NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Total South Dakota Program**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	
Escalation Rate =	
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	
Escalation Rate =	
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	
3) Commodity Cost ($/Dk) =	
Escalation Rate =	
4) Demand Cost ($/Unit/Yr) =	
Escalation Rate =	
5) Peak Reduction Factor =	
6) Variable O&M ($/Dk) =	
Escalation Rate =	
7) Non-Gas Fuel Cost ($/Fuel Unit) =	
Escalation Rate =	
8) Non-Gas Fuel Loss Factor	
9) Gas Environmental Damage Factor =	
Escalation Rate =	
10) Non Gas Fuel Environmental Damage Factor =	
Escalation Rate =	
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014
16) Utility Project Costs	
16a) Administrative & Operating Costs = 1/	$17,000
16b) Incentive Costs =	147,900
16c) Total Utility Project Costs =	$164,900
17) Direct Participant Costs ($/Part.) =	
18) Participant Non-Energy Costs (Annual $/Part.) =	
Escalation Rate =	
19) Participant Non-Energy Savings (Annual $/Part) =	
Escalation Rate =	
20) Project Life (Years) =	
21) Avg. Dk/Part. Saved =	
22) Avg Non-Gas Fuel Units/Part. Saved =	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	
23) Number of Participants =	622
24) Total Annual Dk Saved =	4,916
25) Incentive/Participant =	
26) Distribution Delivery Charge	
27) Effective Income Tax Rate =	
(Federal & State Taxes)	

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$241,868	2.15
Utility Cost Test	$315,006	3.30
Societal Test	$540,072	3.01
Participant Test	$639,088	3.51
Total Resource Cost Test	$292,931	2.09

1/ Energy Audit program costs included with Total Program tests only.

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Total South Dakota Program**

		Benefits											Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Dmd Savings '/ Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	4,916	43	30,091	0	0	30,091	49	833	5,868	$35,959		5,668	14,127	122,900	$142,695	($106,736)
2	2015	4,916	44	31,144	0	0	31,144	49	840	5,916	37,060		5,864	0	0	$5,864	$31,196
3	2016	4,916	46	32,234	0	0	32,234	49	847	5,965	38,199		6,071	0	0	$6,071	$32,128
4	2017	4,916	48	33,360	0	0	33,360	49	854	6,015	39,375		6,281	0	0	$6,281	$33,094
5	2018	4,916	49	34,530	0	0	34,530	49	868	6,113	40,643		6,501	0	0	$6,501	$34,142
6	2019	4,916	51	35,739	0	0	35,739	49	875	6,165	41,904		6,729	0	0	$6,729	$35,175
7	2020	4,916	53	36,988	0	0	36,988	49	882	6,212	43,200		6,966	0	0	$6,966	$36,234
8	2021	4,916	55	38,285	0	0	38,285	49	889	6,262	44,547		7,209	0	0	$7,209	$37,338
9	2022	4,916	56	39,624	0	0	39,624	49	903	6,361	45,985		7,461	0	0	$7,461	$38,524
10	2023	4,916	58	41,009	0	0	41,009	49	910	6,409	47,418		7,722	0	0	$7,722	$39,696
11	2024	4,790	60	41,357	0	0	41,357	48	917	6,288	47,645		7,784	0	0	$7,784	$39,861
12	2025	4,790	63	42,803	0	0	42,803	48	931	6,384	49,187		8,055	0	0	$8,055	$41,132
13	2026	4,790	65	44,302	0	0	44,302	48	938	6,432	50,734		8,338	0	0	$8,338	$42,396
14	2027	4,790	67	45,854	0	0	45,854	48	945	6,482	52,336		8,629	0	0	$8,629	$43,707
15	2028	4,790	69	47,460	0	0	47,460	48	959	6,577	54,037		8,933	0	0	$8,933	$45,104
16	2029	4,255	72	43,636	0	0	43,636	43	966	5,879	49,515		8,244	0	0	$8,244	$41,271
17	2030	4,255	74	45,162	0	0	45,162	43	973	5,922	51,084		8,532	0	0	$8,532	$42,552
18	2031	4,255	77	46,742	0	0	46,742	43	987	6,007	52,749		8,829	0	0	$8,829	$43,920
19	2032	0	80	0	0	0	0	0	994	0	0		0	0	0	$0	$0
20	2033	0	82	0	0	0	0	0	1,008	0	0		0	0	0	$0	$0
21	2034	0	85	0	0	0	0	0	1,015	0	0		0	0	0	$0	$0
22	2035	0	0	0	0	0	0	0	0	0	0		0	0	0	$0	$0
Total =		85,875									$821,577					$270,843	$550,734
									NPV =		$452,033					$210,165	$241,868

Total NPV = $241,868
Benefit/Cost Ratio = 2.15

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Total South Dakota Program**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$30,091	$5,868	$35,959	$14,127	$122,900	$137,027	($101,068)
2015	31,144	5,916	37,060	0	0	0	37,060
2016	32,234	5,965	38,199	0	0	0	38,199
2017	33,360	6,015	39,375	0	0	0	39,375
2018	34,530	6,113	40,643	0	0	0	40,643
2019	35,739	6,165	41,904	0	0	0	41,904
2020	36,988	6,212	43,200	0	0	0	43,200
2021	38,285	6,262	44,547	0	0	0	44,547
2022	39,624	6,361	45,985	0	0	0	45,985
2023	41,009	6,409	47,418	0	0	0	47,418
2024	41,357	6,288	47,645	0	0	0	47,645
2025	42,803	6,384	49,187	0	0	0	49,187
2026	44,302	6,432	50,734	0	0	0	50,734
2027	45,854	6,482	52,336	0	0	0	52,336
2028	47,460	6,577	54,037	0	0	0	54,037
2029	43,636	5,879	49,515	0	0	0	49,515
2030	45,162	5,922	51,084	0	0	0	51,084
2031	46,742	6,007	52,749	0	0	0	52,749
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0
Total =			$821,577			$137,027	$684,550
		NPV =	$452,033			$137,027	$315,006

Total NPV = $315,006
Benefit/Cost Ratio = 3.30

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Total South Dakota Program**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$30,091	$5,868	$35,959	8,428	7	5,117	$49,504	137,027	131,920	$268,947	($219,443)
2015	31,144	5,916	$37,060	8,720	7	5,236	51,016	0	0	0	51,016
2016	32,234	5,965	$38,199	9,009	8	5,358	52,566	0	0	0	52,566
2017	33,360	6,015	$39,375	9,300	8	5,480	54,155	0	0	0	54,155
2018	34,530	6,113	$40,643	9,591	8	5,609	55,843	0	0	0	55,843
2019	35,739	6,165	$41,904	10,171	8	5,737	57,812	0	0	0	57,812
2020	36,988	6,212	$43,200	10,463	8	5,869	59,532	0	0	0	59,532
2021	38,285	6,262	$44,547	10,754	9	6,003	61,304	0	0	0	61,304
2022	39,624	6,361	$45,985	11,043	9	6,139	63,167	0	0	0	63,167
2023	41,009	6,409	$47,418	11,626	9	6,283	65,327	0	0	0	65,327
2024	41,357	6,288	$47,645	11,915	9	6,262	65,822	0	0	0	65,822
2025	42,803	6,384	$49,187	12,207	9	6,405	67,799	0	0	0	67,799
2026	44,302	6,432	$50,734	12,787	10	6,553	70,074	0	0	0	70,074
2027	45,854	6,482	$52,336	13,079	10	6,706	72,121	0	0	0	72,121
2028	47,460	6,577	$54,037	13,659	10	6,859	74,555	0	0	0	74,555
2029	43,636	5,879	$49,515	12,654	10	6,234	68,403	0	0	0	68,403
2030	45,162	5,922	$51,084	12,912	10	6,374	70,370	0	0	0	70,370
2031	46,742	6,007	$52,749	13,428	11	6,523	72,700	0	0	0	72,700
2032	0	0	$0	0	11	0	0	0	0	0	0
2033	0	0	$0	0	11	0	0	0	0	0	0
2034	0	0	$0	0	11	0	0	0	0	0	0
2035	0	0	$0	0	0	0	0	0	0	0	0
Total =							$1,132,070			$268,947	$863,123
						NPV =	$809,019			$268,947	$540,072

Total NPV = $540,072
Benefit/Cost Ratio = 3.01

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)
(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Total South Dakota Program**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	122,900	4,916	54	38,809	1	30,815	$192,524	254,820	($62,296)
2015	0	4,916	56	40,164	1	31,694	71,858	0	$71,858
2016	0	4,916	58	41,574	1	32,856	74,430	0	$74,430
2017	0	4,916	60	43,028	1	34,019	77,047	0	$77,047
2018	0	4,916	62	44,531	1	35,181	79,712	0	$79,712
2019	0	4,916	64	46,092	1	36,345	82,437	0	$82,437
2020	0	4,916	67	47,704	1	37,797	85,501	0	$85,501
2021	0	4,916	69	49,374	1	38,960	88,334	0	$88,334
2022	0	4,916	71	51,102	1	40,413	91,515	0	$91,515
2023	0	4,916	74	52,889	1	41,867	94,756	0	$94,756
2024	0	4,790	76	53,332	1	43,319	96,651	0	$96,651
2025	0	4,790	79	55,201	1	44,773	99,974	0	$99,974
2026	0	4,790	82	57,134	1	46,516	103,650	0	$103,650
2027	0	4,790	85	59,131	1	47,970	107,101	0	$107,101
2028	0	4,790	88	61,202	1	49,713	110,915	0	$110,915
2029	0	4,255	91	56,316	1	45,723	102,039	0	$102,039
2030	0	4,255	94	58,288	1	47,278	105,566	0	$105,566
2031	0	4,255	97	60,329	1	48,827	109,156	0	$109,156
2032	0	0	101	0	1	0	0	0	$0
2033	0	0	104	0	1	0	0	0	$0
2034	0	0	108	0	1	0	0	0	$0
2035	0	0	0	0	0	0	0	0	$0
Total =		85,875					$1,773,166	$254,820	$1,518,346
						NPV =	$893,908	$254,820	639,088

Total NPV = $639,088
Benefit/Cost Ratio = 3.51

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Total South Dakota Program**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$30,091	$5,868	$8,428	$44,387	$137,027	$131,920	$268,947	($224,560)
2015	31,144	5,916	8,720	45,780	0	0	0	$45,780
2016	32,234	5,965	9,009	47,208	0	0	0	$47,208
2017	33,360	6,015	9,300	48,675	0	0	0	$48,675
2018	34,530	6,113	9,591	50,234	0	0	0	$50,234
2019	35,739	6,165	10,171	52,075	0	0	0	$52,075
2020	36,988	6,212	10,463	53,663	0	0	0	$53,663
2021	38,285	6,262	10,754	55,301	0	0	0	$55,301
2022	39,624	6,361	11,043	57,028	0	0	0	$57,028
2023	41,009	6,409	11,626	59,044	0	0	0	$59,044
2024	41,357	6,288	11,915	59,560	0	0	0	$59,560
2025	42,803	6,384	12,207	61,394	0	0	0	$61,394
2026	44,302	6,432	12,787	63,521	0	0	0	$63,521
2027	45,854	6,482	13,079	65,415	0	0	0	$65,415
2028	47,460	6,577	13,659	67,696	0	0	0	$67,696
2029	43,636	5,879	12,654	62,169	0	0	0	$62,169
2030	45,162	5,922	12,912	63,996	0	0	0	$63,996
2031	46,742	6,007	13,428	66,177	0	0	0	$66,177
2032	0	0	0	0	0	0	0	$0
2033	0	0	0	0	0	0	0	$0
2034	0	0	0	0	0	0	0	$0
2035	0	0	0	0	0	0	0	$0
			Total =	$1,023,323			$268,947	$754,376
			NPV =	$561,878			$268,947	292,931

Total NPV = $292,931
Benefit/Cost Ratio = 2.09

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - New**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.658
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10200
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$5,171	
16b) Incentive Costs =	45,000	
16c) Total Utility Project Costs =	$50,171	
17) Direct Participant Costs ($/Part.) =	$620	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	18	
21) Avg. Dk/Part. Saved =	7.100	
22) Avg Non-Gas Fuel Units/Part. Saved =	669	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	150	
24) Total Annual Dk Saved =	1,065.0	
25) Incentive/Participant =	$300	
26) Distribution Delivery Charge		$1.744
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$33,491	1.50
Utility Cost Test	$49,987	2.00
Societal Test	$100,616	2.02
Participant Test	$166,495	2.79
Total Resource Cost Test	$40,439	1.41

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - New**

		Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	1,065	$6.121	$6,519	$0.000	$0	$6,519	10.7	$119	$1,273	$7,792	$1.805	$1,250	$5,171	$45,000	$51,421	($43,629)
2	2015	1,065	6.335	6,747	0.000	0	6,747	10.7	120	1,284	8,031	1.868	1,293	0	0	1,293	6,738
3	2016	1,065	6.557	6,983	0.000	0	6,983	10.7	121	1,295	8,278	1.934	1,339	0	0	1,339	6,939
4	2017	1,065	6.786	7,227	0.000	0	7,227	10.7	122	1,305	8,532	2.001	1,385	0	0	1,385	7,147
5	2018	1,065	7.024	7,481	0.000	0	7,481	10.7	124	1,327	8,808	2.071	1,434	0	0	1,434	7,374
6	2019	1,065	7.270	7,743	0.000	0	7,743	10.7	125	1,338	9,081	2.144	1,484	0	0	1,484	7,597
7	2020	1,065	7.524	8,013	0.000	0	8,013	10.7	126	1,348	9,361	2.219	1,536	0	0	1,536	7,825
8	2021	1,065	7.788	8,294	0.000	0	8,294	10.7	127	1,359	9,653	2.297	1,590	0	0	1,590	8,063
9	2022	1,065	8.060	8,584	0.000	0	8,584	10.7	129	1,380	9,964	2.377	1,645	0	0	1,645	8,319
10	2023	1,065	8.342	8,884	0.000	0	8,884	10.7	130	1,391	10,275	2.460	1,703	0	0	1,703	8,572
11	2024	1,065	8.634	9,195	0.000	0	9,195	10.7	131	1,402	10,597	2.546	1,762	0	0	1,762	8,835
12	2025	1,065	8.936	9,517	0.000	0	9,517	10.7	133	1,423	10,940	2.635	1,824	0	0	1,824	9,116
13	2026	1,065	9.249	9,850	0.000	0	9,850	10.7	134	1,434	11,284	2.728	1,888	0	0	1,888	9,396
14	2027	1,065	9.573	10,195	0.000	0	10,195	10.7	135	1,445	11,640	2.823	1,954	0	0	1,954	9,686
15	2028	1,065	9.908	10,552	0.000	0	10,552	10.7	137	1,466	12,018	2.922	2,023	0	0	2,023	9,995
16	2029	1,065	10.255	10,922	0.000	0	10,922	10.7	138	1,477	12,399	3.024	2,093	0	0	2,093	10,306
17	2030	1,065	10.614	11,304	0.000	0	11,304	10.7	139	1,487	12,791	3.130	2,167	0	0	2,167	10,624
18	2031	1,065	10.985	11,699	0.000	0	11,699	10.7	141	1,509	13,208	3.239	2,242	0	0	2,242	10,966
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	3.353	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	3.470	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	3.592	0	0	0	0	0
	Total =	19,170									$184,652					$80,783	$103,869
									NPV =		$100,158					$66,667	$33,491

Total NPV = $33,491
Benefit/Cost Ratio = 1.50

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - New**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$6,519	$1,273	$7,792	$5,171	$45,000	$50,171	($42,379)
2015	6,747	1,284	8,031	0	0	0	8,031
2016	6,983	1,295	8,278	0	0	0	8,278
2017	7,227	1,305	8,532	0	0	0	8,532
2018	7,481	1,327	8,808	0	0	0	8,808
2019	7,743	1,338	9,081	0	0	0	9,081
2020	8,013	1,348	9,361	0	0	0	9,361
2021	8,294	1,359	9,653	0	0	0	9,653
2022	8,584	1,380	9,964	0	0	0	9,964
2023	8,884	1,391	10,275	0	0	0	10,275
2024	9,195	1,402	10,597	0	0	0	10,597
2025	9,517	1,423	10,940	0	0	0	10,940
2026	9,850	1,434	11,284	0	0	0	11,284
2027	10,195	1,445	11,640	0	0	0	11,640
2028	10,552	1,466	12,018	0	0	0	12,018
2029	10,922	1,477	12,399	0	0	0	12,399
2030	11,304	1,487	12,791	0	0	0	12,791
2031	11,699	1,509	13,208	0	0	0	13,208
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$184,652			$50,171	$134,481
		NPV =	$100,158			$50,171	$49,987

Total NPV = $49,987
Benefit/Cost Ratio = 2.00

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - New**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$6,519	$1,273	$0.029	$2,910	$1.041	$1,109	$11,811	$50,171	$48,000	$98,171	($86,360)
2015	6,747	1,284	0.030	3,011	1.065	1,134	12,176	0	0	0	12,176
2016	6,983	1,295	0.031	3,111	1.090	1,161	12,550	0	0	0	12,550
2017	7,227	1,305	0.032	3,211	1.115	1,187	12,930	0	0	0	12,930
2018	7,481	1,327	0.033	3,312	1.141	1,215	13,335	0	0	0	13,335
2019	7,743	1,338	0.035	3,512	1.167	1,243	13,836	0	0	0	13,836
2020	8,013	1,348	0.036	3,613	1.194	1,272	14,246	0	0	0	14,246
2021	8,294	1,359	0.037	3,713	1.221	1,300	14,666	0	0	0	14,666
2022	8,584	1,380	0.038	3,813	1.249	1,330	15,107	0	0	0	15,107
2023	8,884	1,391	0.040	4,014	1.278	1,361	15,650	0	0	0	15,650
2024	9,195	1,402	0.041	4,114	1.307	1,392	16,103	0	0	0	16,103
2025	9,517	1,423	0.042	4,215	1.337	1,424	16,579	0	0	0	16,579
2026	9,850	1,434	0.044	4,415	1.368	1,457	17,156	0	0	0	17,156
2027	10,195	1,445	0.045	4,516	1.400	1,491	17,647	0	0	0	17,647
2028	10,552	1,466	0.047	4,716	1.432	1,525	18,259	0	0	0	18,259
2029	10,922	1,477	0.049	4,917	1.465	1,560	18,876	0	0	0	18,876
2030	11,304	1,487	0.050	5,018	1.498	1,595	19,404	0	0	0	19,404
2031	11,699	1,509	0.052	5,218	1.533	1,633	20,059	0	0	0	20,059
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$280,390			$98,171	$182,219
						NPV =	$198,787			$98,171	$100,616

Total NPV = $100,616
Benefit/Cost Ratio = 2.02

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)

(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - New**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$45,000	1,065	$7.926	$8,441	$0.106	$10,637	$64,078	$93,000	($28,922)
2015	0	1,065	8.203	8,736	0.109	10,938	19,674	0	19,674
2016	0	1,065	8.491	9,043	0.113	11,340	20,383	0	20,383
2017	0	1,065	8.788	9,359	0.117	11,741	21,100	0	21,100
2018	0	1,065	9.095	9,686	0.121	12,142	21,828	0	21,828
2019	0	1,065	9.414	10,026	0.125	12,544	22,570	0	22,570
2020	0	1,065	9.743	10,376	0.130	13,046	23,422	0	23,422
2021	0	1,065	10.084	10,739	0.134	13,447	24,186	0	24,186
2022	0	1,065	10.437	11,115	0.139	13,949	25,064	0	25,064
2023	0	1,065	10.802	11,504	0.144	14,450	25,954	0	25,954
2024	0	1,065	11.180	11,907	0.149	14,952	26,859	0	26,859
2025	0	1,065	11.572	12,324	0.154	15,454	27,778	0	27,778
2026	0	1,065	11.977	12,756	0.160	16,056	28,812	0	28,812
2027	0	1,065	12.396	13,202	0.165	16,558	29,760	0	29,760
2028	0	1,065	12.830	13,664	0.171	17,160	30,824	0	30,824
2029	0	1,065	13.279	14,142	0.177	17,762	31,904	0	31,904
2030	0	1,065	13.744	14,637	0.183	18,364	33,001	0	33,001
2031	0	1,065	14.225	15,150	0.189	18,966	34,116	0	34,116
2032	0	0	14.723	0	0.196	0	0	0	0
2033	0	0	15.238	0	0.203	0	0	0	0
2034	0	0	15.771	0	0.210	0	0	0	0
Total =		19,170					$511,313	$93,000	$418,313
						NPV =	$259,495	$93,000	166,495

Total NPV = $166,495
Benefit/Cost Ratio = 2.79

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Residential 95+% AFUE Furnace - New**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$6,519	$1,273	$2,910	$10,702	$50,171	$48,000	$98,171	($87,469)
2015	6,747	1,284	3,011	11,042	0	0	0	11,042
2016	6,983	1,295	3,111	11,389	0	0	0	11,389
2017	7,227	1,305	3,211	11,743	0	0	0	11,743
2018	7,481	1,327	3,312	12,120	0	0	0	12,120
2019	7,743	1,338	3,512	12,593	0	0	0	12,593
2020	8,013	1,348	3,613	12,974	0	0	0	12,974
2021	8,294	1,359	3,713	13,366	0	0	0	13,366
2022	8,584	1,380	3,813	13,777	0	0	0	13,777
2023	8,884	1,391	4,014	14,289	0	0	0	14,289
2024	9,195	1,402	4,114	14,711	0	0	0	14,711
2025	9,517	1,423	4,215	15,155	0	0	0	15,155
2026	9,850	1,434	4,415	15,699	0	0	0	15,699
2027	10,195	1,445	4,516	16,156	0	0	0	16,156
2028	10,552	1,466	4,716	16,734	0	0	0	16,734
2029	10,922	1,477	4,917	17,316	0	0	0	17,316
2030	11,304	1,487	5,018	17,809	0	0	0	17,809
2031	11,699	1,509	5,218	18,426	0	0	0	18,426
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$256,001			$98,171	$157,830
			NPV =	$138,610			$98,171	40,439

Total NPV =	$40,439
Benefit/Cost Ratio =	1.41

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - Replacement**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.658
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10200
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$7,759	
16b) Incentive Costs =	67,500	
16c) Total Utility Project Costs =	$75,259	
17) Direct Participant Costs ($/Part.) =	$620	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	18	
21) Avg. Dk/Part. Saved =	13.102	
22) Avg Non-Gas Fuel Units/Part. Saved =	669	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	225	
24) Total Annual Dk Saved =	2,948.0	
25) Incentive/Participant =	$300	
26) Distribution Delivery Charge		$1.744
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$156,169	2.29
Utility Cost Test	$201,832	3.68
Societal Test	$338,868	3.30
Participant Test	$370,369	3.65
Total Resource Cost Test	$187,508	2.27

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - Replacement**

		Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	2,948	$6.121	$18,045	$0.000	$0	$18,045	29.5	$119	$3,511	$21,556	$1.805	$3,459	$7,759	$67,500	$78,718	($57,162)
2	2015	2,948	6.335	18,676	0.000	0	18,676	29.5	120	3,540	22,216	1.868	3,579	0	0	3,579	18,637
3	2016	2,948	6.557	19,330	0.000	0	19,330	29.5	121	3,570	22,900	1.934	3,706	0	0	3,706	19,194
4	2017	2,948	6.786	20,005	0.000	0	20,005	29.5	122	3,599	23,604	2.001	3,834	0	0	3,834	19,770
5	2018	2,948	7.024	20,707	0.000	0	20,707	29.5	124	3,658	24,365	2.071	3,968	0	0	3,968	20,397
6	2019	2,948	7.270	21,432	0.000	0	21,432	29.5	125	3,688	25,120	2.144	4,108	0	0	4,108	21,012
7	2020	2,948	7.524	22,181	0.000	0	22,181	29.5	126	3,717	25,898	2.219	4,252	0	0	4,252	21,646
8	2021	2,948	7.788	22,959	0.000	0	22,959	29.5	127	3,747	26,706	2.297	4,402	0	0	4,402	22,304
9	2022	2,948	8.060	23,761	0.000	0	23,761	29.5	129	3,806	27,567	2.377	4,555	0	0	4,555	23,012
10	2023	2,948	8.342	24,592	0.000	0	24,592	29.5	130	3,835	28,427	2.460	4,714	0	0	4,714	23,713
11	2024	2,948	8.634	25,453	0.000	0	25,453	29.5	131	3,865	29,318	2.546	4,879	0	0	4,879	24,439
12	2025	2,948	8.936	26,343	0.000	0	26,343	29.5	133	3,924	30,267	2.635	5,049	0	0	5,049	25,218
13	2026	2,948	9.249	27,266	0.000	0	27,266	29.5	134	3,953	31,219	2.728	5,227	0	0	5,227	25,992
14	2027	2,948	9.573	28,221	0.000	0	28,221	29.5	135	3,983	32,204	2.823	5,409	0	0	5,409	26,795
15	2028	2,948	9.908	29,209	0.000	0	29,209	29.5	137	4,042	33,251	2.922	5,599	0	0	5,599	27,652
16	2029	2,948	10.255	30,232	0.000	0	30,232	29.5	138	4,071	34,303	3.024	5,795	0	0	5,795	28,508
17	2030	2,948	10.614	31,290	0.000	0	31,290	29.5	139	4,101	35,391	3.130	5,998	0	0	5,998	29,393
18	2031	2,948	10.985	32,384	0.000	0	32,384	29.5	141	4,160	36,544	3.239	6,207	0	0	6,207	30,337
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	3.353	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	3.470	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	3.592	0	0	0	0	0
Total =		53,064									$510,856					$159,999	$350,857
									NPV =		$277,091					$120,923	$156,169

Total NPV = $156,169
Benefit/Cost Ratio = 2.29

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - Replacement**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$18,045	$3,511	$21,556	$7,759	$67,500	$75,259	($53,703)
2015	18,676	3,540	22,216	0	0	0	22,216
2016	19,330	3,570	22,900	0	0	0	22,900
2017	20,005	3,599	23,604	0	0	0	23,604
2018	20,707	3,658	24,365	0	0	0	24,365
2019	21,432	3,688	25,120	0	0	0	25,120
2020	22,181	3,717	25,898	0	0	0	25,898
2021	22,959	3,747	26,706	0	0	0	26,706
2022	23,761	3,806	27,567	0	0	0	27,567
2023	24,592	3,835	28,427	0	0	0	28,427
2024	25,453	3,865	29,318	0	0	0	29,318
2025	26,343	3,924	30,267	0	0	0	30,267
2026	27,266	3,953	31,219	0	0	0	31,219
2027	28,221	3,983	32,204	0	0	0	32,204
2028	29,209	4,042	33,251	0	0	0	33,251
2029	30,232	4,071	34,303	0	0	0	34,303
2030	31,290	4,101	35,391	0	0	0	35,391
2031	32,384	4,160	36,544	0	0	0	36,544
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$510,856			$75,259	$435,597
		NPV =	$277,091			$75,259	$201,832

Total NPV =	$201,832
Benefit/Cost Ratio =	3.68

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - Replacement**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$18,045	$3,511	$0.029	$4,365	$1.041	$3,069	$28,990	$75,259	$72,000	$147,259	($118,269)
2015	18,676	3,540	0.030	4,516	1.065	3,140	29,872	0	0	0	29,872
2016	19,330	3,570	0.031	4,666	1.090	3,213	30,779	0	0	0	30,779
2017	20,005	3,599	0.032	4,817	1.115	3,287	31,708	0	0	0	31,708
2018	20,707	3,658	0.033	4,967	1.141	3,364	32,696	0	0	0	32,696
2019	21,432	3,688	0.035	5,268	1.167	3,440	33,828	0	0	0	33,828
2020	22,181	3,717	0.036	5,419	1.194	3,520	34,837	0	0	0	34,837
2021	22,959	3,747	0.037	5,569	1.221	3,600	35,875	0	0	0	35,875
2022	23,761	3,806	0.038	5,720	1.249	3,682	36,969	0	0	0	36,969
2023	24,592	3,835	0.040	6,021	1.278	3,768	38,216	0	0	0	38,216
2024	25,453	3,865	0.041	6,172	1.307	3,853	39,343	0	0	0	39,343
2025	26,343	3,924	0.042	6,322	1.337	3,941	40,530	0	0	0	40,530
2026	27,266	3,953	0.044	6,623	1.368	4,033	41,875	0	0	0	41,875
2027	28,221	3,983	0.045	6,774	1.400	4,127	43,105	0	0	0	43,105
2028	29,209	4,042	0.047	7,075	1.432	4,222	44,548	0	0	0	44,548
2029	30,232	4,071	0.049	7,376	1.465	4,319	45,998	0	0	0	45,998
2030	31,290	4,101	0.050	7,526	1.498	4,416	47,333	0	0	0	47,333
2031	32,384	4,160	0.052	7,827	1.533	4,519	48,890	0	0	0	48,890
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$685,392			$147,259	$538,133
						NPV =	$486,127			$147,259	$338,868

Total NPV = $338,868
Benefit/Cost Ratio = 3.30

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)

(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95+% AFUE Furnace - Replacement**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$67,500	2,948	$7.926	$23,366	$0.106	$15,956	$106,822	$139,500	($32,678)
2015	0	2,948	8.203	24,182	0.109	16,407	40,589	0	40,589
2016	0	2,948	8.491	25,031	0.113	17,009	42,040	0	42,040
2017	0	2,948	8.788	25,907	0.117	17,611	43,518	0	43,518
2018	0	2,948	9.095	26,812	0.121	18,214	45,026	0	45,026
2019	0	2,948	9.414	27,752	0.125	18,816	46,568	0	46,568
2020	0	2,948	9.743	28,722	0.130	19,568	48,290	0	48,290
2021	0	2,948	10.084	29,728	0.134	20,170	49,898	0	49,898
2022	0	2,948	10.437	30,768	0.139	20,923	51,691	0	51,691
2023	0	2,948	10.802	31,844	0.144	21,676	53,520	0	53,520
2024	0	2,948	11.180	32,959	0.149	22,428	55,387	0	55,387
2025	0	2,948	11.572	34,114	0.154	23,181	57,295	0	57,295
2026	0	2,948	11.977	35,308	0.160	24,084	59,392	0	59,392
2027	0	2,948	12.396	36,543	0.165	24,837	61,380	0	61,380
2028	0	2,948	12.830	37,823	0.171	25,740	63,563	0	63,563
2029	0	2,948	13.279	39,146	0.177	26,643	65,789	0	65,789
2030	0	2,948	13.744	40,517	0.183	27,546	68,063	0	68,063
2031	0	2,948	14.225	41,935	0.189	28,449	70,384	0	70,384
2032	0	0	14.723	0	0.196	0	0	0	0
2033	0	0	15.238	0	0.203	0	0	0	0
2034	0	0	15.771	0	0.210	0	0	0	0
Total =		53,064					$1,029,215	$139,500	$889,715
						NPV =	$509,869	$139,500	370,369

Total NPV = $370,369
Benefit/Cost Ratio = 3.65

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Residential 95+% AFUE Furnace - Replacement**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$18,045	$3,511	$4,365	$25,921	$75,259	$72,000	$147,259	($121,338)
2015	18,676	3,540	4,516	26,732	0	0	0	26,732
2016	19,330	3,570	4,666	27,566	0	0	0	27,566
2017	20,005	3,599	4,817	28,421	0	0	0	28,421
2018	20,707	3,658	4,967	29,332	0	0	0	29,332
2019	21,432	3,688	5,268	30,388	0	0	0	30,388
2020	22,181	3,717	5,419	31,317	0	0	0	31,317
2021	22,959	3,747	5,569	32,275	0	0	0	32,275
2022	23,761	3,806	5,720	33,287	0	0	0	33,287
2023	24,592	3,835	6,021	34,448	0	0	0	34,448
2024	25,453	3,865	6,172	35,490	0	0	0	35,490
2025	26,343	3,924	6,322	36,589	0	0	0	36,589
2026	27,266	3,953	6,623	37,842	0	0	0	37,842
2027	28,221	3,983	6,774	38,978	0	0	0	38,978
2028	29,209	4,042	7,075	40,326	0	0	0	40,326
2029	30,232	4,071	7,376	41,679	0	0	0	41,679
2030	31,290	4,101	7,526	42,917	0	0	0	42,917
2031	32,384	4,160	7,827	44,371	0	0	0	44,371
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$617,879			$147,259	$470,620
			NPV =	$334,767			$147,259	187,508

Total NPV =	$187,508
Benefit/Cost Ratio =	2.27

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Residential Water Heating .67 EF**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.658
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10200
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$403	
16b) Incentive Costs =	3,500	
16c) Total Utility Project Costs =	$3,903	
17) Direct Participant Costs ($/Part.) =	$100	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	10	
21) Avg. Dk/Part. Saved =	3.600	
22) Avg Non-Gas Fuel Units/Part. Saved =	0	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	35	
24) Total Annual Dk Saved =	126.0	
25) Incentive/Participant =	$100	
26) Distribution Delivery Charge		$1.744
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$2,544	1.49
Utility Cost Test	$3,794	1.97
Societal Test	$6,230	2.60
Participant Test	$7,710	3.20
Total Resource Cost Test	$3,794	1.97

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential Water Heating .67 EF**

		Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	126	$6.121	$771	$0.000	$0	$771	1.3	$119	$155	$926	$1.805	$148	$403	$3,500	$4,051	($3,125)
2	2015	126	6.335	798	0.000	0	798	1.3	120	156	954	1.868	153	0	0	153	801
3	2016	126	6.557	826	0.000	0	826	1.3	121	157	983	1.934	158	0	0	158	825
4	2017	126	6.786	855	0.000	0	855	1.3	122	159	1,014	2.001	164	0	0	164	850
5	2018	126	7.024	885	0.000	0	885	1.3	124	161	1,046	2.071	170	0	0	170	876
6	2019	126	7.270	916	0.000	0	916	1.3	125	163	1,079	2.144	176	0	0	176	903
7	2020	126	7.524	948	0.000	0	948	1.3	126	164	1,112	2.219	182	0	0	182	930
8	2021	126	7.788	981	0.000	0	981	1.3	127	165	1,146	2.297	188	0	0	188	958
9	2022	126	8.060	1,016	0.000	0	1,016	1.3	129	168	1,184	2.377	195	0	0	195	989
10	2023	126	8.342	1,051	0.000	0	1,051	1.3	130	169	1,220	2.460	201	0	0	201	1,019
11	2024	0	8.634	0	0.000	0	0	0.0	131	0	0	2.546	0	0	0	0	0
12	2025	0	8.936	0	0.000	0	0	0.0	133	0	0	2.635	0	0	0	0	0
13	2026	0	9.249	0	0.000	0	0	0.0	134	0	0	2.728	0	0	0	0	0
14	2027	0	9.573	0	0.000	0	0	0.0	135	0	0	2.823	0	0	0	0	0
15	2028	0	9.908	0	0.000	0	0	0.0	137	0	0	2.922	0	0	0	0	0
16	2029	0	10.255	0	0.000	0	0	0.0	138	0	0	3.024	0	0	0	0	0
17	2030	0	10.614	0	0.000	0	0	0.0	139	0	0	3.130	0	0	0	0	0
18	2031	0	10.985	0	0.000	0	0	0.0	141	0	0	3.239	0	0	0	0	0
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	3.353	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	3.470	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	3.592	0	0	0	0	0
	Total =	1,260									$10,664					$5,638	$5,026
									NPV =		$7,697					$5,153	$2,544

Total NPV = $2,544
Benefit/Cost Ratio = 1.49

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential Water Heating .67 EF**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$771	$155	$926	$403	$3,500	$3,903	($2,977)
2015	798	156	954	0	0	0	954
2016	826	157	983	0	0	0	983
2017	855	159	1,014	0	0	0	1,014
2018	885	161	1,046	0	0	0	1,046
2019	916	163	1,079	0	0	0	1,079
2020	948	164	1,112	0	0	0	1,112
2021	981	165	1,146	0	0	0	1,146
2022	1,016	168	1,184	0	0	0	1,184
2023	1,051	169	1,220	0	0	0	1,220
2024	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$10,664			$3,903	$6,761
		NPV =	$7,697			$3,903	$3,794

Total NPV = $3,794
Benefit/Cost Ratio = 1.97

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential Water Heating .67 EF**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$771	$155	$0.029	$0	$1.041	$131	$1,057	$3,903	$0	$3,903	($2,846)
2015	798	156	0.030	0	1.065	134	1,088	0	0	0	1,088
2016	826	157	0.031	0	1.090	137	1,120	0	0	0	1,120
2017	855	159	0.032	0	1.115	140	1,154	0	0	0	1,154
2018	885	161	0.033	0	1.141	144	1,190	0	0	0	1,190
2019	916	163	0.035	0	1.167	147	1,226	0	0	0	1,226
2020	948	164	0.036	0	1.194	150	1,262	0	0	0	1,262
2021	981	165	0.037	0	1.221	154	1,300	0	0	0	1,300
2022	1,016	168	0.038	0	1.249	157	1,341	0	0	0	1,341
2023	1,051	169	0.040	0	1.278	161	1,381	0	0	0	1,381
2024	0	0	0.041	0	1.307	0	0	0	0	0	0
2025	0	0	0.042	0	1.337	0	0	0	0	0	0
2026	0	0	0.044	0	1.368	0	0	0	0	0	0
2027	0	0	0.045	0	1.400	0	0	0	0	0	0
2028	0	0	0.047	0	1.432	0	0	0	0	0	0
2029	0	0	0.049	0	1.465	0	0	0	0	0	0
2030	0	0	0.050	0	1.498	0	0	0	0	0	0
2031	0	0	0.052	0	1.533	0	0	0	0	0	0
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$12,119			$3,903	$8,216
						NPV =	$10,133			$3,903	$6,230

Total NPV = $6,230
Benefit/Cost Ratio = 2.60

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)
(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential Water Heating .67 EF**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$3,500	126	$7.926	$999	$0.106	$0	$4,499	$3,500	$999
2015	0	126	8.203	1,034	0.109	0	1,034	0	1,034
2016	0	126	8.491	1,070	0.113	0	1,070	0	1,070
2017	0	126	8.788	1,107	0.117	0	1,107	0	1,107
2018	0	126	9.095	1,146	0.121	0	1,146	0	1,146
2019	0	126	9.414	1,186	0.125	0	1,186	0	1,186
2020	0	126	9.743	1,228	0.130	0	1,228	0	1,228
2021	0	126	10.084	1,271	0.134	0	1,271	0	1,271
2022	0	126	10.437	1,315	0.139	0	1,315	0	1,315
2023	0	126	10.802	1,361	0.144	0	1,361	0	1,361
2024	0	0	11.180	0	0.149	0	0	0	0
2025	0	0	11.572	0	0.154	0	0	0	0
2026	0	0	11.977	0	0.160	0	0	0	0
2027	0	0	12.396	0	0.165	0	0	0	0
2028	0	0	12.830	0	0.171	0	0	0	0
2029	0	0	13.279	0	0.177	0	0	0	0
2030	0	0	13.744	0	0.183	0	0	0	0
2031	0	0	14.225	0	0.189	0	0	0	0
2032	0	0	14.723	0	0.196	0	0	0	0
2033	0	0	15.238	0	0.203	0	0	0	0
2034	0	0	15.771	0	0.210	0	0	0	0
Total =		1,260					$15,217	$3,500	$11,717
						NPV =	$11,210	$3,500	7,710

Total NPV = $7,710
Benefit/Cost Ratio = 3.20

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Residential Water Heating .67 EF**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$771	$155	$0	$926	$3,903	$0	$3,903	($2,977)
2015	798	156	0	954	0	0	0	954
2016	826	157	0	983	0	0	0	983
2017	855	159	0	1,014	0	0	0	1,014
2018	885	161	0	1,046	0	0	0	1,046
2019	916	163	0	1,079	0	0	0	1,079
2020	948	164	0	1,112	0	0	0	1,112
2021	981	165	0	1,146	0	0	0	1,146
2022	1,016	168	0	1,184	0	0	0	1,184
2023	1,051	169	0	1,220	0	0	0	1,220
2024	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$10,664			$3,903	$6,761
			NPV =	$7,697			$3,903	3,794

Total NPV =	$3,794
Benefit/Cost Ratio =	1.97

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.658
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10200
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$345	
16b) Incentive Costs =	3,000	
16c) Total Utility Project Costs =	$3,345	
17) Direct Participant Costs ($/Part.) =	$60	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	15	
21) Avg. Dk/Part. Saved =	2.900	
22) Avg Non-Gas Fuel Units/Part. Saved =	216	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	150	
24) Total Annual Dk Saved =	435.0	
25) Incentive/Participant =	$20	
26) Distribution Delivery Charge		$1.744
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$26,826	3.90
Utility Cost Test	$32,741	10.79
Societal Test	$55,514	6.94
Participant Test	$63,613	8.07
Total Resource Cost Test	$37,640	5.03

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats**

		Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	435	$6.121	$2,663	$0.000	$0	$2,663	4.4	$119	$524	$3,187	$1.805	$510	$345	$3,000	$3,855	($668)
2	2015	435	6.335	2,756	0.000	0	2,756	4.4	120	528	3,284	1.868	528	0	0	528	2,756
3	2016	435	6.557	2,852	0.000	0	2,852	4.4	121	532	3,384	1.934	547	0	0	547	2,837
4	2017	435	6.786	2,952	0.000	0	2,952	4.4	122	537	3,489	2.001	566	0	0	566	2,923
5	2018	435	7.024	3,055	0.000	0	3,055	4.4	124	546	3,601	2.071	586	0	0	586	3,015
6	2019	435	7.270	3,162	0.000	0	3,162	4.4	125	550	3,712	2.144	606	0	0	606	3,106
7	2020	435	7.524	3,273	0.000	0	3,273	4.4	126	554	3,827	2.219	627	0	0	627	3,200
8	2021	435	7.788	3,388	0.000	0	3,388	4.4	127	559	3,947	2.297	649	0	0	649	3,298
9	2022	435	8.060	3,506	0.000	0	3,506	4.4	129	568	4,074	2.377	672	0	0	672	3,402
10	2023	435	8.342	3,629	0.000	0	3,629	4.4	130	572	4,201	2.460	696	0	0	696	3,505
11	2024	435	8.634	3,756	0.000	0	3,756	4.4	131	576	4,332	2.546	720	0	0	720	3,612
12	2025	435	8.936	3,887	0.000	0	3,887	4.4	133	585	4,472	2.635	745	0	0	745	3,727
13	2026	435	9.249	4,023	0.000	0	4,023	4.4	134	590	4,613	2.728	771	0	0	771	3,842
14	2027	435	9.573	4,164	0.000	0	4,164	4.4	135	594	4,758	2.823	798	0	0	798	3,960
15	2028	435	9.908	4,310	0.000	0	4,310	4.4	137	603	4,913	2.922	826	0	0	826	4,087
16	2029	0	10.255	0	0.000	0	0	0.0	138	0	0	3.024	0	0	0	0	0
17	2030	0	10.614	0	0.000	0	0	0.0	139	0	0	3.130	0	0	0	0	0
18	2031	0	10.985	0	0.000	0	0	0.0	141	0	0	3.239	0	0	0	0	0
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	3.353	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	3.470	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	3.592	0	0	0	0	0
Total =		6,525									$59,794					$13,192	$46,602
									NPV =		$36,086					$9,260	$26,826

Total NPV = $26,826
Benefit/Cost Ratio = 3.90

Worksheet Calculations	
(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)	(I) = (G) x (H)
(B) = Commodity Cost (3) escalated	(J) = (F) + (I)
(C) = (A) x (B)	(K) = Distribution Delivery Charge (26) escalated.
(D) = Variable O&M Cost (6), escalated	(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(E) = (A) x (D)	(M) = Admin & Operating Costs (16a)
(F) = (C) + (E)	(N) = Incentive Costs (16b)
(G) = (A) x Peak Reduction Factor (5)	(O) = (L) + (M) + (N)
(H) = Demand Cost (4) escalated.	(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$2,663	$524	$3,187	$345	$3,000	$3,345	($158)
2015	2,756	528	3,284	0	0	0	3,284
2016	2,852	532	3,384	0	0	0	3,384
2017	2,952	537	3,489	0	0	0	3,489
2018	3,055	546	3,601	0	0	0	3,601
2019	3,162	550	3,712	0	0	0	3,712
2020	3,273	554	3,827	0	0	0	3,827
2021	3,388	559	3,947	0	0	0	3,947
2022	3,506	568	4,074	0	0	0	4,074
2023	3,629	572	4,201	0	0	0	4,201
2024	3,756	576	4,332	0	0	0	4,332
2025	3,887	585	4,472	0	0	0	4,472
2026	4,023	590	4,613	0	0	0	4,613
2027	4,164	594	4,758	0	0	0	4,758
2028	4,310	603	4,913	0	0	0	4,913
2029	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$59,794			$3,345	$56,449
		NPV =	$36,086			$3,345	$32,741

Total NPV = $32,741
Benefit/Cost Ratio = 10.79

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$2,663	$524	$0.029	$940	$1.041	$453	$4,580	$3,345	$6,000	$9,345	($4,765)
2015	2,756	528	0.030	972	1.065	463	4,719	0	0	0	4,719
2016	2,852	532	0.031	1,004	1.090	474	4,862	0	0	0	4,862
2017	2,952	537	0.032	1,037	1.115	485	5,011	0	0	0	5,011
2018	3,055	546	0.033	1,069	1.141	496	5,166	0	0	0	5,166
2019	3,162	550	0.035	1,134	1.167	508	5,354	0	0	0	5,354
2020	3,273	554	0.036	1,166	1.194	519	5,512	0	0	0	5,512
2021	3,388	559	0.037	1,199	1.221	531	5,677	0	0	0	5,677
2022	3,506	568	0.038	1,231	1.249	543	5,848	0	0	0	5,848
2023	3,629	572	0.040	1,296	1.278	556	6,053	0	0	0	6,053
2024	3,756	576	0.041	1,328	1.307	569	6,229	0	0	0	6,229
2025	3,887	585	0.042	1,361	1.337	582	6,415	0	0	0	6,415
2026	4,023	590	0.044	1,426	1.368	595	6,634	0	0	0	6,634
2027	4,164	594	0.045	1,458	1.400	609	6,825	0	0	0	6,825
2028	4,310	603	0.047	1,523	1.432	623	7,059	0	0	0	7,059
2029	0	0	0.049	0	1.465	0	0	0	0	0	0
2030	0	0	0.050	0	1.498	0	0	0	0	0	0
2031	0	0	0.052	0	1.533	0	0	0	0	0	0
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$85,944			$9,345	$76,599
						NPV =	$64,859			$9,345	$55,514

Total NPV = $55,514
Benefit/Cost Ratio = 6.94

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)
(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$3,000	435	$7.926	$3,448	$0.106	$3,434	$9,882	$9,000	$882
2015	0	435	8.203	3,568	0.109	3,532	7,100	0	7,100
2016	0	435	8.491	3,694	0.113	3,661	7,355	0	7,355
2017	0	435	8.788	3,823	0.117	3,791	7,614	0	7,614
2018	0	435	9.095	3,956	0.121	3,920	7,876	0	7,876
2019	0	435	9.414	4,095	0.125	4,050	8,145	0	8,145
2020	0	435	9.743	4,238	0.130	4,212	8,450	0	8,450
2021	0	435	10.084	4,387	0.134	4,342	8,729	0	8,729
2022	0	435	10.437	4,540	0.139	4,504	9,044	0	9,044
2023	0	435	10.802	4,699	0.144	4,666	9,365	0	9,365
2024	0	435	11.180	4,863	0.149	4,828	9,691	0	9,691
2025	0	435	11.572	5,034	0.154	4,990	10,024	0	10,024
2026	0	435	11.977	5,210	0.160	5,184	10,394	0	10,394
2027	0	435	12.396	5,392	0.165	5,346	10,738	0	10,738
2028	0	435	12.830	5,581	0.171	5,540	11,121	0	11,121
2029	0	0	13.279	0	0.177	0	0	0	0
2030	0	0	13.744	0	0.183	0	0	0	0
2031	0	0	14.225	0	0.189	0	0	0	0
2032	0	0	14.723	0	0.196	0	0	0	0
2033	0	0	15.238	0	0.203	0	0	0	0
2034	0	0	15.771	0	0.210	0	0	0	0
Total =		6,525					$135,528	$9,000	$126,528
						NPV =	$72,613	$9,000	63,613

Total NPV = $63,613
Benefit/Cost Ratio = 8.07

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Programmable Thermostats**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$2,663	$524	$940	$4,127	$3,345	$6,000	$9,345	($5,218)
2015	2,756	528	972	4,256	0	0	0	4,256
2016	2,852	532	1,004	4,388	0	0	0	4,388
2017	2,952	537	1,037	4,526	0	0	0	4,526
2018	3,055	546	1,069	4,670	0	0	0	4,670
2019	3,162	550	1,134	4,846	0	0	0	4,846
2020	3,273	554	1,166	4,993	0	0	0	4,993
2021	3,388	559	1,199	5,146	0	0	0	5,146
2022	3,506	568	1,231	5,305	0	0	0	5,305
2023	3,629	572	1,296	5,497	0	0	0	5,497
2024	3,756	576	1,328	5,660	0	0	0	5,660
2025	3,887	585	1,361	5,833	0	0	0	5,833
2026	4,023	590	1,426	6,039	0	0	0	6,039
2027	4,164	594	1,458	6,216	0	0	0	6,216
2028	4,310	603	1,523	6,436	0	0	0	6,436
2029	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$77,938			$9,345	$68,593
			NPV =	$46,985			$9,345	37,640

Total NPV =	$37,640
Benefit/Cost Ratio =	5.03

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - New**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.216
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10340
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014
16) Utility Project Costs	
16a) Administrative & Operating Costs =	$34
16b) Incentive Costs =	300
16c) Total Utility Project Costs =	$334
17) Direct Participant Costs ($/Part.) =	$620
18) Participant Non-Energy Costs (Annual $/Part.) =	$0
Escalation Rate =	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0
Escalation Rate =	0.00%
20) Project Life (Years) =	18
21) Avg. Dk/Part. Saved =	12.000
22) Avg Non-Gas Fuel Units/Part. Saved =	669
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0
23) Number of Participants =	1
24) Total Annual Dk Saved =	12.0
25) Incentive/Participant =	$300
26) Distribution Delivery Charge	$1.302
27) Effective Income Tax Rate = (Federal & State Taxes)	35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$628	2.33
Utility Cost Test	$767	3.30
Societal Test	$1,316	3.01
Participant Test	$1,497	3.41
Total Resource Cost Test	$701	2.07

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - New**

			Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	12	$6.121	$73	$0.000	$0	$73	0.1	$119	$12	$85	$1.348	$11	$34	$300	$345	($260)
2	2015	12	6.335	76	0.000	0	76	0.1	120	12	88	1.395	11	0	0	11	77
3	2016	12	6.557	79	0.000	0	79	0.1	121	12	91	1.444	11	0	0	11	80
4	2017	12	6.786	81	0.000	0	81	0.1	122	12	93	1.494	12	0	0	12	81
5	2018	12	7.024	84	0.000	0	84	0.1	124	12	96	1.546	12	0	0	12	84
6	2019	12	7.270	87	0.000	0	87	0.1	125	13	100	1.600	12	0	0	12	88
7	2020	12	7.524	90	0.000	0	90	0.1	126	13	103	1.657	13	0	0	13	90
8	2021	12	7.788	93	0.000	0	93	0.1	127	13	106	1.714	13	0	0	13	93
9	2022	12	8.060	97	0.000	0	97	0.1	129	13	110	1.774	14	0	0	14	96
10	2023	12	8.342	100	0.000	0	100	0.1	130	13	113	1.837	14	0	0	14	99
11	2024	12	8.634	104	0.000	0	104	0.1	131	13	117	1.901	15	0	0	15	102
12	2025	12	8.936	107	0.000	0	107	0.1	133	13	120	1.967	15	0	0	15	105
13	2026	12	9.249	111	0.000	0	111	0.1	134	13	124	2.036	16	0	0	16	108
14	2027	12	9.573	115	0.000	0	115	0.1	135	14	129	2.108	16	0	0	16	113
15	2028	12	9.908	119	0.000	0	119	0.1	137	14	133	2.181	17	0	0	17	116
16	2029	12	10.255	123	0.000	0	123	0.1	138	14	137	2.258	18	0	0	18	119
17	2030	12	10.614	127	0.000	0	127	0.1	139	14	141	2.337	18	0	0	18	123
18	2031	12	10.985	132	0.000	0	132	0.1	141	14	146	2.418	19	0	0	19	127
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	2.503	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	2.591	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	2.681	0	0	0	0	0
Total =		216									$2,032					$591	$1,441
									NPV =		$1,101					$473	$628

Total NPV = $628
Benefit/Cost Ratio = 2.33

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - New**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$73	$12	$85	$34	$300	$334	($249)
2015	76	12	88	0	0	0	88
2016	79	12	91	0	0	0	91
2017	81	12	93	0	0	0	93
2018	84	12	96	0	0	0	96
2019	87	13	100	0	0	0	100
2020	90	13	103	0	0	0	103
2021	93	13	106	0	0	0	106
2022	97	13	110	0	0	0	110
2023	100	13	113	0	0	0	113
2024	104	13	117	0	0	0	117
2025	107	13	120	0	0	0	120
2026	111	13	124	0	0	0	124
2027	115	14	129	0	0	0	129
2028	119	14	133	0	0	0	133
2029	123	14	137	0	0	0	137
2030	127	14	141	0	0	0	141
2031	132	14	146	0	0	0	146
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$2,032			$334	$1,698
		NPV =	$1,101			$334	$767

Total NPV =	$767
Benefit/Cost Ratio =	3.30

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - New**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$73	$12	$0.029	$19	$1.041	$12	$116	$334	$320	$654	($538)
2015	76	12	0.030	20	1.065	13	121	0	0	0	121
2016	79	12	0.031	21	1.090	13	125	0	0	0	125
2017	81	12	0.032	21	1.115	13	127	0	0	0	127
2018	84	12	0.033	22	1.141	14	132	0	0	0	132
2019	87	13	0.035	23	1.167	14	137	0	0	0	137
2020	90	13	0.036	24	1.194	14	141	0	0	0	141
2021	93	13	0.037	25	1.221	15	146	0	0	0	146
2022	97	13	0.038	25	1.249	15	150	0	0	0	150
2023	100	13	0.040	27	1.278	15	155	0	0	0	155
2024	104	13	0.041	27	1.307	16	160	0	0	0	160
2025	107	13	0.042	28	1.337	16	164	0	0	0	164
2026	111	13	0.044	29	1.368	16	169	0	0	0	169
2027	115	14	0.045	30	1.400	17	176	0	0	0	176
2028	119	14	0.047	31	1.432	17	181	0	0	0	181
2029	123	14	0.049	33	1.465	18	188	0	0	0	188
2030	127	14	0.050	33	1.498	18	192	0	0	0	192
2031	132	14	0.052	35	1.533	18	199	0	0	0	199
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$2,779			$654	$2,125
						NPV =	$1,970			$654	$1,316

Total NPV = $1,316
Benefit/Cost Ratio = 3.01

Worksheet Calculations

(A) = Table 1 (F)
(G) = Table 1 (I)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(E) = Gas Environmental Damage Factor (9), escalated
(F) = Table 1 (A) x (E)
(G) = (A) + (B) + (D) + (F)

(H) = Table 2 (F)
(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(J) = (H) + (I)
(K) = (G) - (J)

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - New**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$300	12	$7.469	$90	$0.107	$72	$462	$620	($158)
2015	0	12	7.730	93	0.111	74	167	0	167
2016	0	12	8.001	96	0.115	77	173	0	173
2017	0	12	8.281	99	0.119	80	179	0	179
2018	0	12	8.570	103	0.123	82	185	0	185
2019	0	12	8.870	106	0.127	85	191	0	191
2020	0	12	9.181	110	0.132	88	198	0	198
2021	0	12	9.502	114	0.136	91	205	0	205
2022	0	12	9.835	118	0.141	94	212	0	212
2023	0	12	10.179	122	0.146	98	220	0	220
2024	0	12	10.535	126	0.151	101	227	0	227
2025	0	12	10.904	131	0.156	104	235	0	235
2026	0	12	11.286	135	0.162	108	243	0	243
2027	0	12	11.680	140	0.167	112	252	0	252
2028	0	12	12.089	145	0.173	116	261	0	261
2029	0	12	12.512	150	0.179	120	270	0	270
2030	0	12	12.950	155	0.186	124	279	0	279
2031	0	12	13.404	161	0.192	128	289	0	289
2032	0	0	13.873	0	0.199	0	0	0	0
2033	0	0	14.358	0	0.206	0	0	0	0
2034	0	0	14.861	0	0.213	0	0	0	0
Total =		216					$4,248	$620	$3,628
						NPV =	$2,117	$620	1,497

Total NPV =	$1,497
Benefit/Cost Ratio =	3.41

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Commercial 95+% AFUE Furnace - New**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$73	$12	$19	$104	$334	$320	$654	($550)
2015	76	12	20	108	0	0	0	108
2016	79	12	21	112	0	0	0	112
2017	81	12	21	114	0	0	0	114
2018	84	12	22	118	0	0	0	118
2019	87	13	23	123	0	0	0	123
2020	90	13	24	127	0	0	0	127
2021	93	13	25	131	0	0	0	131
2022	97	13	25	135	0	0	0	135
2023	100	13	27	140	0	0	0	140
2024	104	13	27	144	0	0	0	144
2025	107	13	28	148	0	0	0	148
2026	111	13	29	153	0	0	0	153
2027	115	14	30	159	0	0	0	159
2028	119	14	31	164	0	0	0	164
2029	123	14	33	170	0	0	0	170
2030	127	14	33	174	0	0	0	174
2031	132	14	35	181	0	0	0	181
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$2,505			$654	$1,851
			NPV =	$1,355			$654	701

Total NPV =	$701
Benefit/Cost Ratio =	2.07

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - Replacement**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.216
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10340
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$345	
16b) Incentive Costs =	3,000	
16c) Total Utility Project Costs =	$3,345	
17) Direct Participant Costs ($/Part.) =	$620	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	18	
21) Avg. Dk/Part. Saved =	23.000	
22) Avg Non-Gas Fuel Units/Part. Saved =	669	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	10	
24) Total Annual Dk Saved =	230.0	
25) Incentive/Participant =	$300	
26) Distribution Delivery Charge		$1.302
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$15,613	3.60
Utility Cost Test	$18,273	6.46
Societal Test	$28,843	5.41
Participant Test	$24,233	4.91
Total Resource Cost Test	$17,636	3.69

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - Replacement**

			Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	230	$6.121	$1,408	$0.000	$0	$1,408	2.3	$119	$274	$1,682	$1.348	$202	$345	$3,000	$3,547	($1,865)
2	2015	230	6.335	1,457	0.000	0	1,457	2.3	120	276	1,733	1.395	209	0	0	209	1,524
3	2016	230	6.557	1,508	0.000	0	1,508	2.3	121	278	1,786	1.444	216	0	0	216	1,570
4	2017	230	6.786	1,561	0.000	0	1,561	2.3	122	281	1,842	1.494	223	0	0	223	1,619
5	2018	230	7.024	1,616	0.000	0	1,616	2.3	124	285	1,901	1.546	231	0	0	231	1,670
6	2019	230	7.270	1,672	0.000	0	1,672	2.3	125	288	1,960	1.600	239	0	0	239	1,721
7	2020	230	7.524	1,731	0.000	0	1,731	2.3	126	290	2,021	1.657	248	0	0	248	1,773
8	2021	230	7.788	1,791	0.000	0	1,791	2.3	127	292	2,083	1.714	256	0	0	256	1,827
9	2022	230	8.060	1,854	0.000	0	1,854	2.3	129	297	2,151	1.774	265	0	0	265	1,886
10	2023	230	8.342	1,919	0.000	0	1,919	2.3	130	299	2,218	1.837	275	0	0	275	1,943
11	2024	230	8.634	1,986	0.000	0	1,986	2.3	131	301	2,287	1.901	284	0	0	284	2,003
12	2025	230	8.936	2,055	0.000	0	2,055	2.3	133	306	2,361	1.967	294	0	0	294	2,067
13	2026	230	9.249	2,127	0.000	0	2,127	2.3	134	308	2,435	2.036	304	0	0	304	2,131
14	2027	230	9.573	2,202	0.000	0	2,202	2.3	135	311	2,513	2.108	315	0	0	315	2,198
15	2028	230	9.908	2,279	0.000	0	2,279	2.3	137	315	2,594	2.181	326	0	0	326	2,268
16	2029	230	10.255	2,359	0.000	0	2,359	2.3	138	317	2,676	2.258	338	0	0	338	2,338
17	2030	230	10.614	2,441	0.000	0	2,441	2.3	139	320	2,761	2.337	349	0	0	349	2,412
18	2031	230	10.985	2,527	0.000	0	2,527	2.3	141	324	2,851	2.418	361	0	0	361	2,490
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	2.503	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	2.591	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	2.681	0	0	0	0	0
	Total =	4,140									$39,855					$8,280	$31,575
									NPV =		$21,618					$6,005	$15,613

Total NPV = $15,613
Benefit/Cost Ratio = 3.60

Worksheet Calculations

(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)
(B) = Commodity Cost (3) escalated
(C) = (A) x (B)
(D) = Variable O&M Cost (6), escalated
(E) = (A) x (D)
(F) = (C) + (E)
(G) = (A) x Peak Reduction Factor (5)
(H) = Demand Cost (4) escalated.
(I) = (G) x (H)
(J) = (F) + (I)
(K) = Distribution Delivery Charge (26) escalated.
(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(M) = Admin & Operating Costs (16a)
(N) = Incentive Costs (16b)
(O) = (L) + (M) + (N)
(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - Replacement**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$1,408	$274	$1,682	$345	$3,000	$3,345	($1,663)
2015	1,457	276	1,733	0	0	0	1,733
2016	1,508	278	1,786	0	0	0	1,786
2017	1,561	281	1,842	0	0	0	1,842
2018	1,616	285	1,901	0	0	0	1,901
2019	1,672	288	1,960	0	0	0	1,960
2020	1,731	290	2,021	0	0	0	2,021
2021	1,791	292	2,083	0	0	0	2,083
2022	1,854	297	2,151	0	0	0	2,151
2023	1,919	299	2,218	0	0	0	2,218
2024	1,986	301	2,287	0	0	0	2,287
2025	2,055	306	2,361	0	0	0	2,361
2026	2,127	308	2,435	0	0	0	2,435
2027	2,202	311	2,513	0	0	0	2,513
2028	2,279	315	2,594	0	0	0	2,594
2029	2,359	317	2,676	0	0	0	2,676
2030	2,441	320	2,761	0	0	0	2,761
2031	2,527	324	2,851	0	0	0	2,851
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$39,855			$3,345	$36,510
		NPV =	$21,618			$3,345	$18,273

Total NPV = $18,273
Benefit/Cost Ratio = 6.46

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - Replacement**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$1,408	$274	$0.029	$194	$1.041	$239	$2,115	$3,345	$3,200	$6,545	($4,430)
2015	1,457	276	0.030	201	1.065	245	2,179	0	0	0	2,179
2016	1,508	278	0.031	207	1.090	251	2,244	0	0	0	2,244
2017	1,561	281	0.032	214	1.115	256	2,312	0	0	0	2,312
2018	1,616	285	0.033	221	1.141	262	2,384	0	0	0	2,384
2019	1,672	288	0.035	234	1.167	268	2,462	0	0	0	2,462
2020	1,731	290	0.036	241	1.194	275	2,537	0	0	0	2,537
2021	1,791	292	0.037	248	1.221	281	2,612	0	0	0	2,612
2022	1,854	297	0.038	254	1.249	287	2,692	0	0	0	2,692
2023	1,919	299	0.040	268	1.278	294	2,780	0	0	0	2,780
2024	1,986	301	0.041	274	1.307	301	2,862	0	0	0	2,862
2025	2,055	306	0.042	281	1.337	308	2,950	0	0	0	2,950
2026	2,127	308	0.044	294	1.368	315	3,044	0	0	0	3,044
2027	2,202	311	0.045	301	1.400	322	3,136	0	0	0	3,136
2028	2,279	315	0.047	314	1.432	329	3,237	0	0	0	3,237
2029	2,359	317	0.049	328	1.465	337	3,341	0	0	0	3,341
2030	2,441	320	0.050	335	1.498	345	3,441	0	0	0	3,441
2031	2,527	324	0.052	348	1.533	353	3,552	0	0	0	3,552
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$49,880			$6,545	$43,335
						NPV =	$35,388			$6,545	$28,843

Total NPV = $28,843
Benefit/Cost Ratio = 5.41

Worksheet Calculations	
(A) = Table 1 (F)	(H) = Table 2 (F)
(G) = Table 1 (I)	(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..	(J) = (H) + (I)
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)	(K) = (G) - (J)
(E) = Gas Environmental Damage Factor (9), escalated	
(F) = Table 1 (A) x (E)	
(G) = (A) + (B) + (D) + (F)	

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95+% AFUE Furnace - Replacement**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$3,000	230	$7.469	$1,718	$0.107	$716	$5,434	$6,200	($766)
2015	0	230	7.730	1,778	0.111	743	2,521	0	2,521
2016	0	230	8.001	1,840	0.115	769	2,609	0	2,609
2017	0	230	8.281	1,905	0.119	796	2,701	0	2,701
2018	0	230	8.570	1,971	0.123	823	2,794	0	2,794
2019	0	230	8.870	2,040	0.127	850	2,890	0	2,890
2020	0	230	9.181	2,112	0.132	883	2,995	0	2,995
2021	0	230	9.502	2,185	0.136	910	3,095	0	3,095
2022	0	230	9.835	2,262	0.141	943	3,205	0	3,205
2023	0	230	10.179	2,341	0.146	977	3,318	0	3,318
2024	0	230	10.535	2,423	0.151	1,010	3,433	0	3,433
2025	0	230	10.904	2,508	0.156	1,044	3,552	0	3,552
2026	0	230	11.286	2,596	0.162	1,084	3,680	0	3,680
2027	0	230	11.680	2,686	0.167	1,117	3,803	0	3,803
2028	0	230	12.089	2,780	0.173	1,157	3,937	0	3,937
2029	0	230	12.512	2,878	0.179	1,198	4,076	0	4,076
2030	0	230	12.950	2,979	0.186	1,244	4,223	0	4,223
2031	0	230	13.404	3,083	0.192	1,284	4,367	0	4,367
2032	0	0	13.873	0	0.199	0	0	0	0
2033	0	0	14.358	0	0.206	0	0	0	0
2034	0	0	14.861	0	0.213	0	0	0	0
Total =		4,140					$62,633	$6,200	$56,433
						NPV =	$30,433	$6,200	24,233

Total NPV = $24,233
Benefit/Cost Ratio = 4.91

Worksheet Calculations

(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Commercial 95+% AFUE Furnace - Replacement**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$1,408	$274	$194	$1,876	$3,345	$3,200	$6,545	($4,669)
2015	1,457	276	201	1,934	0	0	0	1,934
2016	1,508	278	207	1,993	0	0	0	1,993
2017	1,561	281	214	2,056	0	0	0	2,056
2018	1,616	285	221	2,122	0	0	0	2,122
2019	1,672	288	234	2,194	0	0	0	2,194
2020	1,731	290	241	2,262	0	0	0	2,262
2021	1,791	292	248	2,331	0	0	0	2,331
2022	1,854	297	254	2,405	0	0	0	2,405
2023	1,919	299	268	2,486	0	0	0	2,486
2024	1,986	301	274	2,561	0	0	0	2,561
2025	2,055	306	281	2,642	0	0	0	2,642
2026	2,127	308	294	2,729	0	0	0	2,729
2027	2,202	311	301	2,814	0	0	0	2,814
2028	2,279	315	314	2,908	0	0	0	2,908
2029	2,359	317	328	3,004	0	0	0	3,004
2030	2,441	320	335	3,096	0	0	0	3,096
2031	2,527	324	348	3,199	0	0	0	3,199
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$44,612			$6,545	$38,067
			NPV =	$24,181			$6,545	17,636

Total NPV =	$17,636
Benefit/Cost Ratio =	3.69

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)

NATURAL GAS CONSERVATION PROGRAMS/DEMAND-SIDE MANAGEMENT
BEN/COST ANALYSIS FOR GAS CONSERVATION

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Program**
Program Years: **Projected 2014**

Input Data	
1) Retail Rate ($/Dk) =	$7.216
Escalation Rate =	3.50%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.10340
Escalation Rate =	3.50%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$5.914
Escalation Rate =	3.50%
4) Demand Cost ($/Unit/Yr) =	$117.63
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02598
Escalation Rate =	3.50%
8) Non-Gas Fuel Loss Factor	7.48%
9) Gas Environmental Damage Factor =	$1.018
Escalation Rate =	2.30%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	10.00%
12) Utility Discount Rate =	7.60%
13) Societal Discount Rate =	3.98%
14) General Input Data Year =	2013
15) Project Analysis Year 1 =	2014
Project Analysis Year 2 =	2015
Project Analysis Year 3 =	2016

	2014	
16) Utility Project Costs		
16a) Administrative & Operating Costs =	$70	
16b) Incentive Costs =	600	
16c) Total Utility Project Costs =	$670	
17) Direct Participant Costs ($/Part.) =	$3,000	
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	
Escalation Rate =	0.00%	
19) Participant Non-Energy Savings (Annual $/Part) =	$0	
Escalation Rate =	0.00%	
20) Project Life (Years) =	15	
21) Avg. Dk/Part. Saved =	100.000	
22) Avg Non-Gas Fuel Units/Part. Saved =	0	
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	
23) Number of Participants =	1	
24) Total Annual Dk Saved =	100.0	
25) Incentive/Participant =	$600	
26) Distribution Delivery Charge		$1.302
27) Effective Income Tax Rate = (Federal & State Taxes)		35.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$6,597	4.92
Utility Cost Test	$7,612	12.36
Societal Test	$8,685	3.83
Participant Test	$5,170	2.72
Total Resource Cost Test	$5,212	2.70

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Program**

		Benefits										Costs				
t	Year	Total Energy Reduction (A)	Gas Commodity Cost/Dk (B)	Gas Commodity Savings (C)	Variable O & M Cost/Dk (D)	Variable O & M Savings (E)	Total Energy Savings (F)	Peak Dk Demand Reduction (G)	Demand Savings Per Unit (H)	Total Demand Savings (I)	Total Savings (J)	Distribution Delivery Charge (K)	Lost Margin (L)	Program Admin Costs (M)	Incentive Costs (N)	Total Program Costs (O)	Annual Benefits Less Costs (P)
1	2014	100	$6.121	$612	$0.000	$0	$612	1.0	$119	$119	$731	$1.348	$88	$70	$600	$758	($27)
2	2015	100	6.335	634	0.000	0	634	1.0	120	120	754	1.395	91	0	0	91	663
3	2016	100	6.557	656	0.000	0	656	1.0	121	121	777	1.444	94	0	0	94	683
4	2017	100	6.786	679	0.000	0	679	1.0	122	122	801	1.494	97	0	0	97	704
5	2018	100	7.024	702	0.000	0	702	1.0	124	124	826	1.546	100	0	0	100	726
6	2019	100	7.270	727	0.000	0	727	1.0	125	125	852	1.600	104	0	0	104	748
7	2020	100	7.524	752	0.000	0	752	1.0	126	126	878	1.657	108	0	0	108	770
8	2021	100	7.788	779	0.000	0	779	1.0	127	127	906	1.714	111	0	0	111	795
9	2022	100	8.060	806	0.000	0	806	1.0	129	129	935	1.774	115	0	0	115	820
10	2023	100	8.342	834	0.000	0	834	1.0	130	130	964	1.837	119	0	0	119	845
11	2024	100	8.634	863	0.000	0	863	1.0	131	131	994	1.901	124	0	0	124	870
12	2025	100	8.936	894	0.000	0	894	1.0	133	133	1,027	1.967	128	0	0	128	899
13	2026	100	9.249	925	0.000	0	925	1.0	134	134	1,059	2.036	132	0	0	132	927
14	2027	100	9.573	957	0.000	0	957	1.0	135	135	1,092	2.108	137	0	0	137	955
15	2028	100	9.908	991	0.000	0	991	1.0	137	137	1,128	2.181	142	0	0	142	986
16	2029	0	10.255	0	0.000	0	0	0.0	138	0	0	2.258	0	0	0	0	0
17	2030	0	10.614	0	0.000	0	0	0.0	139	0	0	2.337	0	0	0	0	0
18	2031	0	10.985	0	0.000	0	0	0.0	141	0	0	2.418	0	0	0	0	0
19	2032	0	11.370	0	0.000	0	0	0.0	142	0	0	2.503	0	0	0	0	0
20	2033	0	11.768	0	0.000	0	0	0.0	144	0	0	2.591	0	0	0	0	0
21	2034	0	12.179	0	0.000	0	0	0.0	145	0	0	2.681	0	0	0	0	0
Total =		1,500									$13,724					$2,360	$11,364
									NPV =		$8,282					$1,685	$6,597

Total NPV = $6,597
Benefit/Cost Ratio = 4.92

Worksheet Calculations	
(A) = Average Dk/Participant Saved (21) x Number of Participants (23) for Project Life (20)	(I) = (G) x (H)
(B) = Commodity Cost (3) escalated	(J) = (F) + (I)
(C) = (A) x (B)	(K) = Distribution Delivery Charge (26) escalated.
(D) = Variable O&M Cost (6), escalated	(L) = (A) x (K) x (1-Inverse of Tax Rate (27)
(E) = (A) x (D)	(M) = Admin & Operating Costs (16a)
(F) = (C) + (E)	(N) = Incentive Costs (16b)
(G) = (A) x Peak Reduction Factor (5)	(O) = (L) + (M) + (N)
(H) = Demand Cost (4) escalated.	(P) = (J) - (O)

Table 2
Utility Cost Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Program**

	Benefits			Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Annual Total Savings (C)	Program Admin Costs (D)	Incentive Costs (E)	Utility Program Costs (F)	Annual Benefits Less Costs (G)
2014	$612	$119	$731	$70	$600	$670	$61
2015	634	120	754	0	0	0	754
2016	656	121	777	0	0	0	777
2017	679	122	801	0	0	0	801
2018	702	124	826	0	0	0	826
2019	727	125	852	0	0	0	852
2020	752	126	878	0	0	0	878
2021	779	127	906	0	0	0	906
2022	806	129	935	0	0	0	935
2023	834	130	964	0	0	0	964
2024	863	131	994	0	0	0	994
2025	894	133	1,027	0	0	0	1,027
2026	925	134	1,059	0	0	0	1,059
2027	957	135	1,092	0	0	0	1,092
2028	991	137	1,128	0	0	0	1,128
2029	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0
Total =			$13,724			$670	$13,054
		NPV =	$8,282			$670	$7,612

Total NPV =	$7,612
Benefit/Cost Ratio =	12.36

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(C) = Table 1 (J)
(D) = Table 1 (M)
(E) = Table 1 (N)
(F) = (D) + (E)
(G) = (C) - (F)

Table 3
Societal Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Program**

	Benefits							Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings ($/Part.) (C)	Non-Gas Energy Savings (D)	Environmental Damage Savings/Dk (E)	Environmental Damage Savings (F)	Annual Total Savings (G)	Utility Program Costs (H)	Participants' Costs Net of Rebate (I)	Annual Total Costs (J)	Annual Benefits Less Costs (K)
2014	$612	$119	$0.029	$0	$1.041	$104	$835	$670	$2,400	$3,070	($2,235)
2015	634	120	0.030	0	1.065	107	861	0	0	0	861
2016	656	121	0.031	0	1.090	109	886	0	0	0	886
2017	679	122	0.032	0	1.115	112	913	0	0	0	913
2018	702	124	0.033	0	1.141	114	940	0	0	0	940
2019	727	125	0.035	0	1.167	117	969	0	0	0	969
2020	752	126	0.036	0	1.194	119	997	0	0	0	997
2021	779	127	0.037	0	1.221	122	1,028	0	0	0	1,028
2022	806	129	0.038	0	1.249	125	1,060	0	0	0	1,060
2023	834	130	0.040	0	1.278	128	1,092	0	0	0	1,092
2024	863	131	0.041	0	1.307	131	1,125	0	0	0	1,125
2025	894	133	0.042	0	1.337	134	1,161	0	0	0	1,161
2026	925	134	0.044	0	1.368	137	1,196	0	0	0	1,196
2027	957	135	0.045	0	1.400	140	1,232	0	0	0	1,232
2028	991	137	0.047	0	1.432	143	1,271	0	0	0	1,271
2029	0	0	0.049	0	1.465	0	0	0	0	0	0
2030	0	0	0.050	0	1.498	0	0	0	0	0	0
2031	0	0	0.052	0	1.533	0	0	0	0	0	0
2032	0	0	0.054	0	1.568	0	0	0	0	0	0
2033	0	0	0.056	0	1.604	0	0	0	0	0	0
2034	0	0	0.058	0	1.641	0	0	0	0	0	0
Total =							$15,566			$3,070	$12,496
						NPV =	$11,755			$3,070	$8,685

Total NPV = $8,685
Benefit/Cost Ratio = 3.83

Worksheet Calculations	
(A) = Table 1 (F)	(H) = Table 2 (F)
(G) = Table 1 (I)	(I) = Direct Part. Costs (17) x No. of Part. (23) - Table 1 (N)
(C) = Non-Gas Fuel Cost (7), adjusted for losses (8), escalated..	(J) = (H) + (I)
(D) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)	(K) = (G) - (J)
(E) = Gas Environmental Damage Factor (9), escalated	
(F) = Table 1 (A) x (E)	
(G) = (A) + (B) + (D) + (F)	

Table 4
Participant Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Program**

	Benefits							Costs	
Year	Incentives Received (A)	Total Energy Reduction (B)	Retail Rate (C)	Gas Bill Savings (D)	Non-Gas Fuel Retail Rate (E)	Non-Gas Energy Savings (F)	Total Annual Benefits (G)	Direct Participant Costs (H)	Annual Benefits Less Costs (I)
2014	$600	100	$7.469	$747	$0.107	$0	$1,347	$3,000	($1,653)
2015	0	100	7.730	773	0.111	0	773	0	773
2016	0	100	8.001	800	0.115	0	800	0	800
2017	0	100	8.281	828	0.119	0	828	0	828
2018	0	100	8.570	857	0.123	0	857	0	857
2019	0	100	8.870	887	0.127	0	887	0	887
2020	0	100	9.181	918	0.132	0	918	0	918
2021	0	100	9.502	950	0.136	0	950	0	950
2022	0	100	9.835	984	0.141	0	984	0	984
2023	0	100	10.179	1,018	0.146	0	1,018	0	1,018
2024	0	100	10.535	1,054	0.151	0	1,054	0	1,054
2025	0	100	10.904	1,090	0.156	0	1,090	0	1,090
2026	0	100	11.286	1,129	0.162	0	1,129	0	1,129
2027	0	100	11.680	1,168	0.167	0	1,168	0	1,168
2028	0	100	12.089	1,209	0.173	0	1,209	0	1,209
2029	0	0	12.512	0	0.179	0	0	0	0
2030	0	0	12.950	0	0.186	0	0	0	0
2031	0	0	13.404	0	0.192	0	0	0	0
2032	0	0	13.873	0	0.199	0	0	0	0
2033	0	0	14.358	0	0.206	0	0	0	0
2034	0	0	14.861	0	0.213	0	0	0	0
Total =		1,500					$15,012	$3,000	$12,012
						NPV =	$8,170	$3,000	5,170

Total NPV =	$5,170
Benefit/Cost Ratio =	2.72

Worksheet Calculations
(A) = Table 1 (N)
(B) = Table 1 (A)
(C) = Retail Rate (1) escalated.
(D) =(B) x (C)
(E) = Non-Gas Fuel Retail Rate (2), escalated.
(F) = (C) x [Avg. Non-Gas Fuel Units/Part.Saved (22) x No. of Part. (23)
(G) = (A) + (D) + (F)
(H) = Direct Participant Costs (17) x Number of Participants (23)
(I) = (G) - (H)

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project **Commercial Custom Program**

	Benefits				Costs			
Year	Total Energy Savings (A)	Total Demand Savings (B)	Non-Gas Energy Savings (C)	Total Annual Benefits (D)	Utility Program Costs (E)	Participants' Costs Net of Rebate (F)	Total Costs (G)	Annual Benefits Less Costs (H)
2014	$612	$119	$0	$731	$670	$2,400	$3,070	($2,339)
2015	634	120	0	754	0	0	0	754
2016	656	121	0	777	0	0	0	777
2017	679	122	0	801	0	0	0	801
2018	702	124	0	826	0	0	0	826
2019	727	125	0	852	0	0	0	852
2020	752	126	0	878	0	0	0	878
2021	779	127	0	906	0	0	0	906
2022	806	129	0	935	0	0	0	935
2023	834	130	0	964	0	0	0	964
2024	863	131	0	994	0	0	0	994
2025	894	133	0	1,027	0	0	0	1,027
2026	925	134	0	1,059	0	0	0	1,059
2027	957	135	0	1,092	0	0	0	1,092
2028	991	137	0	1,128	0	0	0	1,128
2029	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
			Total =	$13,724			$3,070	$10,654
			NPV =	$8,282			$3,070	5,212

Total NPV =	$5,212
Benefit/Cost Ratio =	2.70

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (T)
(C) = Table 3 (D)
(D) = (A) + (B) + (C)
(E) = Table 3 (H)
(F) = Table 3 (I)
(G) = (E) + (F)
(H) = (D) - (G)