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

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

ORIGINAL



January 12, 2006

Ms. Patricia Van Gerpen
Executive Director
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 Ms. Van Gerpen:

Montana-Dakota Utilities Co. (Montana-Dakota), a Division of MDU Resources Group, Inc., herewith requests Commission approval of a revised portfolio of Natural Gas Conservation Programs along with the associated Conservation Tracking Adjustment.

Montana-Dakota appreciates the Commission's consideration of the Company's portfolio of conservation programs that will serve to promote a long term solution to the volatile natural gas markets facing consumers today and as expected to continue into the future. Montana-Dakota also believes this proposal is in alignment with provisions of the Energy Policy Act of 2005 relating to conservation and finally, will serve to promote the NARUC's *Resolution on Energy Efficiency and Innovative Rate Design* adopted by the NARUC on November 16, 2005. As part of this resolution, NARUC recognized that "Energy conservation and energy efficiency are, in the short term, the actions most likely to reduce upward pressure on natural gas prices and to assist in bringing energy prices down, to the benefit of all natural gas consumers;"...

As discussed with Commissioners and Staff at the Commission's December 20, 2005 Agenda Meeting, Montana-Dakota is revising the original proposed portfolio of programs filed in this Docket to target those that provide the most savings to

customers. Upon further review, Montana-Dakota proposes to implement the following programs:

1. Customer Conservation Starter Kits
2. High-Efficiency Furnace Incentive
3. Programmable Thermostats

By focusing on those programs that provide the highest payback to the participants and to all customers, the estimated cost of the programs, based on assumed participation rates, will be reduced from $220,567 to $187,404 for Black Hills customers and from $31,855 to $22,544 for East River customers. The estimated cost recovery amount is also reduced and would be $.037 per dk in the Black Hills area and $.042 per dk in the East River rate area. Please see Attachment A for test results supporting the refined portfolio of conservation programs as noted above.

In response to questions regarding the assumed participation levels, a sensitivity analysis was run for each program in each rate area. Positive results continue to be produced under 1) a scenario assuming the participation level in each program is half of what was assumed in the original analysis and 2) a scenario assuming the participation level is double that what was assumed in the original analysis.

We look forward to moving ahead with the proposed conservation programs as set forth herein and encourage the Commission to approve this proposal.

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

Donald R. Ball
Vice President – Regulatory Affairs

Attachments
cc: D. A. Gerdes

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

| | | | |
|---|---|---|---|
| **Estimated Conservation Program Costs:** | | | |
| High Efficiency Furnace Replacement | | $114,650 | 1/ |
| Programmable Thermostats | | 47,520 | 2/ |
| Conservation Starter Kits | | 8,074 | |
| | | $170,244 | |
| Estimated Dk Savings | 10,923 3/ | | |
| Currently Effective Distribution Delivery Charge | $1.571 | | |
| Annual Distribution Margin Loss | | $17,160 | |
| Total Conservation Tracking Adjustment Balance | | $187,404 | |
| Projected Firm Sales | | 5,112,187 | dk |
| Estimated Tracking Adjustment | | $0.037 | per dk |

1/ Attachment A, Page 3.
2/ Attachment A, Page 4.
3/ Attachment A, 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 | 2.13 | 2.13 | 1.24 | 1.87 |
| Programmable Thermostats | 3.49 | 3.49 | 2.31 | 5.10 |
| 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 | $164.00 | $114,650 | $71,450 | $49,700 | $235,800 | 4,975 | 15 | 147,260 |
| Programmable Thermostats | 25.00 | 47,520 | 31,120 | 22,900 | 101,540 | 5,948 | 15 | 176,059 |
| Weatherization Kits (BH Share) | 1.20 | 8,074 | 8,074 | 8,074 | 24,222 | NA | NA | NA |
| **Totals** | | **$170,244** | **$110,644** | **$80,674** | **$361,562** | **10,923** | | **323,319** |

# 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 | | | | $ 14 | $ 6,500 | $ 6,500 | $ 6,500 | $ 19,500 |
| **Total Cost** | | | | **$ 164** | **$ 114,650** | **$ 71,450** | **$ 49,700** | **$ 235,800** |

**Notes**
Administrative cost is estimated at $6,500 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 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 | | | | $ 5 | $ 6,500 | $ 6,500 | $ 6,500 | $ 19,500 |
| **Total Cost** | | | | **$ 25** | **$ 47,520** | **$ 31,120** | **$ 22,900** | **$ 101,540** |

**Notes**
Administrative cost is estimated at $6,500 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 |

**Demand-Side Management** Cost-Effectiveness Analysis

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

**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 (T-Bill) = | 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 T | 39.00% |
| 14) Net Operating Income Before<br>as % Total Operating Income | 1.00% |

| | |
|---|---|
| 15) Utility Project Costs (First Year) | |
| Administrative Costs = | $6,500 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $108,150 |
| Total Utility Project Costs = | $114,650 |
| 15a) Utility Project Costs (Second Year) | |
| Administrative Costs = | $6,500 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $64,950 |
| Total Utility Project Costs = | $71,450 |
| Third Year Costs | $49,700 |
| 16) Direct Participant Costs ($/Part.) = | $470.00 |
| 17) Other Participant Costs (Annual $/Part.) = | $0.00 |
| Escalation Rate = | 1.40% |
| 18) Project Life (Years) = | 15 |
| 19) Avg. Energy Reduction (Project) = | 12.00% |
| 20) Avg. Consumption (dk/Part.) = | 57 |
| 21) Avg. dk/Part. Saved (First Year Program) = | 6.9 |
| 21a) Avg. dk/Part. Saved (Second Year Program) = | 6.9 |
| 22) Number of Participants (First Year Program) = | 721 |
| 22a) Number of Participants (Second Year Program) = | 433 |
| 22b) Number of Participants (Third Year Program) = | 288 |
| 23) Incentive/Participant (First Year Program) = | $150 |
| 23a) Incentive/Participant (Second Year Program) = | $150 |
| 24) Distribution Margin | $1.571 |
| Escalation Rate = | 1.40% |

**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) = | $159.02 |
| Utility Cost per participant (Second Year) = | $165.01 |
| Total Energy Reduction (dk) | 147,260 |
| Societal Cost per dk | $4.10 |
| Cost per Participant per dk (First Year) = | $91.16 |
| Cost per Participant per dk (Second Year) = | $92.03 |

**Test Results**

| | NPV | B/C |
|---|---|---|
| **Cost Comparison Test** | $378,295 | 2.13 |
| **Revenue Requirements Test** | $378,295 | 2.13 |
| **Societal Benefit Test** | $144,838 | 1.24 |
| **Participant Test** | $566,105 | 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 | $114,650 | 7,925 | $122,575 | ($79,488) |
| 2 | 2007 | 7,963 | 8.62 | 409 | 79.63 | 11.13 | 69,928 | 71,450 | 12,862 | 84,312 | (14,384) |
| 3 | 2008 | 9,950 | 8.74 | 519 | 99.50 | 11.29 | 88,603 | 49,700 | 16,297 | 65,997 | 22,607 |
| 4 | 2009 | 9,950 | 8.86 | 526 | 99.50 | 11.45 | 89,844 | 0 | 16,525 | 16,525 | 73,319 |
| 5 | 2010 | 9,950 | 8.99 | 533 | 99.50 | 11.61 | 91,102 | 0 | 16,756 | 16,756 | 74,345 |
| 6 | 2011 | 9,950 | 9.11 | 541 | 99.50 | 11.77 | 92,377 | 0 | 16,991 | 16,991 | 75,386 |
| 7 | 2012 | 9,950 | 9.24 | 548 | 99.50 | 11.93 | 93,670 | 0 | 17,229 | 17,229 | 76,442 |
| 8 | 2013 | 9,950 | 9.37 | 556 | 99.50 | 12.10 | 94,982 | 0 | 17,470 | 17,470 | 77,512 |
| 9 | 2014 | 9,950 | 9.50 | 564 | 99.50 | 12.27 | 96,312 | 0 | 17,715 | 17,715 | 78,597 |
| 10 | 2015 | 9,950 | 9.63 | 572 | 99.50 | 12.44 | 97,660 | 0 | 17,963 | 17,963 | 79,697 |
| 11 | 2016 | 9,950 | 9.77 | 580 | 99.50 | 12.62 | 99,027 | 0 | 18,214 | 18,214 | 80,813 |
| 12 | 2017 | 9,950 | 9.91 | 588 | 99.50 | 12.79 | 100,414 | 0 | 18,469 | 18,469 | 81,944 |
| 13 | 2018 | 9,950 | 10.04 | 596 | 99.50 | 12.97 | 101,819 | 0 | 18,728 | 18,728 | 83,092 |
| 14 | 2019 | 9,950 | 10.18 | 604 | 99.50 | 13.15 | 103,245 | 0 | 18,990 | 18,990 | 84,255 |
| 15 | 2020 | 9,950 | 10.33 | 613 | 99.50 | 13.34 | 104,690 | 0 | 19,256 | 19,256 | 85,434 |
| 16 | 2021 | 4,975 | 10.47 | 311 | 49.75 | 13.52 | 53,078 | 0 | 9,763 | 9,763 | 43,315 |
| Total = | | 147,260 | | | 1,473 | | $1,419,838 | $235,800 | $261,152 | $496,952 | $922,887 |
| NPV = | | | | | | | 713,485 | 203,959 | 131,232 | 335,190 | 378,295 |

Total NPV = $378,295
Benefit/Cost Ratio = 2.13

(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 in
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 & Lost Margin (E) | Annual Total Increase (F) | Net Change (G) |
| 2006 | $42,288 | $252 | $546 | $43,087 | $122,575 | $122,575 | ($79,488) |
| 2007 | 68,633 | 409 | 886 | 69,928 | 84,312 | 84,312 | (14,384) |
| 2008 | 86,962 | 519 | 1,123 | 88,603 | 65,997 | 65,997 | 22,607 |
| 2009 | 88,179 | 526 | 1,139 | 89,844 | 16,525 | 16,525 | 73,319 |
| 2010 | 89,414 | 533 | 1,155 | 91,102 | 16,756 | 16,756 | 74,345 |
| 2011 | 90,665 | 541 | 1,171 | 92,377 | 16,991 | 16,991 | 75,386 |
| 2012 | 91,935 | 548 | 1,187 | 93,670 | 17,229 | 17,229 | 76,442 |
| 2013 | 93,222 | 556 | 1,204 | 94,982 | 17,470 | 17,470 | 77,512 |
| 2014 | 94,527 | 564 | 1,221 | 96,312 | 17,715 | 17,715 | 78,597 |
| 2015 | 95,850 | 572 | 1,238 | 97,660 | 17,963 | 17,963 | 79,697 |
| 2016 | 97,192 | 580 | 1,255 | 99,027 | 18,214 | 18,214 | 80,813 |
| 2017 | 98,553 | 588 | 1,273 | 100,414 | 18,469 | 18,469 | 81,944 |
| 2018 | 99,933 | 596 | 1,291 | 101,819 | 18,728 | 18,728 | 83,092 |
| 2019 | 101,332 | 604 | 1,309 | 103,245 | 18,990 | 18,990 | 84,255 |
| 2020 | 102,750 | 613 | 1,327 | 104,690 | 19,256 | 19,256 | 85,434 |
| 2021 | 52,094 | 311 | 673 | 53,078 | 9,763 | 9,763 | 43,315 |
| Total = | $1,393,528 | $8,312 | $17,998 | $1,419,838 | $496,952 | $496,952 | $922,887 |
| NPV = | 700,264 | 4,177 | 9,044 | 713,485 | 335,190 | 335,190 | 378,295 |

Total NPV = $378,295
Benefit/Cost Ratio = 2.13

(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 Facto
x Demand Cost (3)
(D) = (A) + (B) + (C)
(E) = Total Utility Project Costs plus
(F) = (E)
(G) = (D) - (F)

**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 | $114,650 | $338,870 | $108,150 | $345,370 | ($300,803) |
| 2007 | 68,633 | 409 | 886 | 2,431 | 72,359 | 71,450 | 203,510 | 64,950 | 210,010 | (137,651) |
| 2008 | 86,962 | 519 | 1,123 | 3,116 | 91,720 | 49,700 | 135,360 | 43,200 | 141,860 | (50,140) |
| 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 | $235,800 | $677,740 | $216,300 | $697,240 | $776,162 |
| NPV = | 700,264 | 4,177 | 9,044 | 35,271 | 748,756 | 203,959 | 587,440 | 187,481 | 603,918 | 144,838 |

Total NPV = $144,838
Benefit/Cost Ratio = 1.24

(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)

**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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.0193 | $108,150 | 4,975 | $11.26 | 49.75 | $10.98 | $164,195 | $338,870 | $0 | $2,214 | $153 | $341,237 | ($177,042) |
| 2007 | 0.0302 | 64,950 | 7,963 | 11.42 | 79.63 | 11.13 | 155,919 | 203,510 | $0 | 2,157 | 388 | 206,055 | (50,136) |
| 2008 | 0.0295 | 43,200 | 9,950 | 11.58 | 99.50 | 11.29 | 158,463 | 135,360 | $0 | 1,465 | 480 | 137,305 | 21,157 |
| 2009 | 0.0288 | 0 | 9,950 | 11.74 | 99.50 | 11.45 | 116,876 | 0 | $0 | 0 | 476 | 476 | 116,400 |
| 2010 | 0.0281 | 0 | 9,950 | 11.91 | 99.50 | 11.61 | 118,511 | 0 | $0 | 0 | 471 | 471 | 118,040 |
| 2011 | 0.0275 | 0 | 9,950 | 12.07 | 99.50 | 11.77 | 120,169 | 0 | $0 | 0 | 466 | 466 | 119,703 |
| 2012 | 0.0268 | 0 | 9,950 | 12.24 | 99.50 | 11.93 | 121,851 | 0 | $0 | 0 | 462 | 462 | 121,389 |
| 2013 | 0.0262 | 0 | 9,950 | 12.41 | 99.50 | 12.10 | 123,556 | 0 | $0 | 0 | 457 | 457 | 123,099 |
| 2014 | 0.0256 | 0 | 9,950 | 12.59 | 99.50 | 12.27 | 125,285 | 0 | $0 | 0 | 453 | 453 | 124,832 |
| 2015 | 0.0250 | 0 | 9,950 | 12.76 | 99.50 | 12.44 | 127,039 | 0 | $0 | 0 | 449 | 449 | 126,590 |
| 2016 | 0.0244 | 0 | 9,950 | 12.94 | 99.50 | 12.62 | 128,816 | 0 | $0 | 0 | 444 | 444 | 128,372 |
| 2017 | 0.0238 | 0 | 9,950 | 13.12 | 99.50 | 12.79 | 130,619 | 0 | $0 | 0 | 440 | 440 | 130,179 |
| 2018 | 0.0233 | 0 | 9,950 | 13.31 | 99.50 | 12.97 | 132,447 | 0 | $0 | 0 | 435 | 435 | 132,011 |
| 2019 | 0.0227 | 0 | 9,950 | 13.49 | 99.50 | 13.15 | 134,301 | 0 | $0 | 0 | 431 | 431 | 133,869 |
| 2020 | 0.0222 | 0 | 9,950 | 13.68 | 99.50 | 13.34 | 136,180 | 0 | $0 | 0 | 427 | 427 | 135,753 |
| 2021 | 0.0217 | 0 | 4,975 | 13.88 | 49.75 | 13.52 | 69,043 | 0 | 0 | 0 | 211 | 211 | 68,831 |
| | | | 147,260 | | | | $2,063,270 | $677,740 | $0 | $5,836 | | $690,221 | $1,373,050 |
| | | | | | | | $1,215,090 | 639,822 | 0 | 5,429 | | 648,985 | 566,105 |

$566,105
1.87

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: **SD Set Back Thermostat Program**

**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 Tax Rate = | 39.00% |
| 14) Net Operating Income Before Taxes | 1.00% |

| | |
|---|---|
| 15) Utility Project Costs (First Year) | |
| Administrative Costs = | $6,500 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $41,020 |
| Total Utility Project Costs = | $47,520 |
| 15a) Utility Project Costs (Second Year) | |
| Administrative Costs = | $6,500 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $24,620 |
| Total Utility Project Costs = | $31,120 |
| Third Year | $22,900 |
| 16) Direct Participant Costs ($/Part.) = | $60.00 |
| 17) Other Participant Costs (Annual $/Part.) = | $0.00 |
| Escalation Rate = | 1.40% |
| 18) Project Life (Years) = | 15 |
| 19) Avg. Energy Reduction (Project) = | 5.00% |
| 20) Avg. Consumption (dk/Part.) = | 57 |
| 21) Avg. dk/Part. Saved (First Year Program) = | 2.9 |
| 21a) Avg. dk/Part. Saved (Second Year Program) = | 2.9 |
| 22) Number of Participants (First Year Program) = | 2,051 |
| 22a) Number of Participants (Second Year Program) = | 1,231 |
| 22b) Number of Participants (Third Year Program) = | 820 |
| 23) Incentive/Participant (First Year Program) = | $20 |
| 23a) Incentive/Participant (Second Year Program) = | $20 |
| 24) Distribution Margin | $1.571 |
| Escalation Rate = | 1.40% |

Cost-Effectiveness Analysis

**Summary Information**

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

**Cost Summary**

| | |
|---|---|
| Utility Cost per Participant (First Year) = | $23.17 |
| Utility Cost per participant (Second Year) = | $25.28 |
| Total Energy Reduction (dk) | 176,059 |
| Societal Cost per dk | $2.20 |
| Cost per Participant per dk (First Year) = | $28.68 |
| Cost per Participant per dk (Second Year) = | $29.41 |

**Test Results**

| | NPV | B/C |
|---|---|---|
| **Cost Comparison Test** | $608,533 | 3.49 |
| **Revenue Requirements Test** | $608,533 | 3.49 |
| **Societal Benefit Test** | $508,485 | 2.31 |
| **Participant Test** | $1,034,293 | 5.10 |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) | Saved Less Project Cost (J) |
| 1 | 2006 | 5,948 | $8.50 | $302 | 59.48 | $10.98 | $51,514 | $47,520 | $9,475 | $56,995 | ($5,481) |
| 2 | 2007 | 9,518 | 8.62 | 489 | 95.18 | 11.13 | 83,586 | 31,120 | 15,374 | 46,494 | 37,092 |
| 3 | 2008 | 11,896 | 8.74 | 620 | 118.96 | 11.29 | 105,933 | 22,900 | 19,484 | 42,384 | 63,548 |
| 4 | 2009 | 11,896 | 8.86 | 629 | 118.96 | 11.45 | 107,416 | 0 | 19,757 | 19,757 | 87,659 |
| 5 | 2010 | 11,896 | 8.99 | 638 | 118.96 | 11.61 | 108,920 | 0 | 20,034 | 20,034 | 88,886 |
| 6 | 2011 | 11,896 | 9.11 | 647 | 118.96 | 11.77 | 110,444 | 0 | 20,314 | 20,314 | 90,130 |
| 7 | 2012 | 11,896 | 9.24 | 656 | 118.96 | 11.93 | 111,991 | 0 | 20,598 | 20,598 | 91,392 |
| 8 | 2013 | 11,896 | 9.37 | 665 | 118.96 | 12.10 | 113,559 | 0 | 20,887 | 20,887 | 92,672 |
| 9 | 2014 | 11,896 | 9.50 | 674 | 118.96 | 12.27 | 115,148 | 0 | 21,179 | 21,179 | 93,969 |
| 10 | 2015 | 11,896 | 9.63 | 684 | 118.96 | 12.44 | 116,760 | 0 | 21,476 | 21,476 | 95,285 |
| 11 | 2016 | 11,896 | 9.77 | 693 | 118.96 | 12.62 | 118,395 | 0 | 21,776 | 21,776 | 96,619 |
| 12 | 2017 | 11,896 | 9.91 | 703 | 118.96 | 12.79 | 120,053 | 0 | 22,081 | 22,081 | 97,971 |
| 13 | 2018 | 11,896 | 10.04 | 713 | 118.96 | 12.97 | 121,733 | 0 | 22,390 | 22,390 | 99,343 |
| 14 | 2019 | 11,896 | 10.18 | 723 | 118.96 | 13.15 | 123,438 | 0 | 22,704 | 22,704 | 100,734 |
| 15 | 2020 | 11,896 | 10.33 | 733 | 118.96 | 13.34 | 125,166 | 0 | 23,022 | 23,022 | 102,144 |
| 16 | 2021 | 5,948 | 10.47 | 371 | 59.48 | 13.52 | 63,459 | 0 | 11,672 | 11,672 | 51,787 |
| Total = | | 176,059 | | | 1,761 | | $1,697,514 | $101,540 | $312,225 | $413,765 | $1,283,749 |
| NPV = | | | | | | | 853,014 | 87,586 | 156,895 | 244,481 | 608,533 |

Total NPV = $608,533
Benefit/Cost Ratio = 3.49

(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: **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 & Lost Margin (E) | Annual Total Increase (F) | Net Change (G) |
| 2006 | $50,559 | $302 | $653 | $51,514 | $56,995 | $56,995 | ($5,481) |
| 2007 | 82,037 | 489 | 1,060 | 83,586 | 46,494 | 46,494 | 37,092 |
| 2008 | 103,970 | 620 | 1,343 | 105,933 | 42,384 | 42,384 | 63,548 |
| 2009 | 105,425 | 629 | 1,362 | 107,416 | 19,757 | 19,757 | 87,659 |
| 2010 | 106,901 | 638 | 1,381 | 108,920 | 20,034 | 20,034 | 88,886 |
| 2011 | 108,398 | 647 | 1,400 | 110,444 | 20,314 | 20,314 | 90,130 |
| 2012 | 109,915 | 656 | 1,420 | 111,991 | 20,598 | 20,598 | 91,392 |
| 2013 | 111,454 | 665 | 1,439 | 113,559 | 20,887 | 20,887 | 92,672 |
| 2014 | 113,015 | 674 | 1,460 | 115,148 | 21,179 | 21,179 | 93,969 |
| 2015 | 114,597 | 684 | 1,480 | 116,760 | 21,476 | 21,476 | 95,285 |
| 2016 | 116,201 | 693 | 1,501 | 118,395 | 21,776 | 21,776 | 96,619 |
| 2017 | 117,828 | 703 | 1,522 | 120,053 | 22,081 | 22,081 | 97,971 |
| 2018 | 119,478 | 713 | 1,543 | 121,733 | 22,390 | 22,390 | 99,343 |
| 2019 | 121,150 | 723 | 1,565 | 123,438 | 22,704 | 22,704 | 100,734 |
| 2020 | 122,846 | 733 | 1,587 | 125,166 | 23,022 | 23,022 | 102,144 |
| 2021 | 62,283 | 371 | 804 | 63,459 | 11,672 | 11,672 | 51,787 |
| Total = | $1,666,059 | $9,937 | $21,518 | $1,697,514 | $413,765 | $413,765 | $1,283,749 |
| NPV = | 837,208 | 4,993 | 10,813 | 853,014 | 244,481 | 244,481 | 608,533 |

Total NPV = $608,533
Benefit/Cost Ratio = 3.49

(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 Fa (G) = (D) - (F)
x Demand Cost (3)
(D) = (A) + (B) + (C)
(E) = Utility Project Costs + Lost Margin

**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 Environmental Damage Cost (D) | Annual Total Decrease (E) | Utility Program Costs & Lost Margin (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 | $56,995 | $123,060 | $41,020 | $139,035 | ($85,751) |
| 2007 | 82,037 | 489 | 1,060 | 2,906 | 86,492 | 46,494 | 73,860 | 24,620 | 95,734 | (9,242) |
| 2008 | 103,970 | 620 | 1,343 | 3,726 | 109,659 | 42,384 | 49,200 | 16,400 | 75,184 | 34,474 |
| 2009 | 105,425 | 629 | 1,362 | 3,823 | 111,239 | 19,757 | 0 | 0 | 19,757 | 91,482 |
| 2010 | 106,901 | 638 | 1,381 | 3,922 | 112,842 | 20,034 | 0 | 0 | 20,034 | 92,808 |
| 2011 | 108,398 | 647 | 1,400 | 4,024 | 114,469 | 20,314 | 0 | 0 | 20,314 | 94,155 |
| 2012 | 109,915 | 656 | 1,420 | 4,129 | 116,119 | 20,598 | 0 | 0 | 20,598 | 95,521 |
| 2013 | 111,454 | 665 | 1,439 | 4,236 | 117,795 | 20,887 | 0 | 0 | 20,887 | 96,908 |
| 2014 | 113,015 | 674 | 1,460 | 4,346 | 119,495 | 21,179 | 0 | 0 | 21,179 | 98,315 |
| 2015 | 114,597 | 684 | 1,480 | 4,459 | 121,220 | 21,476 | 0 | 0 | 21,476 | 99,744 |
| 2016 | 116,201 | 693 | 1,501 | 4,575 | 122,970 | 21,776 | 0 | 0 | 21,776 | 101,194 |
| 2017 | 117,828 | 703 | 1,522 | 4,694 | 124,747 | 22,081 | 0 | 0 | 22,081 | 102,665 |
| 2018 | 119,478 | 713 | 1,543 | 4,816 | 126,550 | 22,390 | 0 | 0 | 22,390 | 104,159 |
| 2019 | 121,150 | 723 | 1,565 | 4,941 | 128,379 | 22,704 | 0 | 0 | 22,704 | 105,675 |
| 2020 | 122,846 | 733 | 1,587 | 5,070 | 130,236 | 23,022 | 0 | 0 | 23,022 | 107,214 |
| 2021 | 62,283 | 371 | 804 | 2,601 | 66,060 | 11,672 | 0 | 0 | 11,672 | 54,388 |
| Total = | $1,666,059 | $9,937 | $21,518 | $64,039 | $1,761,553 | $413,765 | $246,120 | $82,040 | $577,845 | $1,183,708 |
| NPV = | 837,208 | 4,993 | 10,813 | 42,169 | 895,183 | 244,481 | 213,325 | 71,108 | 386,698 | 508,485 |

Total NPV = $508,485
Benefit/Cost Ratio = 2.31

(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 Del
(D) = Energy Reduction/Part. (21) x Participants (22) x Environmental Damage Factor (
(E) = (A) + (B) + (C) + (D)

(F) = Total Utility Project Costs plus Lost Margin
(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 | $2,611 | $521 | $126,191 | ($18,141) |
| 2007 | 0.0858 | 24,620 | 9,518 | 11.42 | 95.18 | 11.13 | 133,416 | 73,860 | $0 | 2,672 | 1320 | 77,851 | 55,564 |
| 2008 | 0.0838 | 16,400 | 11,896 | 11.58 | 118.96 | 11.29 | 154,279 | 49,200 | $0 | 2,609 | 1633 | 53,442 | 100,837 |
| 2009 | 0.0819 | 0 | 11,896 | 11.74 | 118.96 | 11.45 | 139,807 | 0 | $0 | 0 | 1618 | 1,618 | 138,189 |
| 2010 | 0.0800 | 0 | 11,896 | 11.91 | 118.96 | 11.61 | 141,761 | 0 | $0 | 0 | 1602 | 1,602 | 140,160 |
| 2011 | 0.0781 | 0 | 11,896 | 12.07 | 118.96 | 11.77 | 143,743 | 0 | $0 | 0 | 1586 | 1,586 | 142,157 |
| 2012 | 0.0762 | 0 | 11,896 | 12.24 | 118.96 | 11.93 | 145,753 | 0 | $0 | 0 | 1571 | 1,571 | 144,183 |
| 2013 | 0.0745 | 0 | 11,896 | 12.41 | 118.96 | 12.10 | 147,791 | 0 | $0 | 0 | 1555 | 1,555 | 146,236 |
| 2014 | 0.0727 | 0 | 11,896 | 12.59 | 118.96 | 12.27 | 149,858 | 0 | $0 | 0 | 1540 | 1,540 | 148,318 |
| 2015 | 0.0710 | 0 | 11,896 | 12.76 | 118.96 | 12.44 | 151,953 | 0 | $0 | 0 | 1525 | 1,525 | 150,428 |
| 2016 | 0.0693 | 0 | 11,896 | 12.94 | 118.96 | 12.62 | 154,078 | 0 | $0 | 0 | 1510 | 1,510 | 152,568 |
| 2017 | 0.0677 | 0 | 11,896 | 13.12 | 118.96 | 12.79 | 156,233 | 0 | $0 | 0 | 1495 | 1,495 | 154,737 |
| 2018 | 0.0661 | 0 | 11,896 | 13.31 | 118.96 | 12.97 | 158,417 | 0 | $0 | 0 | 1481 | 1,481 | 156,937 |
| 2019 | 0.0646 | 0 | 11,896 | 13.49 | 118.96 | 13.15 | 160,633 | 0 | $0 | 0 | 1466 | 1,466 | 159,166 |
| 2020 | 0.0631 | 0 | 11,896 | 13.68 | 118.96 | 13.34 | 162,879 | 0 | $0 | 0 | 1452 | 1,452 | 161,427 |
| 2021 | 0.0616 | 0 | 5,948 | 13.88 | 59.48 | 13.52 | 82,579 | 0 | 0 | 0 | 719 | 719 | 81,860 |
| | | | 176,059 | | | | $2,291,229 | $246,120 | $0 | $7,891 | | $276,605 | $2,014,624 |
| | | | | | | | $1,286,598 | 232,347 | 0 | 7,263 | | 252,305 | 1,034,293 |

$1,034,293
5.10

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

# EAST RIVER

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

| | | | |
|---|---|---|---|
| **Estimated Conservation Program Costs:** | | | |
| High Efficiency Furnace Replacement | | $15,200 | 1/ |
| Programmable Thermostats | | 6,240 | 2/ |
| Conservation Starter Kits | | 1,104 | |
| | | $22,544 | |
| Estimated Dk Savings | 1,600 3/ | | |
| Currently Effective Distribution Delivery Charge | $2.915 | | |
| Annual Distribution Margin Loss | | $4,664 | |
| Total Conservation Tracking Adjustment Balance | | $27,208 | |
| Projected Firm Sales | | 645,188 | dk |
| Estimated Tracking Adjustment | | $0.042 | per dk |

1/ Attachment A, Page 19.
2/ Attachment A, Page 20.
3/ Attachment A, Page 18.

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

**Benefit Cost Ratios**

| Program | Utility | Rate Payer | Societal | Partcipant |
|---|---|---|---|---|
| High Efficiency Furnace | 1.67 | 1.67 | 1.37 | 2.22 |
| Programmable Thermostats | 2.31 | 2.31 | 4.31 | 5.93 |
| 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 | $163.00 | $15,200 | $9,350 | $6,500 | $31,050 | 730 | 15 | 21,485 |
| Programmable Thermostats | 24.00 | 6,240 | 4,060 | 2,980 | 13,280 | 870 | 15 | 25,763 |
| Weatherization Kits (East River Share) | 1.20 | 1,104 | 1,104 | 1,104 | 3,312 | NA | NA | NA |
| **Totals** | | **$22,544** | **$14,514** | **$10,584** | **$47,642** | **1,600** | | **47,248** |

# 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 | | | | $ 13 | $ 800 | $ 800 | $ 800 | $ 2,400 |
| **Total Cost** | | | | **$ 163** | **$ 15,200** | **$ 9,350** | **$ 6,500** | **$ 31,050** |

**Notes**
Administrative cost is estimated at $800 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 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 | | | | $ 4 | $ 800 | $ 800 | $ 800 | $ 2,400 |
| **Total Cost** | | | | **$ 24** | **$ 6,240** | **$ 4,060** | **$ 2,980** | **$ 13,280** |

**Notes**
Administrative cost is estimated at $800 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 |

**Demand-Side Management** Cost-Effectiveness Analysis

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

**Input Data**

| | |
|---|---|
| 1) Retail Rate ($/dk) = | $12.44 |
| Escalation Rate = | 1.40% |
| 2) Commodity Cost ($/dk) = | $8.37 |
| Escalation Rate = | 1.40% |
| 3) Demand Cost ($/Unit/Yr) = | $10.81 |
| Escalation Rate = | 1.40% |
| 4) Peak Reduction Factor = | 1.00% |
| 5) Variable O&M ($/dk) = | $0.05 |
| Escalation Rate = | 1.40% |
| 6) Environmental Damage Factor = | $0.2900 |
| Escalation Rate = | 2.60% |
| 7) Total Sales (dk) = | 305,065 |
| Growth Rate = | 1.00% |
| 8) Total Customers = | 4,832 |
| Growth Rate = | 2.90% |
| 9) Utility Discount Rate = | 8.94% |
| 10) Social Discount Rate (T-Bill) = | 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 T | 39.00% |
| 14) Net Operating Income Before as % Total Operating Income | 1.00% |

| | |
|---|---|
| 15) Utility Project Costs (First Year) | |
| Administrative Costs = | $800 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $14,400 |
| Total Utility Project Costs = | $15,200 |
| 15a) Utility Project Costs (Second Year) | |
| Administrative Costs = | $800 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $8,550 |
| Total Utility Project Costs = | $9,350 |
| Total Utility Project Costs (Third Year) = | $6,500 |
| 16) Direct Participant Costs ($/Part.) = | $470.00 |
| 17) Other Participant Costs (Annual $/Part.) = | $0.00 |
| Escalation Rate = | 1.40% |
| 18) Project Life (Years) = | 15 |
| 19) Avg. Energy Reduction (Project) = | 12.00% |
| 20) Avg. Consumption (dk/Part.) = | 63.1 |
| 21) Avg. dk/Part. Saved (First Year Program) = | 7.6 |
| 21a) Avg. dk/Part. Saved (Second Year Program) = | 7.6 |
| 22) Number of Participants (First Year Program) = | 96 |
| 22a) Number of Participants (Second Year Program) = | 57 |
| 22b) Number of Participants (Third Year Program) = | 38 |
| 23) Incentive/Participant (First Year Program) = | $150 |
| 23a) Incentive/Participant (Second Year Program) = | $150 |
| 24) Distribution Margin | $2.915 |
| Escalation Rate = | 1.40% |

Cost-Effectiveness Analysis

**Summary Information**

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

**Cost Summary**

| | |
|---|---|
| Utility Cost per Participant (First Year) = | $158.33 |
| Utility Cost per participant (Second Year) = | $164.04 |
| Total Energy Reduction (dk) | 21,485 |
| Societal Cost per dk | $3.72 |
| Cost per Participant per dk (First Year) = | $82.68 |
| Cost per Participant per dk (Second Year) = | $83.43 |

**Test Results**

| | NPV | B/C |
|---|---|---|
| **Cost Comparison Test** | $41,510 | 1.67 |
| **Revenue Requirements Test** | $41,510 | 1.67 |
| **Societal Benefit Test** | $29,163 | 1.37 |
| **Participant Test** | $105,565 | 2.22 |

**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**

| | | 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 | 730 | $8.49 | $37 | 7.30 | $10.96 | $6,312 | $15,200 | 2,157 | $17,357 | ($11,044) |
| 2 | 2007 | 1,163 | 8.61 | 60 | 11.63 | 11.11 | 10,201 | 9,350 | 3,485 | 12,835 | (2,634) |
| 3 | 2008 | 1,452 | 8.73 | 76 | 14.52 | 11.27 | 12,913 | 6,500 | 4,412 | 10,912 | 2,001 |
| 4 | 2009 | 1,452 | 8.85 | 77 | 14.52 | 11.43 | 13,093 | 0 | 4,473 | 4,473 | 8,620 |
| 5 | 2010 | 1,452 | 8.98 | 78 | 14.52 | 11.59 | 13,277 | 0 | 4,536 | 4,536 | 8,741 |
| 6 | 2011 | 1,452 | 9.10 | 79 | 14.52 | 11.75 | 13,463 | 0 | 4,600 | 4,600 | 8,863 |
| 7 | 2012 | 1,452 | 9.23 | 80 | 14.52 | 11.91 | 13,651 | 0 | 4,664 | 4,664 | 8,987 |
| 8 | 2013 | 1,452 | 9.36 | 81 | 14.52 | 12.08 | 13,842 | 0 | 4,729 | 4,729 | 9,113 |
| 9 | 2014 | 1,452 | 9.49 | 82 | 14.52 | 12.25 | 14,036 | 0 | 4,795 | 4,795 | 9,241 |
| 10 | 2015 | 1,452 | 9.62 | 83 | 14.52 | 12.42 | 14,233 | 0 | 4,863 | 4,863 | 9,370 |
| 11 | 2016 | 1,452 | 9.76 | 85 | 14.52 | 12.60 | 14,432 | 0 | 4,931 | 4,931 | 9,501 |
| 12 | 2017 | 1,452 | 9.89 | 86 | 14.52 | 12.77 | 14,634 | 0 | 5,000 | 5,000 | 9,634 |
| 13 | 2018 | 1,452 | 10.03 | 87 | 14.52 | 12.95 | 14,839 | 0 | 5,070 | 5,070 | 9,769 |
| 14 | 2019 | 1,452 | 10.17 | 88 | 14.52 | 13.13 | 15,046 | 0 | 5,141 | 5,141 | 9,906 |
| 15 | 2020 | 1,452 | 10.32 | 89 | 14.52 | 13.32 | 15,257 | 0 | 5,213 | 5,213 | 10,045 |
| 16 | 2021 | 722 | 10.46 | 45 | 7.22 | 13.50 | 7,695 | 0 | 2,629 | 2,629 | 5,066 |
| Total = | | 21,485 | | | 215 | | $206,923 | $31,050 | $70,696 | $101,746 | $105,178 |
| NPV = | | | | | | | 103,849 | 26,859 | 35,480 | 62,339 | 41,510 |

Total NPV = $41,510
Benefit/Cost Ratio = 1.67

(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: **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 & Lost Margir (E) | Annual Total Increase (F) | Net Change (G) |
| 2006 | $6,195 | $37 | $80 | $6,312 | $17,357 | $17,357 | ($11,044) |
| 2007 | 10,012 | 60 | 129 | 10,201 | 12,835 | 12,835 | (2,634) |
| 2008 | 12,673 | 76 | 164 | 12,913 | 10,912 | 10,912 | 2,001 |
| 2009 | 12,851 | 77 | 166 | 13,093 | 4,473 | 4,473 | 8,620 |
| 2010 | 13,031 | 78 | 168 | 13,277 | 4,536 | 4,536 | 8,741 |
| 2011 | 13,213 | 79 | 171 | 13,463 | 4,600 | 4,600 | 8,863 |
| 2012 | 13,398 | 80 | 173 | 13,651 | 4,664 | 4,664 | 8,987 |
| 2013 | 13,586 | 81 | 175 | 13,842 | 4,729 | 4,729 | 9,113 |
| 2014 | 13,776 | 82 | 178 | 14,036 | 4,795 | 4,795 | 9,241 |
| 2015 | 13,969 | 83 | 180 | 14,233 | 4,863 | 4,863 | 9,370 |
| 2016 | 14,164 | 85 | 183 | 14,432 | 4,931 | 4,931 | 9,501 |
| 2017 | 14,363 | 86 | 185 | 14,634 | 5,000 | 5,000 | 9,634 |
| 2018 | 14,564 | 87 | 188 | 14,839 | 5,070 | 5,070 | 9,769 |
| 2019 | 14,768 | 88 | 191 | 15,046 | 5,141 | 5,141 | 9,906 |
| 2020 | 14,974 | 89 | 193 | 15,257 | 5,213 | 5,213 | 10,045 |
| 2021 | 7,552 | 45 | 97 | 7,695 | 2,629 | 2,629 | 5,066 |
| Total = | $203,089 | $1,213 | $2,622 | $206,923 | $101,746 | $101,746 | $105,178 |
| NPV = | 101,924 | 609 | 1,316 | 103,849 | 62,339 | 62,339 | 41,510 |

Total NPV = $41,510
Benefit/Cost Ratio = 1.67

(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 Fac x Demand Cost (3)
(D) = (A) + (B) + (C)
(E) = Total Utility Project Costs (15)
(F) = (E)
(G) = (D) - (F)

**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 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 | $6,195 | $37 | $80 | $217 | $6,529 | $15,200 | $45,120 | $14,400 | $45,920 | ($39,391) |
| 2007 | 10,012 | 60 | 129 | 355 | 10,556 | 9,350 | 26,790 | 8,550 | 27,590 | (17,034) |
| 2008 | 12,673 | 76 | 164 | 455 | 13,367 | 6,500 | 17,860 | 5,700 | 18,660 | (5,293) |
| 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 | $31,050 | $89,770 | $28,650 | $92,170 | $122,568 |
| NPV = | 101,924 | 609 | 1,316 | 5,146 | 108,995 | 26,859 | 77,805 | 24,831 | 79,832 | 29,163 |

Total NPV = $29,163
Benefit/Cost Ratio = 1.37

(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)

**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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.0193 | $14,400 | 730 | $12.61 | 7.30 | $10.96 | $23,603 | $45,120 | $0 | $293 | $42 | $45,455 | ($21,852) |
| 2007 | 0.0299 | 8,550 | 1,163 | 12.79 | 11.63 | 11.11 | 23,425 | 26,790 | $0 | 280 | 104 | 27,174 | (3,749) |
| 2008 | 0.0291 | 5,700 | 1,452 | 12.97 | 14.52 | 11.27 | 24,529 | 17,860 | $0 | 189 | 128 | 18,177 | 6,352 |
| 2009 | 0.0282 | 0 | 1,452 | 13.15 | 14.52 | 11.43 | 19,092 | 0 | $0 | 0 | 126 | 126 | 18,966 |
| 2010 | 0.0274 | 0 | 1,452 | 13.33 | 14.52 | 11.59 | 19,359 | 0 | $0 | 0 | 124 | 124 | 19,235 |
| 2011 | 0.0267 | 0 | 1,452 | 13.52 | 14.52 | 11.75 | 19,630 | 0 | $0 | 0 | 123 | 123 | 19,508 |
| 2012 | 0.0259 | 0 | 1,452 | 13.71 | 14.52 | 11.91 | 19,905 | 0 | $0 | 0 | 121 | 121 | 19,784 |
| 2013 | 0.0252 | 0 | 1,452 | 13.90 | 14.52 | 12.08 | 20,183 | 0 | $0 | 0 | 119 | 119 | 20,064 |
| 2014 | 0.0245 | 0 | 1,452 | 14.10 | 14.52 | 12.25 | 20,466 | 0 | $0 | 0 | 117 | 117 | 20,349 |
| 2015 | 0.0238 | 0 | 1,452 | 14.29 | 14.52 | 12.42 | 20,752 | 0 | $0 | 0 | 116 | 116 | 20,637 |
| 2016 | 0.0231 | 0 | 1,452 | 14.49 | 14.52 | 12.60 | 21,043 | 0 | $0 | 0 | 114 | 114 | 20,929 |
| 2017 | 0.0225 | 0 | 1,452 | 14.70 | 14.52 | 12.77 | 21,337 | 0 | $0 | 0 | 112 | 112 | 21,225 |
| 2018 | 0.0218 | 0 | 1,452 | 14.90 | 14.52 | 12.95 | 21,636 | 0 | $0 | 0 | 111 | 111 | 21,525 |
| 2019 | 0.0212 | 0 | 1,452 | 15.11 | 14.52 | 13.13 | 21,939 | 0 | $0 | 0 | 109 | 109 | 21,830 |
| 2020 | 0.0206 | 0 | 1,452 | 15.32 | 14.52 | 13.32 | 22,246 | 0 | $0 | 0 | 107 | 107 | 22,138 |
| 2021 | 0.0200 | 0 | 722 | 15.54 | 7.22 | 13.50 | 11,219 | 0 | 0 | 0 | 53 | 53 | 11,167 |
| | | | 21,485 | | | | $330,365 | $89,770 | $0 | $762 | | $92,259 | $238,106 |
| | | | | | | | $192,011 | 84,760 | 0 | 709 | | 86,446 | 105,565 |

$105,565
2.22

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) = | $12.44 |
| Escalation Rate = | 1.40% |
| 2) Commodity Cost ($/dk) = | $8.37 |
| Escalation Rate = | 1.40% |
| 3) Demand Cost ($/Unit/Yr) = | $10.81 |
| Escalation Rate = | 1.40% |
| 4) Peak Reduction Factor = | 1.00% |
| 5) Variable O&M ($/dk) = | $0.05 |
| Escalation Rate = | 1.40% |
| 6) Environmental Damage Factor = | $0.2900 |
| Escalation Rate = | 2.60% |
| 7) Total Sales dk = | 305,065 |
| Growth Rate = | 1.00% |
| 8) Total Customers = | 4,832 |
| Growth Rate = | 2.90% |
| 9) Utility Discount Rate = | 8.94% |
| 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 Tax Rate = | 39.00% |
| 14) Net Operating Income Before Taxes | 1.00% |

| | |
|---|---|
| 15) Utility Project Costs (First Year) | |
| Administrative Costs = | $800 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $5,440 |
| Total Utility Project Costs = | $6,240 |
| 15a) Utility Project Costs (Second Year) | |
| Administrative Costs = | $800 |
| Direct Operating Costs = | $0 |
| Incentive Costs = | $3,260 |
| Total Utility Project Costs = | $4,060 |
| Total Utility Project Costs (Third Year) = | $2,980 |
| 16) Direct Participant Costs ($/Part.) = | $60.00 |
| 17) Other Participant Costs (Annual $/Part.) = | $0.00 |
| Escalation Rate = | 1.40% |
| 18) Project Life (Years) = | 15 |
| 19) Avg. Energy Reduction (Project) = | 5.00% |
| 20) Avg. Consumption (dk/Part.) = | 63 |
| 21) Avg. dk/Part. Saved (First Year Program) = | 3.2 |
| 21a) Avg. dk/Part. Saved (Second Year Program) = | 3.2 |
| 22) Number of Participants (First Year Program) = | 272 |
| 22a) Number of Participants (Second Year Program) = | 163 |
| 22b) Number of Participants (Third Year Program) = | 109 |
| 23) Incentive/Participant (First Year Program) = | $20 |
| 23a) Incentive/Participant (Second Year Program) = | $20 |
| 24) Distribution Margin | $2.915 |
| Escalation Rate = | 1.40% |

Cost-Effectiveness Analysis

**Summary Information**

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

**Cost Summary**

| | |
|---|---|
| Utility Cost per Participant (First Year) = | $22.94 |
| Utility Cost per participant (Second Year) = | $24.91 |
| Total Energy Reduction (dk) | 25,763 |
| Societal Cost per dk | $1.18 |
| Cost per Participant per dk (First Year) = | $25.92 |
| Cost per Participant per dk (Second Year) = | $26.53 |

**Test Results**

| | NPV | B/C |
|---|---|---|
| **Cost Comparison Test** | $70,508 | 2.31 |
| **Revenue Requirements Test** | $70,508 | 2.31 |
| **Societal Benefit Test** | $100,360 | 4.31 |
| **Participant Test** | $173,030 | 5.93 |

**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 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 | $6,240 | 2,573 | $8,813 | ($1,282) |
| 2 | 2007 | 1,392 | 8.61 | 72 | 13.92 | 11.11 | 12,212 | 4,060 | 4,172 | 8,232 | 3,979 |
| 3 | 2008 | 1,741 | 8.73 | 91 | 17.41 | 11.27 | 15,485 | 2,980 | 5,291 | 8,271 | 7,215 |
| 4 | 2009 | 1,741 | 8.85 | 92 | 17.41 | 11.43 | 15,702 | 0 | 5,365 | 5,365 | 10,337 |
| 5 | 2010 | 1,741 | 8.98 | 93 | 17.41 | 11.59 | 15,922 | 0 | 5,440 | 5,440 | 10,482 |
| 6 | 2011 | 1,741 | 9.10 | 95 | 17.41 | 11.75 | 16,145 | 0 | 5,516 | 5,516 | 10,629 |
| 7 | 2012 | 1,741 | 9.23 | 96 | 17.41 | 11.91 | 16,371 | 0 | 5,593 | 5,593 | 10,778 |
| 8 | 2013 | 1,741 | 9.36 | 97 | 17.41 | 12.08 | 16,600 | 0 | 5,671 | 5,671 | 10,929 |
| 9 | 2014 | 1,741 | 9.49 | 99 | 17.41 | 12.25 | 16,832 | 0 | 5,751 | 5,751 | 11,082 |
| 10 | 2015 | 1,741 | 9.62 | 100 | 17.41 | 12.42 | 17,068 | 0 | 5,831 | 5,831 | 11,237 |
| 11 | 2016 | 1,741 | 9.76 | 101 | 17.41 | 12.60 | 17,307 | 0 | 5,913 | 5,913 | 11,394 |
| 12 | 2017 | 1,741 | 9.89 | 103 | 17.41 | 12.77 | 17,549 | 0 | 5,996 | 5,996 | 11,554 |
| 13 | 2018 | 1,741 | 10.03 | 104 | 17.41 | 12.95 | 17,795 | 0 | 6,080 | 6,080 | 11,715 |
| 14 | 2019 | 1,741 | 10.17 | 106 | 17.41 | 13.13 | 18,044 | 0 | 6,165 | 6,165 | 11,879 |
| 15 | 2020 | 1,741 | 10.32 | 107 | 17.41 | 13.32 | 18,297 | 0 | 6,251 | 6,251 | 12,046 |
| 16 | 2021 | 870 | 10.46 | 54 | 8.70 | 13.50 | 9,276 | 0 | 3,169 | 3,169 | 6,107 |
| Total = | | 25,763 | | | 258 | | $248,136 | $13,280 | $84,776 | $98,056 | $150,080 |
| NPV = | | | | | | | 124,496 | 11,454 | 42,534 | 53,988 | 70,508 |

Total NPV = $70,508
Benefit/Cost Ratio = 2.31

(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 & Lost Margir (E) | Annual Total Increase (F) | Net Change (G) |
| 2006 | $7,391 | $44 | $95 | $7,530 | $8,813 | $8,813 | ($1,282) |
| 2007 | 11,985 | 72 | 155 | 12,212 | 8,232 | 8,232 | 3,979 |
| 2008 | 15,198 | 91 | 196 | 15,485 | 8,271 | 8,271 | 7,215 |
| 2009 | 15,411 | 92 | 199 | 15,702 | 5,365 | 5,365 | 10,337 |
| 2010 | 15,627 | 93 | 202 | 15,922 | 5,440 | 5,440 | 10,482 |
| 2011 | 15,846 | 95 | 205 | 16,145 | 5,516 | 5,516 | 10,629 |
| 2012 | 16,067 | 96 | 207 | 16,371 | 5,593 | 5,593 | 10,778 |
| 2013 | 16,292 | 97 | 210 | 16,600 | 5,671 | 5,671 | 10,929 |
| 2014 | 16,521 | 99 | 213 | 16,832 | 5,751 | 5,751 | 11,082 |
| 2015 | 16,752 | 100 | 216 | 17,068 | 5,831 | 5,831 | 11,237 |
| 2016 | 16,986 | 101 | 219 | 17,307 | 5,913 | 5,913 | 11,394 |
| 2017 | 17,224 | 103 | 222 | 17,549 | 5,996 | 5,996 | 11,554 |
| 2018 | 17,465 | 104 | 225 | 17,795 | 6,080 | 6,080 | 11,715 |
| 2019 | 17,710 | 106 | 229 | 18,044 | 6,165 | 6,165 | 11,879 |
| 2020 | 17,958 | 107 | 232 | 18,297 | 6,251 | 6,251 | 12,046 |
| 2021 | 9,105 | 54 | 118 | 9,276 | 3,169 | 3,169 | 6,107 |
| Total = | $243,538 | $1,454 | $3,144 | $248,136 | $98,056 | $98,056 | $150,080 |
| NPV = | 122,189 | 730 | 1,577 | 124,496 | 53,988 | 53,988 | 70,508 |

Total NPV = $70,508
Benefit/Cost Ratio = 2.31

(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 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 | $7,391 | $44 | $95 | $259 | $7,789 | $6,240 | $16,320 | $5,440 | $17,120 | ($9,331) |
| 2007 | 11,985 | 72 | 155 | 425 | 12,637 | 4,060 | 9,780 | 3,260 | 10,580 | 2,057 |
| 2008 | 15,198 | 91 | 196 | 545 | 16,031 | 2,980 | 6,540 | 2,180 | 7,340 | 8,691 |
| 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 | $13,280 | $32,640 | $10,880 | $35,040 | $222,467 |
| NPV = | 122,189 | 730 | 1,577 | 6,171 | 130,667 | 11,454 | 28,280 | 9,427 | 30,307 | 100,360 |

Total NPV = $100,360
Benefit/Cost Ratio = 4.31

(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 D
(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: **ER 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 Reductio (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 | $341 | $141 | $16,802 | ($379) |
| 2007 | 0.0850 | 3,260 | 1,392 | 12.79 | 13.92 | 11.11 | 21,075 | 9,780 | $0 | 345 | 355 | 10,480 | 10,595 |
| 2008 | 0.0826 | 2,180 | 1,741 | 12.97 | 17.41 | 11.27 | 24,770 | 6,540 | $0 | 335 | 437 | 7,313 | 17,458 |
| 2009 | 0.0803 | 0 | 1,741 | 13.15 | 17.41 | 11.43 | 22,906 | 0 | $0 | 0 | 431 | 431 | 22,475 |
| 2010 | 0.0780 | 0 | 1,741 | 13.33 | 17.41 | 11.59 | 23,226 | 0 | $0 | 0 | 424 | 424 | 22,802 |
| 2011 | 0.0758 | 0 | 1,741 | 13.52 | 17.41 | 11.75 | 23,551 | 0 | $0 | 0 | 418 | 418 | 23,133 |
| 2012 | 0.0737 | 0 | 1,741 | 13.71 | 17.41 | 11.91 | 23,880 | 0 | $0 | 0 | 412 | 412 | 23,468 |
| 2013 | 0.0716 | 0 | 1,741 | 13.90 | 17.41 | 12.08 | 24,214 | 0 | $0 | 0 | 406 | 406 | 23,808 |
| 2014 | 0.0696 | 0 | 1,741 | 14.10 | 17.41 | 12.25 | 24,553 | 0 | $0 | 0 | 400 | 400 | 24,153 |
| 2015 | 0.0676 | 0 | 1,741 | 14.29 | 17.41 | 12.42 | 24,896 | 0 | $0 | 0 | 394 | 394 | 24,502 |
| 2016 | 0.0657 | 0 | 1,741 | 14.49 | 17.41 | 12.60 | 25,244 | 0 | $0 | 0 | 389 | 389 | 24,856 |
| 2017 | 0.0639 | 0 | 1,741 | 14.70 | 17.41 | 12.77 | 25,597 | 0 | $0 | 0 | 383 | 383 | 25,214 |
| 2018 | 0.0621 | 0 | 1,741 | 14.90 | 17.41 | 12.95 | 25,955 | 0 | $0 | 0 | 377 | 377 | 25,578 |
| 2019 | 0.0603 | 0 | 1,741 | 15.11 | 17.41 | 13.13 | 26,318 | 0 | $0 | 0 | 372 | 372 | 25,946 |
| 2020 | 0.0586 | 0 | 1,741 | 15.32 | 17.41 | 13.32 | 26,686 | 0 | $0 | 0 | 367 | 367 | 26,320 |
| 2021 | 0.0570 | 0 | 870 | 15.54 | 8.70 | 13.50 | 13,530 | 0 | 0 | 0 | 181 | 181 | 13,349 |
| | | | 25,763 | | | | $372,828 | $32,640 | $0 | $1,022 | | $39,549 | $333,279 |
| | | | | | | | $208,107 | 30,808 | 0 | 941 | | 35,077 | 173,030 |

$173,030
5.93

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