,601	66,060	0	0	0	0	66,060
Total =	$1,666,059	$9,937	$21,518	$64,039	$1,761,553	$91,790	$246,120	$82,040	$255,870	$1,505,683
NPV =	837,208	4,993	10,813	42,169	895,183	79,347	213,325	71,108	221,564	673,619

Total NPV = $673,619
Benefit/Cost Ratio = 4.04

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4) x L
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Facto
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

Table 4
Participant Test This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilites Co.**
Project: **SD Set Back Thermostat Program**

		Benefits						Costs					
Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Annual Benefits Less Costs (M)
2006	0.0549	$41,020	5,948	$11.26	59.48	$10.98	$108,050	$123,060	$0	$2,432	$847	$126,339	($18,289)
2007	0.0858	24,620	9,518	11.42	95.18	11.13	133,416	73,860	$0	2,393	2148	78,400	55,015
2008	0.0838	16,400	11,896	11.58	118.96	11.29	154,279	49,200	$0	2,337	2658	54,195	100,084
2009	0.0819	0	11,896	11.74	118.96	11.45	139,807	0	$0	0	2632	2,632	137,174
2010	0.0800	0	11,896	11.91	118.96	11.61	141,761	0	$0	0	2607	2,607	139,155
2011	0.0781	0	11,896	12.07	118.96	11.77	143,743	0	$0	0	2581	2,581	141,162
2012	0.0762	0	11,896	12.24	118.96	11.93	145,753	0	$0	0	2556	2,556	143,197
2013	0.0745	0	11,896	12.41	118.96	12.10	147,791	0	$0	0	2531	2,531	145,260
2014	0.0727	0	11,896	12.59	118.96	12.27	149,858	0	$0	0	2506	2,506	147,351
2015	0.0710	0	11,896	12.76	118.96	12.44	151,953	0	$0	0	2482	2,482	149,471
2016	0.0693	0	11,896	12.94	118.96	12.62	154,078	0	$0	0	2458	2,458	151,620
2017	0.0677	0	11,896	13.12	118.96	12.79	156,233	0	$0	0	2434	2,434	153,799
2018	0.0661	0	11,896	13.31	118.96	12.97	158,417	0	$0	0	2410	2,410	156,008
2019	0.0646	0	11,896	13.49	118.96	13.15	160,633	0	$0	0	2386	2,386	158,246
2020	0.0631	0	11,896	13.68	118.96	13.34	162,879	0	$0	0	2363	2,363	160,516
2021	0.0616	0	5,948	13.88	59.48	13.52	82,579	0	0	0	1170	1,170	81,409
			176,059				$2,291,229	$246,120	$0	$7,161		$290,050	$2,001,179
							$1,286,598	232,347	0	6,598		259,605	1,026,992

$1,026,992
4.96

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

24

ATTACHMENT A
(EAST RIVER)

Demand-Side Management   Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heating Furnace**

Input Data

1) Retail Rate ($/dk) =	$12.44	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.37	Incentive Costs =	$14,400
Escalation Rate =	1.40%	Total Utility Project Costs =	$14,800
3) Demand Cost ($/Unit/Yr) =	$10.81	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$8,550
		Total Utility Project Costs =	$8,950
5) Variable O&M ($/dk) =	$0.05	Total Utility Project Costs (Third Year) =	$6,100
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$470.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales (dk) =	305,065	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	12.00%
8) Total Customers =	4,832		
Growth Rate =	2.90%	20) Avg. Consumption (dk/Part.) =	63.1
9) Utility Discount Rate =	8.94%	21) Avg. dk/Part. Saved (First Year Program) =	7.6
		21a) Avg. dk/Part. Saved (Second Year Program) =	7.6
10) Social Discount Rate (T-Bill) =	4.97%		
		22) Number of Participants (First Year Program) =	96
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	57
		22b) Number of Participants (Third Year Program) =	38
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$150
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$150
13) Effective Fed & State Income]	39.39%		
14) Net Operating Income Before ˉ	1.00%		
as % Total Operating Income			

1

Cost-Effectiveness Analysis

Summary Information

Company:	**Montana-Dakota Utilities Co.**
Project:	**ER Space Heating Furnace**

Cost Summary

Utility Cost per Participant (First Year) =	$154.17
Utility Cost per participant (Second Year) =	$157.02
Total Energy Reduction (dk)	21,485
Societal Cost per dk	$3.67
Cost per Participant per dk (First Year) =	$82.13
Cost per Participant per dk (Second Year) =	$82.50

Test Results

	NPV	B/C
Cost Comparison Test	$30,650	1.42
Revenue Requirements Test	$78,004	4.02
Societal Benefit Test	$30,177	1.38
Participant Test	$105,267	2.21

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heating Furnace**

t	Year	Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
		Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Savings (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	730	$8.49	$37	7.30	$10.96	$6,312	$14,800	2,878	$17,678	($11,366)
2	2007	1,163	8.61	60	11.63	11.11	10,201	8,950	4,651	13,601	(3,401)
3	2008	1,452	8.73	76	14.52	11.27	12,913	6,100	5,888	11,988	925
4	2009	1,452	8.85	77	14.52	11.43	13,093	0	5,970	5,970	7,123
5	2010	1,452	8.98	78	14.52	11.59	13,277	0	6,054	6,054	7,223
6	2011	1,452	9.10	79	14.52	11.75	13,463	0	6,139	6,139	7,324
7	2012	1,452	9.23	80	14.52	11.91	13,651	0	6,225	6,225	7,426
8	2013	1,452	9.36	81	14.52	12.08	13,842	0	6,312	6,312	7,530
9	2014	1,452	9.49	82	14.52	12.25	14,036	0	6,400	6,400	7,636
10	2015	1,452	9.62	83	14.52	12.42	14,233	0	6,490	6,490	7,743
11	2016	1,452	9.76	85	14.52	12.60	14,432	0	6,581	6,581	7,851
12	2017	1,452	9.89	86	14.52	12.77	14,634	0	6,673	6,673	7,961
13	2018	1,452	10.03	87	14.52	12.95	14,839	0	6,766	6,766	8,072
14	2019	1,452	10.17	88	14.52	13.13	15,046	0	6,861	6,861	8,185
15	2020	1,452	10.32	89	14.52	13.32	15,257	0	6,957	6,957	8,300
16	2021	722	10.46	45	7.22	13.50	7,695	0	3,509	3,509	4,186
Total =		21,485			215		$206,923	$29,850	$94,354	$124,204	$82,719
NPV =							103,849	25,845	47,354	73,198	30,650

Total NPV = $30,650
Benefit/Cost Ratio = 1.42

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before
    Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

3

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and
to revenue requirements as a direct result of the

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heating Furnace**

	Decreases				Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$6,195	$37	$80	$6,312	$14,800	$14,800	($8,488)
2007	10,012	60	129	10,201	8,950	8,950	1,251
2008	12,673	76	164	12,913	6,100	6,100	6,813
2009	12,851	77	166	13,093	0	0	13,093
2010	13,031	78	168	13,277	0	0	13,277
2011	13,213	79	171	13,463	0	0	13,463
2012	13,398	80	173	13,651	0	0	13,651
2013	13,586	81	175	13,842	0	0	13,842
2014	13,776	82	178	14,036	0	0	14,036
2015	13,969	83	180	14,233	0	0	14,233
2016	14,164	85	183	14,432	0	0	14,432
2017	14,363	86	185	14,634	0	0	14,634
2018	14,564	87	188	14,839	0	0	14,839
2019	14,768	88	191	15,046	0	0	15,046
2020	14,974	89	193	15,257	0	0	15,257
2021	7,552	45	97	7,695	0	0	7,695
Total =	$203,089	$1,213	$2,622	$206,923	$29,850	$29,850	$177,073
NPV =	101,924	609	1,316	103,849	25,845	25,845	78,004

Total NPV = $78,004
Benefit/Cost Ratio =   4.02

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2) (E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)   (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Fac (G) = (D) - (F)
   x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heating Furnace**

		Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environment. Damage Cos (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants' Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$6,195	$37	$80	$217	$6,529	$14,800	$45,120	$14,400	$45,520	($38,991)
2007	10,012	60	129	355	10,556	8,950	26,790	8,550	27,190	(16,634)
2008	12,673	76	164	455	13,367	6,100	17,860	5,700	18,260	(4,893)
2009	12,851	77	166	466	13,560	0	0	0	0	13,560
2010	13,031	78	168	479	13,755	0	0	0	0	13,755
2011	13,213	79	171	491	13,954	0	0	0	0	13,954
2012	13,398	80	173	504	14,155	0	0	0	0	14,155
2013	13,586	81	175	517	14,359	0	0	0	0	14,359
2014	13,776	82	178	530	14,566	0	0	0	0	14,566
2015	13,969	83	180	544	14,777	0	0	0	0	14,777
2016	14,164	85	183	558	14,990	0	0	0	0	14,990
2017	14,363	86	185	573	15,207	0	0	0	0	15,207
2018	14,564	87	188	588	15,426	0	0	0	0	15,426
2019	14,768	88	191	603	15,649	0	0	0	0	15,649
2020	14,974	89	193	619	15,876	0	0	0	0	15,876
2021	7,552	45	97	316	8,011	0	0	0	0	8,011
Total =	$203,089	$1,213	$2,622	$7,814	$214,738	$29,850	$89,770	$28,650	$90,970	$123,768
NPV =	101,924	609	1,316	5,146	108,995	25,845	77,805	24,831	78,818	30,177

Total NPV = $30,177
Benefit/Cost Ratio = 1.38

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4)
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Fac
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

5

Table 4
Participant Test   This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heating Furnace**

		Benefits					Costs						Annual
Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Benefits Less Costs (M)
2006	0.0193	$14,400	730	$12.61	7.30	$10.96	$23,603	$45,120	$0	$286	$56	$45,461	($21,858)
2007	0.0299	8,550	1,163	12.79	11.63	11.11	23,425	26,790	$0	268	139	27,197	(3,772)
2008	0.0291	5,700	1,452	12.97	14.52	11.27	24,529	17,860	$0	177	171	18,208	6,320
2009	0.0282	0	1,452	13.15	14.52	11.43	19,092	0	$0	0	169	169	18,924
2010	0.0274	0	1,452	13.33	14.52	11.59	19,359	0	$0	0	166	166	19,193
2011	0.0267	0	1,452	13.52	14.52	11.75	19,630	0	$0	0	164	164	19,467
2012	0.0259	0	1,452	13.71	14.52	11.91	19,905	0	$0	0	161	161	19,744
2013	0.0252	0	1,452	13.90	14.52	12.08	20,183	0	$0	0	159	159	20,024
2014	0.0245	0	1,452	14.10	14.52	12.25	20,466	0	$0	0	157	157	20,309
2015	0.0238	0	1,452	14.29	14.52	12.42	20,752	0	$0	0	154	154	20,598
2016	0.0231	0	1,452	14.49	14.52	12.60	21,043	0	$0	0	152	152	20,891
2017	0.0225	0	1,452	14.70	14.52	12.77	21,337	0	$0	0	150	150	21,187
2018	0.0218	0	1,452	14.90	14.52	12.95	21,636	0	$0	0	148	148	21,488
2019	0.0212	0	1,452	15.11	14.52	13.13	21,939	0	$0	0	146	146	21,793
2020	0.0206	0	1,452	15.32	14.52	13.32	22,246	0	$0	0	143	143	22,102
2021	0.0200	0	722	15.54	7.22	13.50	11,219	0	0	0	70	70	11,149
			21,485				$330,365	$89,770	$0	$731		$92,806	$237,559
							$192,011	84,760	0	681		86,745	105,267

$105,267
2.21

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

6

Demand-Side Management   Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

Input Data

1) Retail Rate ($/dk) =	$12.44	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.37	Incentive Costs =	$1,400
Escalation Rate =	1.40%	Total Utility Project Costs =	$1,800
3) Demand Cost ($/Unit/Yr) =	$10.81	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$800
		Total Utility Project Costs =	$1,200
5) Variable O&M ($/dk) =	$0.05	Total Utility Project Costs (Third Year) =	$900
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$500.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales dk =	305,065	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	6.00%
8) Total Customers =	4,832		
Growth Rate =	2.90%	20) Avg. Consumption (dk/Part.) =	63
9) Utility Discount Rate =	8.94%	21) Avg. dk/Part. Saved (First Year Program) =	3.8
		21a) Avg. dk/Part. Saved (Second Year Program) =	3.8
10) Social Discount Rate =	4.97%		
		22) Number of Participants (First Year Program) =	14
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	8
		22b) Number of Participants (Third Year Program) =	5
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$100
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$100
13) Effective Fed & State Income Ta:	39.39%		
14) Net Operating Income Before Ta as % Total Operating Income	1.00%		

Cost-Effectiveness Analysis

Summary Information

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

Cost Summary

Utility Cost per Participant (First Year) =	$128.57
Utility Cost per participant (Second Year) =	$150.00
Total Energy Reduction (dk)	1,520
Societal Cost per dk	$8.38
Cost per Participant per dk (First Year) =	$165.41
Cost per Participant per dk (Second Year) =	$171.05

Test Results

	NPV	B/C
Cost Comparison Test	$644	1.10
Revenue Requirements Test	$4,000	2.19
Societal Benefit Test	($5,020)	0.61
Participant Test	$1,438	1.11

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

		Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
t	Year	Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Savings (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	53	$8.49	$3	0.53	$10.96	$460	$1,800	210	$2,010	($1,550)
2	2007	84	8.61	4	0.84	11.11	733	1,200	334	1,534	(801)
3	2008	103	8.73	5	1.03	11.27	913	900	416	1,316	(403)
4	2009	103	8.85	5	1.03	11.43	925	0	422	422	503
5	2010	103	8.98	5	1.03	11.59	938	0	428	428	511
6	2011	103	9.10	6	1.03	11.75	952	0	434	434	518
7	2012	103	9.23	6	1.03	11.91	965	0	440	440	525
8	2013	103	9.36	6	1.03	12.08	978	0	446	446	532
9	2014	103	9.49	6	1.03	12.25	992	0	452	452	540
10	2015	103	9.62	6	1.03	12.42	1,006	0	459	459	547
11	2016	103	9.76	6	1.03	12.60	1,020	0	465	465	555
12	2017	103	9.89	6	1.03	12.77	1,034	0	472	472	563
13	2018	103	10.03	6	1.03	12.95	1,049	0	478	478	571
14	2019	103	10.17	6	1.03	13.13	1,063	0	485	485	579
15	2020	103	10.32	6	1.03	13.32	1,078	0	492	492	587
16	2021	49	10.46	3	0.49	13.50	526	0	240	240	286
Total =		1,520				15	$14,635	$3,900	$6,673	$10,573	$4,061
NPV =							7,359	3,360	3,356	6,715	644

Total NPV = $644
Benefit/Cost Ratio =   1.10

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and increases to revenue requirements as a direct result of the project.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

		Decreases			Increases		
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$452	$3	$6	$460	$1,800	$1,800	($1,340)
2007	720	4	9	733	1,200	1,200	(467)
2008	896	5	12	913	900	900	13
2009	908	5	12	925	0	0	925
2010	921	5	12	938	0	0	938
2011	934	6	12	952	0	0	952
2012	947	6	12	965	0	0	965
2013	960	6	12	978	0	0	978
2014	974	6	13	992	0	0	992
2015	987	6	13	1,006	0	0	1,006
2016	1,001	6	13	1,020	0	0	1,020
2017	1,015	6	13	1,034	0	0	1,034
2018	1,029	6	13	1,049	0	0	1,049
2019	1,044	6	13	1,063	0	0	1,063
2020	1,058	6	14	1,078	0	0	1,078
2021	517	3	7	526	0	0	526

Total =	$14,363	$86	$185	$14,635	$3,900	$3,900	$10,735
NPV =	7,223	43	93	7,359	3,360	3,360	4,000

Total NPV = $4,000
Benefit/Cost Ratio = 2.19

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction
   x Demand Cost (3)
(D) = (A) + (B) + (C)

(E) = Total Utility Project Costs (15)
(F) = (E)
F (G) = (D) - (F)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environmental Damage Costs (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants' Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$452	$3	$6	$16	$476	$1,800	$7,000	$1,400	$7,400	($6,924)
2007	720	4	9	26	759	1,200	4,000	800	4,400	(3,641)
2008	896	5	12	32	945	900	2,500	500	2,900	(1,955)
2009	908	5	12	33	958	0	0	0	0	958
2010	921	5	12	34	972	0	0	0	0	972
2011	934	6	12	35	986	0	0	0	0	986
2012	947	6	12	36	1,000	0	0	0	0	1,000
2013	960	6	12	37	1,015	0	0	0	0	1,015
2014	974	6	13	37	1,030	0	0	0	0	1,030
2015	987	6	13	38	1,044	0	0	0	0	1,044
2016	1,001	6	13	39	1,060	0	0	0	0	1,060
2017	1,015	6	13	40	1,075	0	0	0	0	1,075
2018	1,029	6	13	42	1,090	0	0	0	0	1,090
2019	1,044	6	13	43	1,106	0	0	0	0	1,106
2020	1,058	6	14	44	1,122	0	0	0	0	1,122
2021	517	3	7	22	548	0	0	0	0	548
Total =	$14,363	$86	$185	$553	$15,187	$3,900	$13,500	$2,700	$14,700	$487
NPV =	7,223	43	93	364	7,723	3,360	11,730	2,346	12,743	(5,020)

Total NPV = ($5,020)
Benefit/Cost Ratio = 0.61

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4) x Der
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Factor (
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

Table 4
Participant Test

This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Space Heat Boilers**

| Year | Ratio of Part. to Total Customers (A) | Benefits | | | | | Costs | | | | | | Annual Benefits Less Costs (M) |
		Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reductior (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	
2006	0.0028	$1,400	53	$12.61	0.53	$10.96	$2,071	$7,000	$0	$5	$1	$7,006	($4,935)
2007	0.0043	800	84	12.79	0.84	11.11	1,869	4,000	$0	5	1	4,007	(2,137)
2008	0.0042	500	103	12.97	1.03	11.27	1,831	2,500	$0	5	2	2,507	(676)
2009	0.0041	0	103	13.15	1.03	11.43	1,349	0	$0	0	2	2	1,347
2010	0.0039	0	103	13.33	1.03	11.59	1,368	0	$0	0	2	2	1,366
2011	0.0038	0	103	13.52	1.03	11.75	1,387	0	$0	0	2	2	1,386
2012	0.0037	0	103	13.71	1.03	11.91	1,407	0	$0	0	2	2	1,405
2013	0.0036	0	103	13.90	1.03	12.08	1,426	0	$0	0	2	2	1,425
2014	0.0035	0	103	14.10	1.03	12.25	1,446	0	$0	0	2	2	1,445
2015	0.0034	0	103	14.29	1.03	12.42	1,467	0	$0	0	2	2	1,465
2016	0.0033	0	103	14.49	1.03	12.60	1,487	0	$0	0	2	2	1,486
2017	0.0032	0	103	14.70	1.03	12.77	1,508	0	$0	0	2	2	1,506
2018	0.0031	0	103	14.90	1.03	12.95	1,529	0	$0	0	2	2	1,527
2019	0.0031	0	103	15.11	1.03	13.13	1,550	0	$0	0	1	1	1,549
2020	0.0030	0	103	15.32	1.03	13.32	1,572	0	$0	0	1	1	1,571
2021	0.0029	0	49	15.54	0.49	13.50	768	0	0	0	1	1	767
			1,520				$24,035	$13,500	$0	$15		$13,539	$10,496
							$14,243	12,778	0	14		12,806	1,438

$1,438
1.11

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

Demand-Side Management   Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

Input Data

1) Retail Rate ($/dk) =	$12.44	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.37	Incentive Costs =	$780
Escalation Rate =	1.40%	Total Utility Project Costs =	$1,180
3) Demand Cost ($/Unit/Yr) =	$10.81	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$600
		Total Utility Project Costs =	$1,000
5) Variable O&M ($/dk) =	$0.05	Total Utility Project Costs (Third Year)=	$1,000
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$60.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales dk =	305,065	18) Project Life (Years) =	10
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	5.00%
8) Total Customers =	4,832		
Growth Rate =	2.90%	20) Avg. Consumption (MCF/Part.) =	25
9) Utility Discount Rate =	8.94%	21) Avg. dk/Part. Saved (First Year Program) =	1.3
		21a) Avg. dk/Part. Saved (Second Year Program) =	1.3
10) Social Discount Rate =	4.97%		
		22) Number of Participants (First Year Program) =	26
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	20
		22b) Number of Participants (Second Year Program) =	20
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$30
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$30
13) Effective Fed & State Income ⅂	39.39%		
14) Net Operating Income Before ⁻	1.00%		

Cost-Effectiveness Analysis

Summary Information

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

Cost Summary

Utility Cost per Participant (First Year) = $45.38
Utility Cost per participant (Second Year) = $50.00

Total Energy Reduction (dk)   832
Societal Cost per dk $5.27

Cost per Participant per dk (First Year) = $81.07
Cost per Participant per dk (Second Year) = $84.62

Test Results

	NPV	B/C
Cost Comparison Test	($177)	0.96
Revenue Requirements Test	$1,937	1.72
Societal Benefit Test	$461	1.11
Participant Test	$5,487	2.48

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

		Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
t	Year	Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Saving (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	34	$8.49	$2	0.34	$10.96	$292	$1,180	133	$1,313	($1,021)
2	2007	60	8.61	3	0.60	11.11	525	1,000	239	1,239	(715)
3	2008	86	8.73	4	0.86	11.27	763	1,000	348	1,348	(585)
4	2009	86	8.85	5	0.86	11.43	774	0	353	353	421
5	2010	86	8.98	5	0.86	11.59	785	0	358	358	427
6	2011	86	9.10	5	0.86	11.75	796	0	363	363	433
7	2012	86	9.23	5	0.86	11.91	807	0	368	368	439
8	2013	86	9.36	5	0.86	12.08	818	0	373	373	445
9	2014	86	9.49	5	0.86	12.25	830	0	378	378	451
10	2015	86	9.62	5	0.86	12.42	841	0	384	384	458
11	2016	52	9.76	3	0.52	12.60	517	0	236	236	281
12	2017	0	9.89	0	0.00	12.77	0	0	0	0	0
13	2018	0	10.03	0	0.00	12.95	0	0	0	0	0
14	2019	0	10.17	0	0.00	13.13	0	0	0	0	0
15	2020	0	10.32	0	0.00	13.32	0	0	0	0	0
16	2021	0	10.46	0	0.00	13.50	0	0	0	0	0
Total =		832			8		$7,748	$3,180	$3,533	$6,713	$1,035
NPV =							4,636	2,699	2,114	4,813	(177)

Total NPV = ($177)
Benefit/Cost Ratio = 0.96

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and
to revenue requirements as a direct result of th

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

	Decreases			Increases			
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$287	$2	$4	$292	$1,180	$1,180	($888)
2007	515	3	7	525	1,000	1,000	(475)
2008	749	4	10	763	1,000	1,000	(237)
2009	760	5	10	774	0	0	774
2010	770	5	10	785	0	0	785
2011	781	5	10	796	0	0	796
2012	792	5	10	807	0	0	807
2013	803	5	10	818	0	0	818
2014	814	5	11	830	0	0	830
2015	826	5	11	841	0	0	841
2016	507	3	7	517	0	0	517
2017	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0
Total =	$7,604	$45	$98	$7,748	$3,180	$3,180	$4,568
NPV =	4,550	27	59	4,636	2,699	2,699	1,937

Total NPV = $1,937
Benefit/Cost Ratio =   1.72

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity C (E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reducti (G) = (D) - (F)
    x Demand Cost (3)
(D) = (A) + (B) + (C)

16

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Saving (B)	Total Demand Savings (C)	Avoided Environmenta Damage Cos (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants Costs (G)	Incentives Paid to Participant: (H)	Annual Total Increase (I)	Net Change (J)
2006	$287	$2	$4	$10	$302	$1,180	$1,560	$780	$1,960	($1,658)
2007	515	3	7	18	543	1,000	1,200	600	1,600	(1,057)
2008	749	4	10	27	790	1,000	1,200	600	1,600	(810)
2009	760	5	10	28	801	0	0	0	0	801
2010	770	5	10	28	813	0	0	0	0	813
2011	781	5	10	29	825	0	0	0	0	825
2012	792	5	10	30	837	0	0	0	0	837
2013	803	5	10	31	849	0	0	0	0	849
2014	814	5	11	31	861	0	0	0	0	861
2015	826	5	11	32	873	0	0	0	0	873
2016	507	3	7	20	537	0	0	0	0	537
2017	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0
Total =	$7,604	$45	$98	$284	$8,032	$3,180	$3,960	$1,980	$5,160	$2,872
NPV =	4,550	27	59	210	4,846	2,699	3,371	1,686	4,385	461

Total NPV = $461
Benefit/Cost Ratio = 1.11

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage I
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

17

Table 4
Participant Test

This test quantifies the benefits and costs that accrue directly to the participant.

Company: **Montana-Dakota Utilities Co.**
Project: **ER Water Heating Equipment**

	Ratio of	Benefits					Costs						Annual
	Part.		Total		Peak		Total	Direct	Other	Utility		Total	Benefits
	to Total	Incentives	Energy	Retail	Demand	Demand	Annual	Part.	Part.	Project	Lost	Annual	Less
Year	Customers	Received	Reduction	Rate	Reduction	Cost	Benefits	Costs	Costs	Costs	Margin	Costs	Costs
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
2006	0.0052	$780	34	$12.61	0.34	$10.96	$1,206	$1,560	$0	$6	$1	$1,567	($361)
2007	0.0090	600	60	12.79	0.60	11.11	1,365	1,200	$0	9	2	1,211	154
2008	0.0087	600	86	12.97	0.86	11.27	1,713	1,200	$0	9	3	1,212	501
2009	0.0085	0	86	13.15	0.86	11.43	1,128	0	$0	0	3	3	1,125
2010	0.0083	0	86	13.33	0.86	11.59	1,144	0	$0	0	3	3	1,141
2011	0.0080	0	86	13.52	0.86	11.75	1,160	0	$0	0	3	3	1,157
2012	0.0078	0	86	13.71	0.86	11.91	1,176	0	$0	0	3	3	1,173
2013	0.0076	0	86	13.90	0.86	12.08	1,193	0	$0	0	3	3	1,190
2014	0.0074	0	86	14.10	0.86	12.25	1,210	0	$0	0	3	3	1,207
2015	0.0072	0	86	14.29	0.86	12.42	1,226	0	$0	0	3	3	1,224
2016	0.0070	0	52	14.49	0.52	12.60	754	0	$0	0	2	2	752
2017	0.0068	0	0	14.70	0.00	12.77	0	0	$0	0	0	0	0
2018	0.0066	0	0	14.90	0.00	12.95	0	0	$0	0	0	0	0
2019	0.0064	0	0	15.11	0.00	13.13	0	0	$0	0	0	0	0
2020	0.0062	0	0	15.32	0.00	13.32	0	0	$0	0	0	0	0
2021	0.0060	0	0	15.54	0.00	13.50	0	0	0	0	0	0	0
			832				$13,275	$3,960	$0	$24		$4,012	$9,264
							$9,199	3,673	0	22		3,713	5,487

$5,487
2.48

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

Demand-Side Management Cost-Effectiveness Analysis

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

Input Data

1) Retail Rate ($/dk) =	$12.44	15) Utility Project Costs (First Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
2) Commodity Cost ($/dk) =	$8.37	Incentive Costs =	$5,440
Escalation Rate =	1.40%	Total Utility Project Costs =	$5,840
3) Demand Cost ($/Unit/Yr) =	$10.81	15a) Utility Project Costs (Second Year)	
Escalation Rate =	1.40%	Administrative Costs =	$400
		Direct Operating Costs =	$0
4) Peak Reduction Factor =	1.00%	Incentive Costs =	$3,260
		Total Utility Project Costs =	$3,660
5) Variable O&M ($/dk) =	$0.05	Total Utility Project Costs (Third Year) =	$2,580
Escalation Rate =	1.40%	16) Direct Participant Costs ($/Part.) =	$60.00
6) Environmental Damage Factor =	$0.2900	17) Other Participant Costs (Annual $/Part.) =	$0.00
Escalation Rate =	2.60%	Escalation Rate =	1.40%
7) Total Sales dk =	305,065	18) Project Life (Years) =	15
Growth Rate =	1.00%		
		19) Avg. Energy Reduction (Project) =	5.00%
8) Total Customers =	4,832		
Growth Rate =	2.90%	20) Avg. Consumption (dk/Part.) =	63
9) Utility Discount Rate =	8.94%	21) Avg. dk/Part. Saved (First Year Program) =	3.2
		21a) Avg. dk/Part. Saved (Second Year Program) =	3.2
10) Social Discount Rate =	4.97%		
		22) Number of Participants (First Year Program) =	272
11) General Input Data Year =	2005	22a) Number of Participants (Second Year Program) =	163
		22b) Number of Participants (Third Year Program) =	109
12) Project Analysis Year 1 =	2006	23) Incentive/Participant (First Year Program) =	$20
12a) Project Analysis Year 2 =	2007	23a) Incentive/Participant (Second Year Program) =	$20
13) Effective Fed & State Income Tax Rate =	39.39%		
14) Net Operating Income Before Taxes	1.00%		

Cost-Effectiveness Analysis

Summary Information

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

Cost Summary

Utility Cost per Participant (First Year) = $21.47
Utility Cost per participant (Second Year) = $22.45

Total Energy Reduction (dk)   25,763
Societal Cost per dk $1.14

Cost per Participant per dk (First Year) = $25.46
Cost per Participant per dk (Second Year) = $25.77

Test Results

	NPV	B/C
Cost Comparison Test	$57,288	1.85
Revenue Requirements Test	$114,056	11.92
Societal Benefit Test	$101,374	4.46
Participant Test	$171,998	5.76

20

Table 1
Cost Comparison Test

This test compares the cost of energy saved to the total cost of saving that same amount of energy.

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

		Cost of Energy Saved					Project Cost				Cost of Energy Saved Less Project Cost
t	Year	Total Energy Reduction (A)	Commodity Cost (B)	Variable O & M Cost Saving (C)	Peak Demand Reduction (D)	Demand Cost (E)	Annual Cost of Energy Saved (F)	Utility Project Costs (G)	Lost Margin (H)	Annual Project Costs (I)	(J)
1	2006	870	$8.49	$44	8.70	$10.96	$7,530	$5,840	3,434	$9,274	($1,743)
2	2007	1,392	8.61	72	13.92	11.11	12,212	3,660	5,568	9,228	2,983
3	2008	1,741	8.73	91	17.41	11.27	15,485	2,580	7,061	9,641	5,844
4	2009	1,741	8.85	92	17.41	11.43	15,702	0	7,160	7,160	8,542
5	2010	1,741	8.98	93	17.41	11.59	15,922	0	7,260	7,260	8,662
6	2011	1,741	9.10	95	17.41	11.75	16,145	0	7,362	7,362	8,783
7	2012	1,741	9.23	96	17.41	11.91	16,371	0	7,465	7,465	8,906
8	2013	1,741	9.36	97	17.41	12.08	16,600	0	7,569	7,569	9,031
9	2014	1,741	9.49	99	17.41	12.25	16,832	0	7,675	7,675	9,157
10	2015	1,741	9.62	100	17.41	12.42	17,068	0	7,783	7,783	9,285
11	2016	1,741	9.76	101	17.41	12.60	17,307	0	7,892	7,892	9,415
12	2017	1,741	9.89	103	17.41	12.77	17,549	0	8,002	8,002	9,547
13	2018	1,741	10.03	104	17.41	12.95	17,795	0	8,114	8,114	9,681
14	2019	1,741	10.17	106	17.41	13.13	18,044	0	8,228	8,228	9,816
15	2020	1,741	10.32	107	17.41	13.32	18,297	0	8,343	8,343	9,954
16	2021	870	10.46	54	8.70	13.50	9,276	0	4,230	4,230	5,047

Total =		25,763				258	$248,136	$12,080	$113,146	$125,226	$122,909
NPV =							124,496	10,440	56,769	67,209	57,288

Total NPV = $57,288
Benefit/Cost Ratio = 1.85

(A) = Energy Reduction/Part. (21) x Participants (22)
(B) = Commodity Cost (2)
(C) = (A) x Variable O&M (5)
(D) = (A) x Peak Reduction Factor (4)
(E) = Demand Cost (3)

(F) = (A)x(B) + (C) + (D)x(E)
(G) = Total Utility Project Costs (15)
(H) = [1 - Effective Tax Rate (13) x % Net Income Before Taxes (14)] x [(A) x Retail Rate (1) - (F)]
(I) = (G) + (H)
(J) = (F) - (I)

Table 2
Revenue Requirements Test

This test quantifies incremental decreases and i
to revenue requirements as a direct result of the

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

	Decreases			Increases			
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Peak Demand Savings (C)	Annual Total Decrease (D)	Utility Program Costs (E)	Annual Total Increase (F)	Net Change (G)
2006	$7,391	$44	$95	$7,530	$5,840	$5,840	$1,690
2007	11,985	72	155	12,212	3,660	3,660	8,552
2008	15,198	91	196	15,485	2,580	2,580	12,905
2009	15,411	92	199	15,702	0	0	15,702
2010	15,627	93	202	15,922	0	0	15,922
2011	15,846	95	205	16,145	0	0	16,145
2012	16,067	96	207	16,371	0	0	16,371
2013	16,292	97	210	16,600	0	0	16,600
2014	16,521	99	213	16,832	0	0	16,832
2015	16,752	100	216	17,068	0	0	17,068
2016	16,986	101	219	17,307	0	0	17,307
2017	17,224	103	222	17,549	0	0	17,549
2018	17,465	104	225	17,795	0	0	17,795
2019	17,710	106	229	18,044	0	0	18,044
2020	17,958	107	232	18,297	0	0	18,297
2021	9,105	54	118	9,276	0	0	9,276
Total =	$243,538	$1,454	$3,144	$248,136	$12,080	$12,080	$236,056
NPV =	122,189	730	1,577	124,496	10,440	10,440	114,056

Total NPV = $114,056
Benefit/Cost Ratio = 11.92

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost ((E) = Total Utility Project Costs (15)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5) (F) = (E)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction F (G) = (D) - (F)
 x Demand Cost (3)
(D) = (A) + (B) + (C)

Table 3
Societal Benefit Test

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

	Decreases					Increases				
Year	Total Energy Savings (A)	Variable O & M Cost Savings (B)	Total Demand Savings (C)	Avoided Environmenta amage Cos (D)	Annual Total Decrease (E)	Utility Program Costs (F)	Total Participants Costs (G)	Incentives Paid to Participants (H)	Annual Total Increase (I)	Net Change (J)
2006	$7,391	$44	$95	$259	$7,789	$5,840	$16,320	$5,440	$16,720	($8,931)
2007	11,985	72	155	425	12,637	3,660	9,780	3,260	10,180	2,457
2008	15,198	91	196	545	16,031	2,580	6,540	2,180	6,940	9,091
2009	15,411	92	199	559	16,261	0	0	0	0	16,261
2010	15,627	93	202	574	16,496	0	0	0	0	16,496
2011	15,846	95	205	589	16,734	0	0	0	0	16,734
2012	16,067	96	207	604	16,975	0	0	0	0	16,975
2013	16,292	97	210	620	17,220	0	0	0	0	17,220
2014	16,521	99	213	636	17,468	0	0	0	0	17,468
2015	16,752	100	216	653	17,721	0	0	0	0	17,721
2016	16,986	101	219	670	17,977	0	0	0	0	17,977
2017	17,224	103	222	687	18,236	0	0	0	0	18,236
2018	17,465	104	225	705	18,500	0	0	0	0	18,500
2019	17,710	106	229	723	18,767	0	0	0	0	18,767
2020	17,958	107	232	742	19,039	0	0	0	0	19,039
2021	9,105	54	118	381	9,657	0	0	0	0	9,657
Total =	$243,538	$1,454	$3,144	$9,371	$257,507	$12,080	$32,640	$10,880	$33,840	$223,667
NPV =	122,189	730	1,577	6,171	130,667	10,440	28,280	9,427	29,293	101,374

Total NPV = $101,374
Benefit/Cost Ratio =   4.46

(A) = Energy Reduction/Part. (21) x Participants (22) x Commodity Cost (2)
(B) = Energy Reduction/Part. (21) x Participants (22) x Variable O&M (5)
(C) = Energy Reduction/Part. (21) x Participants (22) x Peak Reduction Factor (4) x C
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Facto
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs (15)
(G) = Direct (16) x Other (17) Participant Costs x Participants (22)
(H) = Incentive Costs (15)
(I) = (F) + (G) - (H)
(J) = (E) - (I)

23

Table 4
Participant Test

Company: **Montana-Dakota Utilites Co.**
Project: **ER Set Back Thermostat Program**

This test quantifies the benefits and costs that accrue directly to the participant.

		Benefits						Costs					Annual Benefits
Year	Ratio of Part. to Total Customers (A)	Incentives Received (B)	Total Energy Reduction (C)	Retail Rate (D)	Peak Demand Reduction (E)	Demand Cost (F)	Total Annual Benefits (G)	Direct Part. Costs (H)	Other Part. Costs (I)	Utility Project Costs (J)	Lost Margin (K)	Total Annual Costs (L)	Annual Benefits Less Costs (M)
2006	0.0547	$5,440	870	$12.61	8.70	$10.96	$16,423	$16,320	$0	$319	$188	$16,827	($404)
2007	0.0850	3,260	1,392	12.79	13.92	11.11	21,075	9,780	$0	311	473	10,565	10,510
2008	0.0826	2,180	1,741	12.97	17.41	11.27	24,770	6,540	$0	302	583	7,426	17,345
2009	0.0803	0	1,741	13.15	17.41	11.43	22,906	0	$0	0	575	575	22,331
2010	0.0780	0	1,741	13.33	17.41	11.59	23,226	0	$0	0	567	567	22,660
2011	0.0758	0	1,741	13.52	17.41	11.75	23,551	0	$0	0	558	558	22,993
2012	0.0737	0	1,741	13.71	17.41	11.91	23,880	0	$0	0	550	550	23,330
2013	0.0716	0	1,741	13.90	17.41	12.08	24,214	0	$0	0	542	542	23,672
2014	0.0696	0	1,741	14.10	17.41	12.25	24,553	0	$0	0	534	534	24,019
2015	0.0676	0	1,741	14.29	17.41	12.42	24,896	0	$0	0	526	526	24,370
2016	0.0657	0	1,741	14.49	17.41	12.60	25,244	0	$0	0	519	519	24,726
2017	0.0639	0	1,741	14.70	17.41	12.77	25,597	0	$0	0	511	511	25,086
2018	0.0621	0	1,741	14.90	17.41	12.95	25,955	0	$0	0	504	504	25,452
2019	0.0603	0	1,741	15.11	17.41	13.13	26,318	0	$0	0	496	496	25,822
2020	0.0586	0	1,741	15.32	17.41	13.32	26,686	0	$0	0	489	489	26,197
2021	0.0570	0	870	15.54	8.70	13.50	13,530	0	0	0	241	241	13,289
		25,763					$372,828	$32,640	$0	$933		$41,431	$331,397
							$208,107	30,808	0	860		36,110	171,998

$171,998
5.76

Taxes (14)] x {(C) x [(D) - Commodity Cost (2)] - (A) x (E) x (F)}

ATTACHMENT B
(BLACK HILLS)

Montana-Dakota Utiilties Co.
Gas Utility - South Dakota (Black Hills)
Gas Conservation Tracking Adjustment

Estimated Conservation Program Costs:

High Efficiency Furnace Replacement	$111,400	1/
High Efficienty Boiler Replacement	13,350	2/
High Efficiency Water Heater Replacement	9,190	3/
Programmable Thermostats	44,270	4/
Energy Audits	10,798	
Conservation Starter Kits	13,456	
	$202,464	

Estimated Dk Savings	11,523 5/	
Currently Effective Distribution Delivery Charge	$1.571	
Annual Distribution Margin Loss		$18,103

Total Conservation Tracking Adjustment Balance	$220,567
Projected Firm Sales	5,112,187 dk
Estimated Tracking Adjustment	$0.043 per dk

1/ Attachment B, Page 3.
2/ Attachment B, Page 4.
3/ Attachment B, Page 5.
4/ Attachment B, Page 6.
5/ Attachment B, Page 2.

Montana-Dakota Utilities Co.
Gas Utility - South Dakota (Black Hills)
Summary of DSM Model Runs

Benefit Cost Ratios

Program	Utility	Rate Payer	Societal	Partcipant
High Efficiency Furnace	1.74	3.65	1.26	1.87
High Efficiency Boiler	1.22	1.91	0.54	0.93
High Efficiency Water Heater	1.11	1.67	1.09	2.27
Programmable Thermostats	2.55	10.75	4.04	4.96
Energy Audits (BH Share)	NA	NA	NA	NA
Weatherization Kits (BH Share)	NA	NA	NA	NA

All Programs (3 Year Implementation)

Program	Cost Per Participant	Year 1 Cost	Year 2 Cost	Year 3 Cost	Total Cost	Annual Dk Reduced	Project Life	Total Dk Reduction
High Efficiency Furnace	$157.00	$111,400	$68,200	$46,450	$226,050	4,975	15	147,260
High Efficiency Boiler	148.00	13,350	9,350	7,250	29,950	343	15	10,166
High Efficiency Water Heater	50.00	9,190	7,690	7,690	24,570	257	10	6,230
Programmable Thermostats	22.00	44,270	27,870	19,650	91,790	5,948	15	176,059
Energy Audits (BH Share)	0.30	10,798	2,388	2,388	15,574	NA	NA	NA
Weatherization Kits (BH Share)	2.00	13,456	13,456	13,456	40,368	NA	NA	NA
Totals		$202,464	$128,954	$96,884	$428,302	11,523		339,715

Energy Calc Workup (SD)

Heating Energy per Household

2004 - Rate case Numbers

Customers	36,459	
Total Dk Volumes (Norm)	3,035,759	
Water Heating Volumes (Assumed)	947,934	Based on 26 dk/customer & all customers have water heating
Heating dk Volumes (Calculated)	2,087,825	
Avg Total Use per Customer	83.3	
Avg Water Heating use per Customer	26.0	
Avg Heating Use for SD	57.3	

State	Total Firm Customers	% Allocation
North Dakota	86,451	35.18%
South Dakota - Black Hills	41,328	16.82%
South Dakota - East River	5,648	2.30%
Montana	74,010	30.13%
Wyoming	15,491	6.31%
Minnesota- GPNG	20,740	8.44%
GPNG - Wahpeton	2,003	0.82%
Total Firm Customers	**245,671**	**100.00%**

Intial Cost of Energy Audit Software	$	50,000
Annual Maintenance Energy Audits	$	14,200
Weatherization Kits	$	2.00
Total Kits		40,000

SD (Black Hills) Residential High Efficiency Furnace
Energy Star Rated (90% plus)

Customer Class:	Residential

Cost Montana-Dakota

				$/Part		Total $ Yr 1		Total $ Yr 2		Total $ Yr 3		Total $
Operating Costs				$ -	$	-	$	-	$	-	$	-
Incentive Costs	$	150.00	Incentive	$ 150	$	108,150	$	64,950	$	43,200	$	216,300
Administrative & Advertising				$ 7	$	3,250	$	3,250	$	3,250	$	9,750
Total Cost				**$ 157**	**$**	**111,400**	**$**	**68,200**	**$**	**46,450**	**$**	**226,050**

Notes
Administrative cost is estimated at $3,250 per year for Montana-Dakota
Incentive is $150.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model (80% AFUE)	$ 700	75,000 BTUH
Cost of High Efficiency Model (90% AFUE)	$ 1,170	75,000 BTUH
Increased Cost of Higher Eff Model	**$ 470**	

Participation Rate Calculation

	% of Cust	Cust
Total Customers in Class	100.00%	36,459
Total Customers with Gas Forced-Air Heating	79.10%	28,839

Total Available for Program		28,839		
Total Estimated Saturation Percentage		5.0%		
Total Participants		**1,442**		3.96% of total Customer Base
Participation Year 1	2005-2006	721	50%	
Participation Year 2	2007	433	30%	
Participation Year 3	2008	288	20%	

Energy Savings Calculation

Equipment	Efficiency	Annual Dk	
Base Efficiency	78%	57.3	Energy Star LBNL 2004
High Efficiency	90%	50.4	
Energy Reduction	**12%**	**6.9**	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	6.9	dk
Total Year 1	4,975	dk
Total Year 3	9,950	dk

SD (Black Hills) Residential High Efficiency Boilers
Energy Star Rated (85% plus)

Customer Class:	Residential

Cost Montana-Dakota

				$/Part	Total $ Yr 1	Total $ Yr 2	Total $ Yr 3	Total $
Operating Costs				$ -	$ -	$ -	$ -	$ -
Incentive Costs	$	100.00	Incentive	$ 100	$ 10,100	$ 6,100	$ 4,000	$ 20,200
Administrative & Advertising				$ 48	$ 3,250	$ 3,250	$ 3,250	$ 9,750
Total Cost				**$ 148**	**$ 13,350**	**$ 9,350**	**$ 7,250**	**$ 29,950**

Notes
Administrative cost is estimated at $3,250 per year for Montana-Dakota
Incentive is $100.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model (80% AFUE)	$	700
Cost of High Efficiency Model (86% AFUE)	$	1,200
Increased Cost of Higher Eff Model	**$**	**500**

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	36,459
Total Customers with Gas Boilers	11.10%	4,047

Total Available for Program	4,047		
Total Estimated Saturation Percentage	5.0%		
Total Participants	**202**		0.55% of total Customer Base
Participation Year 1	2005-2006	101	50%
Participation Year 2	2007	61	30%
Participation Year 3	2008	40	20%

Energy Savings Calculation

Equipment	Efficiency	Annual Dk	
Existing Units	80%	57.3	Energy Star LBNL 2004
High Efficiency	86%	53.9	
Energy Reduction	**6%**	**3.4**	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	3.4	dk
Total Year 1	343	dk
Total Year 3	687	dk

SD (Black Hills) Residential High Efficiency Water Heaters
Minimum Energy Factor of .62

Customer Class:	Residential

Cost Montana-Dakota

				$/Part		Total $ Yr 1		Total $ Yr 2		Total $ Yr 3		Total $
Operating Costs				$ -	$	-	$	-	$	-	$	-
Incentive Costs	$	30.00	Incentive	$ 30	$	5,940	$	4,440	$	4,440	$	14,820
Administrative & Advertising				$ 20	$	3,250	$	3,250	$	3,250	$	9,750
Total Cost				$ 50	$	9,190	$	7,690	$	7,690	$	24,570

Notes
Administrative cost is estimated at $3,250 per year for Montana-Dakota
Incentive is $30.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model	$ 438	40 Gallon
Cost of High Efficiency Model	$ 498	40 Gallon
Increased Cost of Higher Eff Model	$ 60	

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	36,459
Total Customers with Gas Water Heaters	67.70%	24,683

Total Available for Program		24,683		
Total Estimated Saturation Percentage		2.0%		
Total Participants		494		1.35% of total Customer Base
Participation Year 1	2005-2006	198	40%	
Participation Year 2	2007	148	30%	
Participation Year 3	2008	148	30%	

Energy Savings Calculation

Equipment	Energy Factor	Annual Dk	
Std Eff Std Vent	57%	26.0	American Council for an Energy Efficient Economy
High Eff Std Vent	62%	24.7	Power shots energy factor is higher at .62 and .64 (GPCR)
Energy Reduction	5%	1.3	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	1.3	dk
Total Year 1	257	dk
Total Year 3	642	dk

SD (Black Hills) Residential Programmable Thermostats
Energy Star Rated

Customer Class: | Residential

Cost Montana-Dakota

				$/Part	Total $ Yr 1	Total $ Yr 2	Total $ Yr 3	Total $
Operating Costs				$ -	$ -	$ -	$ -	$ -
Incentive Costs	$	20.00	Incentive	$ 20	$ 41,020	$ 24,620	$ 16,400	$ 82,040
Administrative & Advertising				$ 2	$ 3,250	$ 3,250	$ 3,250	$ 9,750
Total Cost				**$ 22**	**$ 44,270**	**$ 27,870**	**$ 19,650**	**$ 91,790**

Notes
Administrative cost is estimated at $3,250 per year for Montana-Dakota
Incentive cost is $20.00

Participant Costs (Incremental Cost Basis)

Standard Thermostat	$ 40	Industry Data Energy Star
Programmable Thermostat	$ 100	Industry Data Energy Star
Increased Cost of Higher Effiency Model	**$ 60**	

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	36,459
Customer available for Thermostat	75.00%	27,344

Total Available for Program	27,344			
Total Estimated Saturation Percentage	15.0%			
Total Participants	**4,102**		11.25% of total Customer Base	
Participation Year 1	2005-2006	2,051	50%	
Participation Year 2	2007	1,231	30%	
Participation Year 3	2008	820	20%	

Energy Savings Calculation

Equipment	Degree Setback	% saving per degree		Annual Dk	
Standard T-Stat	-	NA		57.3	Average use per Montana-Dakota Customer (Residential)
Programmable T-Stat	5	1%		54.4	Per Energy Star
Energy Reduction		5%		**2.9**	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	2.9	dk
Total Year 1	5,948	dk
Total Year 3	11,896	dk

ATTACHMENT B
(EAST RIVER)

Montana-Dakota Utiilties Co.
Gas Utility - South Dakota (East River)
Gas Conservation Tracking Adjustment

Estimated Conservation Program Costs:

High Efficiency Furnace Replacement	$14,800	1/
High Efficienty Boiler Replacement	1,800	2/
High Efficiency Water Heater Replacement	1,180	3/
Programmable Thermostats	5,840	4/
Energy Audits	1,477	
Conservation Starter Kits	1,840	
	$26,937	

Estimated Dk Savings	1,687 5/		
Currently Effective Distribution Delivery Charge	$2.915		
Annual Distribution Margin Loss		$4,918	
Total Conservation Tracking Adjustment Balance		$31,855	
Projected Firm Sales		645,188	dk
Estimated Tracking Adjustment		$0.049	per dk

1/ Attachment B, Page 3.
2/ Attachment B, Page 4.
3/ Attachment B, Page 5.
4/ Attachment B, Page 6.
5/ Attachment B, Page 2.

Montana-Dakota Utilities Co.
Gas Utility - South Dakota (East River)
Summary of DSM Model Runs

Benefit Cost Ratios

Program	Utility	Rate Payer	Societal	Participant
High Efficiency Furnace	1.42	4.02	1.38	2.21
High Efficiency Boiler	1.10	2.19	0.61	1.11
High Efficiency Water Heater	0.96	1.72	1.11	2.48
Programmable Thermostats	1.85	11.92	4.46	5.76
Energy Audits (East River Share)	NA	NA	NA	NA
Weatherization Kits (East River Share)	NA	NA	NA	NA

All Programs (3 Year Implementation)

Program	Cost Per Participant	Year 1 Cost	Year 2 Cost	Year 3 Cost	Total Cost	Annual Dk Reduced	Project Life	Total Dk Reduction
High Efficiency Furnace	$156.00	$14,800	$8,950	$6,100	$29,850	730	15	21,485
High Efficiency Boiler	144.00	1,800	1,200	900	3,900	53	15	1,520
High Efficiency Water Heater	48.00	1,180	1,000	1,000	3,180	34	10	832
Programmable Thermostats	22.00	5,840	3,660	2,580	12,080	870	15	25,763
Energy Audits (East River Share)	0.31	1,477	327	327	2,131	NA	NA	NA
Weatherization Kits (East River Share)	2.00	1,840	1,840	1,840	5,520	NA	NA	NA
Totals		$26,937	$16,977	$12,747	$56,661	1,687		49,600

SD (East River) Residential High Efficiency Furnace
Energy Star Rated (90% plus)

Customer Class:	Residential

Cost Montana-Dakota

				$/Part		Total $ Yr 1		Total $ Yr 2		Total $ Yr 3		Total $
Operating Costs			$	-	$	-	$	-	$	-	$	-
Incentive Costs	$	150.00	Incentive	$	150	$	14,400	$	8,550	$	5,700	$ 28,650
Administrative & Advertising				$	6	$	400	$	400	$	400	$ 1,200
Total Cost				$	**156**	$	**14,800**	$	**8,950**	$	**6,100**	$ **29,850**

Notes
Administrative cost is estimated at $400 per year for Montana-Dakota
Incentive is $150.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model (80% AFUE)	$ 700	75,000 BTUH
Cost of High Efficiency Model (90% AFUE)	$ 1,170	75,000 BTUH
Increased Cost of Higher Eff Model	$ 470	

Participation Rate Calculation

	% of Cust	Cust
Total Customers in Class	100.00%	4,832
Total Customers with Gas Forced-Air Heating	79.10%	3,822

Total Available for Program	3,822		
Total Estimated Saturation Percentage	5.0%		
Total Participants	**191**		3.95% of total Customer Base
Participation Year 1	2005-2006	96	50%
Participation Year 2	2007	57	30%
Participation Year 3	2008	38	20%

Energy Savings Calculation

Equipment	Efficiency	Annual Dk	
Base Efficiency	78%	63.1	Energy Star LBNL 2004
High Efficiency	90%	55.5	
Energy Reduction	**12%**	**7.6**	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	7.6	dk
Total Year 1	730	dk
Total Year 3	1,452	dk

SD (East River) Residential High Efficiency Boilers
Energy Star Rated (85% plus)

Customer Class:	Residential

Cost Montana-Dakota

				$/Part		Total $ Yr 1		Total $ Yr 2		Total $ Yr 3		Total $
Operating Costs				$ -	$	-	$	-	$	-	$	-
Incentive Costs	$	100.00	Incentive	$ 100	$	1,400	$	800	$	500	$	2,700
Administrative & Advertising				$ 44	$	400	$	400	$	400	$	1,200
Total Cost				**$ 144**	**$**	**1,800**	**$**	**1,200**	**$**	**900**	**$**	**3,900**

Notes
Administrative cost is estimated at $400 per year for Montana-Dakota
Incentive is $100.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model (80% AFUE)	$ 700
Cost of High Efficiency Model (86% AFUE)	$ 1,200
Increased Cost of Higher Eff Model	**$ 500**

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	4,832
Total Customers with Gas Boilers	11.10%	536

Total Available for Program	536		
Total Estimated Saturation Percentage	5.0%		
Total Participants	**27**		0.56% of total Customer Base
Participation Year 1	2005-2006	14	50%
Participation Year 2	2007	8	30%
Participation Year 3	2008	5	20%

Energy Savings Calculation

Equipment	Efficiency	Annual Dk	
Existing Units	80%	63.1	Energy Star LBNL 2004
High Efficiency	86%	59.3	
Energy Reduction	**6%**	**3.8**	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	3.8	dk
Total Year 1	53	dk
Total Year 3	103	dk

SD (East River) Residential High Efficiency Water Heaters
Minimum Energy Factor of .62

Customer Class:	Residential

Cost Montana-Dakota

				$/Part	Total $ Yr 1	Total $ Yr 2	Total $ Yr 3	Total $
Operating Costs				$ -	$ -	$ -	$ -	$ -
Incentive Costs	$	30.00	Incentive	$ 30	$ 780	$ 600	$ 600	$ 1,980
Administrative & Advertising				$ 18	$ 400	$ 400	$ 400	$ 1,200
Total Cost				$ 48	$ 1,180	$ 1,000	$ 1,000	$ 3,180

Notes
Administrative cost is estimated at $400 per year for Montana-Dakota
Incentive is $30.00

Participant Costs (Incremental Cost Basis)

Cost of STD Efficiency Model	$ 438	40 Gallon
Cost of High Efficiency Model	$ 498	40 Gallon
Increased Cost of Higher Eff Model	$ 60	

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	4,832
Total Customers with Gas Water Heaters	67.70%	3,271

Total Available for Program		3,271	
Total Estimated Saturation Percentage		2.0%	
Total Participants		65	1.35% of total Customer Base
Participation Year 1	2005-2006	26	40%
Participation Year 2	2007	20	30%
Participation Year 3	2008	20	30%

Energy Savings Calculation

Equipment	Energy Factor	Annual Dk	
Std Eff Std Vent	57%	26.0	American Council for an Energy Efficient Economy
High Eff Std Vent	62%	24.7	Power shots energy factor is higher at .62 and .64 (GPCR)
Energy Reduction	5%	1.3	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	1.3	dk
Total Year 1	34	dk
Total Year 3	85	dk

SD (East River) Residential Programmable Thermostats
Energy Star Rated

Customer Class:	Residential

Cost Montana-Dakota

			$/Part	Total $ Yr 1	Total $ Yr 2	Total $ Yr 3	Total $
Operating Costs			$ -	$ -	$ -	$ -	$ -
Incentive Costs	$ 20.00	Incentive	$ 20	$ 5,440	$ 3,260	$ 2,180	$ 10,880
Administrative & Advertising			$ 2	$ 400	$ 400	$ 400	$ 1,200
Total Cost			$ 22	$ 5,840	$ 3,660	$ 2,580	$ 12,080

Notes
Administrative cost is estimated at $400 per year for Montana-Dakota
Incentive cost is $20.00

Participant Costs (Incremental Cost Basis)

Standard Thermostat	$ 40	Industry Data Energy Star
Programmable Thermostat	$ 100	Industry Data Energy Star
Increased Cost of Higher Effiency Model	$ 60	

Participation Rate Calculation

	% of Cust	Customers
Total Customers in Class	100.00%	4,832
Customer available for Thermostat	75.00%	3,624

Total Available for Program		3,624	
Total Estimated Saturation Percentage		15.0%	
Total Participants		544	11.26% of total Customer Base
Participation Year 1	2005-2006	272	50%
Participation Year 2	2007	163	30%
Participation Year 3	2008	109	20%

Energy Savings Calculation

Equipment	Degree Setback	% saving per degree	Annual Dk	
Standard T-Stat	-	NA	63.1	Average use per Montana-Dakota Customer (Residential)
Programmable T-Stat	5	1%	59.9	Per Energy Star
Energy Reduction		5%	3.2	Actual savings will vary by customer depending on use and other factors.

Gas Reduction Annual per Participant	3.2	dk
Total Year 1	870	dk
Total Year 3	1,741	dk

3. **Describe how MDU would advertise each of the proposed programs or make customer's aware of their existence. Describe how MDU would interact with non-MDU contractors with regard to this program including making other contractors aware of the program, and utilizing other contractors for sale, installation and repair of appliances.**

Response:

Montana-Dakota plans to advertise the proposed programs through bill inserts and also through the network of HVAC dealers throughout Montana-Dakota's service territory. Montana-Dakota maintains a list of dealers and information regarding the programs along with the appropriate forms will be mailed to those dealers. Additional information or point of purchase materials will be developed and provided to those dealers as well.

4. **Provide the analysis supporting the Administrative and Advertising cost for each program as shown on Attachment B.**

Response:

The administrative and advertising expenses included in the cost analysis were estimated based on anticipated costs to promote the programs as described in Response 3 and the expenses to administer the program rebates. A total of $13,000 was assigned to Black Hills and $1,600 to East River with approximately 50% of that associated with advertising and 50% associated with administrative costs. Actual amounts will be submitted to the Commission prior to implementation of the Conservation Tracking Adjustment each year.