Montana-Dakota Utilities Co.
Gas Utility - South Dakota
Conservation Portfolio Summary
2027 - 2029 Program Years

Programs	Total Participants	Total Energy Reduction	Total Cost	Lifetime Cost/Dk
Conservation Programs				
Residential Program				
Furnaces - 95%-96.9% AFUE - New	225	25,660	$39,210	$1.53
Furnaces - 95%-96.9% AFUE - Replacement	420	164,640	146,399	0.89
Furnaces - 97+% AFUE - New	135	21,880	39,219	1.79
Furnaces - 97+% AFUE - Replacement	255	113,220	148,159	1.31
Programmable Thermostats - Tier 1	150	3,450	2,613	0.76
Programmable Thermostats - Tier 2	450	28,350	31,373	1.11
	1,635	357,200	$406,973	$1.14
Commercial Program				
Furnaces - 95%-96.9% AFUE - New	15	1,840	$2,613	$1.42
Furnaces - 95%-96.9% AFUE - Replacement	30	14,220	10,458	0.74
Furnaces - 97+% AFUE - New	15	2,740	4,357	1.59
Furnaces - 97+% AFUE - Replacement	30	16,200	17,429	1.08
Custom Efficiency	9	67,500	20,920	0.31
	99	102,500	$55,777	$0.54
Total Programs	1,734	459,700	$462,750	$1.01

Montana-Dakota Utilities Co.
Gas Utility - South Dakota
Conservation Portfolio Summary
2027 - 2029 Program Years

Programs	2027 Participants	2027 Cost	2027 Dk Savings	2028 Participants	2028 Cost	2028 Dk Savings	2029 Participants	2029 Cost	2029 Dk Savings	Lifetime Dk Savings
Residential Program										
Furnaces - 95%-96.9% AFUE - New	80	13,919	456	75	13,071	428	70	12,220	399	25,660
Furnaces - 95%-96.9% AFUE - Repl.	145	50,459	2,842	140	48,803	2,744	135	47,137	2,646	164,640
Furnaces - 97+% AFUE - New	40	11,600	324	45	13,071	365	50	14,548	405	21,880
Furnaces - 97+% AFUE - Repl.	80	46,401	1,776	85	49,384	1,887	90	52,374	1,998	113,220
Programmable Thermostats - Tier 1	50	870	115	50	870	115	50	873	115	3,450
Programmable Thermostats - Tier 2	150	10,441	945	150	10,458	945	150	10,474	945	28,350
Total Residential	545	133,690	6,458	545	135,657	6,484	545	137,626	6,508	357,200
Commercial Program										
Furnaces - 95%-96.9% AFUE - New	5	870	31	5	870	31	5	873	31	1,840
Furnaces - 95%-96.9% AFUE - Repl.	10	3,481	237	10	3,486	237	10	3,491	237	14,220
Furnaces - 97+% AFUE - New	5	1,450	46	5	1,452	46	5	1,455	46	2,740
Furnaces - 97+% AFUE - Repl.	10	5,800	270	10	5,811	270	10	5,818	270	16,200
Custom Efficiency	3	6,959	1,500	3	6,974	1,500	3	6,987	1,500	67,500
Total Commercial	33	$18,560	2,084	33	$18,593	2,084	33	$18,624	2,084	102,500
Total Programs	578	$152,250	8,542	578	$154,250	8,568	578	$156,250	8,592	459,700

Montana-Dakota Utilities Co.
South Dakota Gas DSM Program Summary
Benefit/Cost Ratios

Program	Customer Class	RIM	Utility	Societal	Participant	Total Resource Cost
Total Portfolio		1.61	3.79	4.96	3.45	1.94
Furnace (95%-96.9%) - New	Residential	1.22	2.42	6.16	4.08	2.23
Furnace (95%-96.9%) - Replacement	Residential	1.54	4.16	5.72	4.31	2.26
Furnace (97+%) - New	Residential	1.12	2.07	3.21	2.09	1.16
Furnace (97+%) - Replacement	Residential	1.31	2.83	4.45	3.45	1.74
Programmable Thermostats - Tier 1	Residential	1.77	5.97	7.25	5.35	3.21
Programmable Thermostats - Tier 2	Residential	1.55	4.07	3.98	3.23	1.79
Furnace (95%-96.9%) - New	Commercial	1.75	2.59	6.61	3.76	2.38
Furnace (95%-96.9%) - Replacement	Commercial	2.60	5.03	6.18	2.87	2.23
Furnace (97+%) - New	Commercial	1.64	2.34	3.63	1.99	1.32
Furnace (97+%) - Replacement	Commercial	2.10	3.44	4.89	2.45	1.77
Custom Efficiency	Commercial	3.86	13.14	5.00	2.37	1.99

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: **2027 - 2029**

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 =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$21,000	$21,500	$22,000
16b) Incentive Costs =	131,250	132,750	134,250
16c) Total Utility Project Costs =	$152,250	$154,250	$156,250
17) Direct Participant Costs ($/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 =	578	578	578
24) Total Annual Dk Saved =	8,542	8,568	8,592
25) Incentive/Participant =			
26) Distribution Delivery Charge			
27) Effective Income Tax Rate =			
(Federal & State Taxes)			

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$623,094	1.61
Utility Cost Test	$1,206,163	3.79
Societal Test	$3,928,374	4.96
Participant Test	$2,091,033	3.45
Total Resource Cost Test	$896,536	1.94

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	2027	8,542		$30,052		$0	$30,052	85.6		$15,579	$45,631		$15,252	$21,000	$131,250	$167,502	($121,871)
2	2028	17,108		62,001		0	62,001	171.0		31,465	93,466		31,472	21,500	132,750	185,722	(92,256)
3	2029	25,700		95,938		0	95,938	257.0		47,548	143,486		48,708	22,000	134,250	204,958	(61,472)
4	2030	25,700		98,818		0	98,818	257.0		48,060	146,878		50,172	0	0	50,172	96,706
5	2031	25,700		101,774		0	101,774	257.0		48,574	150,348		51,671	0	0	51,671	98,677
6	2032	25,700		104,829		0	104,829	257.0		49,087	153,916		53,218	0	0	53,218	100,698
7	2033	25,700		107,967		0	107,967	257.0		49,601	157,568		54,820	0	0	54,820	102,748
8	2034	25,700		111,205		0	111,205	257.0		50,118	161,323		56,457	0	0	56,457	104,866
9	2035	25,700		114,546		0	114,546	257.0		50,630	165,176		58,165	0	0	58,165	107,011
10	2036	25,700		117,989		0	117,989	257.0		51,144	169,133		59,907	0	0	59,907	109,226
11	2037	24,640		116,523		0	116,523	246.3		49,506	166,029		58,767	0	0	58,767	107,262
12	2038	23,580		114,835		0	114,835	235.8		47,868	162,703		57,507	0	0	57,507	105,196
13	2039	22,520		112,984		0	112,984	225.1		46,148	159,132		56,113	0	0	56,113	103,019
14	2040	22,520		116,361		0	116,361	225.1		46,596	162,957		57,799	0	0	57,799	105,158
15	2041	22,520		119,852		0	119,852	225.1		47,046	166,898		59,541	0	0	59,541	107,357
16	2042	21,020		115,231		0	115,231	210.1		44,331	159,562		59,136	0	0	59,136	100,426
17	2043	19,520		110,210		0	110,210	195.1		41,556	151,766		58,662	0	0	58,662	93,104
18	2044	18,020		104,804		0	104,804	180.1		38,724	143,528		58,113	0	0	58,113	85,415
19	2045	18,020		107,940		0	107,940	180.1		39,082	147,022		59,852	0	0	59,852	87,170
20	2046	18,020		111,183		0	111,183	180.1		39,622	150,805		61,643	0	0	61,643	89,162
21	2047	12,038		76,501		0	76,501	120.4		26,729	103,230		42,422	0	0	42,422	60,808
22	2048	6,032		39,479		0	39,479	60.5		13,552	53,031		21,896	0	0	21,896	31,135
23	2049	0		0		0	0	0.0		0	0		0	0	0	0	0
	Total =	459,700									$3,113,588					$1,594,043	$1,519,545
									NPV =		$1,639,008					$1,015,914	$623,094

Total NPV = $623,094
Benefit/Cost Ratio = 1.61

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: **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)
2027	$30,052	$15,579	$45,631	$21,000	$131,250	$152,250	($106,619)
2028	62,001	31,465	93,466	21,500	132,750	154,250	(60,784)
2029	95,938	47,548	143,486	22,000	134,250	156,250	(12,764)
2030	98,818	48,060	146,878	0	0	0	146,878
2031	101,774	48,574	150,348	0	0	0	150,348
2032	104,829	49,087	153,916	0	0	0	153,916
2033	107,967	49,601	157,568	0	0	0	157,568
2034	111,205	50,118	161,323	0	0	0	161,323
2035	114,546	50,630	165,176	0	0	0	165,176
2036	117,989	51,144	169,133	0	0	0	169,133
2037	116,523	49,506	166,029	0	0	0	166,029
2038	114,835	47,868	162,703	0	0	0	162,703
2039	112,984	46,148	159,132	0	0	0	159,132
2040	116,361	46,596	162,957	0	0	0	162,957
2041	119,852	47,046	166,898	0	0	0	166,898
2042	115,231	44,331	159,562	0	0	0	159,562
2043	110,210	41,556	151,766	0	0	0	151,766
2044	104,804	38,724	143,528	0	0	0	143,528
2045	107,940	39,082	147,022	0	0	0	147,022
2046	111,183	39,622	150,805	0	0	0	150,805
2047	76,501	26,729	103,230	0	0	0	103,230
2048	39,479	13,552	53,031	0	0	0	53,031
2049	0	0	0	0	0	0	0
Total =			$3,113,588			$462,750	$2,650,838
		NPV =	$1,639,008			$432,845	$1,206,163

Total NPV = $1,206,163
Benefit/Cost Ratio = 3.79

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: **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)
2027	$30,052	$15,579		$5,045		$39,413	$90,089	$152,250	$182,390	$334,640	($244,551)
2028	62,001	31,465		10,425		80,768	184,659	154,250	184,010	338,260	(153,601)
2029	95,938	47,548		16,142		124,131	283,759	156,250	185,630	341,880	(58,121)
2030	98,818	48,060		16,647		126,984	290,509	0	0	0	290,509
2031	101,774	48,574		17,151		129,939	297,438	0	0	0	297,438
2032	104,829	49,087		17,656		132,921	304,493	0	0	0	304,493
2033	107,967	49,601		18,160		136,006	311,734	0	0	0	311,734
2034	111,205	50,118		18,665		139,140	319,128	0	0	0	319,128
2035	114,546	50,630		19,674		142,354	327,204	0	0	0	327,204
2036	117,989	51,144		20,178		145,642	334,953	0	0	0	334,953
2037	116,523	49,506		20,430		142,861	329,320	0	0	0	329,320
2038	114,835	47,868		20,670		139,878	323,251	0	0	0	323,251
2039	112,984	46,148		20,898		136,674	316,704	0	0	0	316,704
2040	116,361	46,596		21,870		139,827	324,654	0	0	0	324,654
2041	119,852	47,046		22,356		143,069	332,323	0	0	0	332,323
2042	115,231	44,331		22,842		136,609	319,013	0	0	0	319,013
2043	110,210	41,556		23,814		129,790	305,370	0	0	0	305,370
2044	104,804	38,724		24,300		122,589	290,417	0	0	0	290,417
2045	107,940	39,082		25,272		125,421	297,715	0	0	0	297,715
2046	111,183	39,622		25,758		128,320	304,883	0	0	0	304,883
2047	76,501	26,729		17,820		87,696	208,746	0	0	0	208,746
2048	39,479	13,552		9,234		44,963	107,228	0	0	0	107,228
2049	0	0		0		0	0	0	0	0	0
Total =							$6,203,590			$1,014,780	$5,188,810
						NPV =	$4,920,445			$992,071	$3,928,374

Total NPV = $3,928,374
Benefit/Cost Ratio = 4.96

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: **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)
2027	$131,250	8,542		$70,207		$23,373	$224,830	$313,640	($88,810)
2028	132,750	17,108		144,841		48,091	325,682	316,760	8,922
2029	134,250	25,700		224,111		74,154	432,515	319,880	112,635
2030	0	25,700		230,841		76,676	307,517	0	307,517
2031	0	25,700		237,767		78,694	316,461	0	316,461
2032	0	25,700		244,895		81,216	326,111	0	326,111
2033	0	25,700		252,248		83,739	335,987	0	335,987
2034	0	25,700		259,819		86,261	346,080	0	346,080
2035	0	25,700		267,608		88,783	356,391	0	356,391
2036	0	25,700		275,624		91,305	366,929	0	366,929
2037	0	24,640		271,706		93,182	364,888	0	364,888
2038	0	23,580		267,281		94,493	361,774	0	361,774
2039	0	22,520		262,355		96,228	358,583	0	358,583
2040	0	22,520		270,221		99,144	369,365	0	369,365
2041	0	22,520		278,334		102,060	380,394	0	380,394
2042	0	21,020		269,984		105,462	375,446	0	375,446
2043	0	19,520		260,905		108,378	369,283	0	369,283
2044	0	18,020		251,022		111,780	362,802	0	362,802
2045	0	18,020		258,556		115,182	373,738	0	373,738
2046	0	18,020		266,306		118,584	384,890	0	384,890
2047	0	12,038		183,249		81,324	264,573	0	264,573
2048	0	6,032		94,577		41,958	136,535	0	136,535
2049	0	0		0		0	0	0	0
Total =		459,700					$7,440,774	$950,280	$6,490,494
						NPV =	$2,946,062	$855,028	2,091,033

Total NPV = $2,091,033
Benefit/Cost Ratio = 3.45

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) = (E) 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

Compai **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)
2027	$30,052	$15,579	$5,045	$50,676	$152,250	$182,390	$334,640	($283,964)
2028	62,001	31,465	10,425	103,891	154,250	184,010	338,260	(234,369)
2029	95,938	47,548	16,142	159,628	156,250	185,630	341,880	(182,252)
2030	98,818	48,060	16,647	163,525	0	0	0	163,525
2031	101,774	48,574	17,151	167,499	0	0	0	167,499
2032	104,829	49,087	17,656	171,572	0	0	0	171,572
2033	107,967	49,601	18,160	175,728	0	0	0	175,728
2034	111,205	50,118	18,665	179,988	0	0	0	179,988
2035	114,546	50,630	19,674	184,850	0	0	0	184,850
2036	117,989	51,144	20,178	189,311	0	0	0	189,311
2037	116,523	49,506	20,430	186,459	0	0	0	186,459
2038	114,835	47,868	20,670	183,373	0	0	0	183,373
2039	112,984	46,148	20,898	180,030	0	0	0	180,030
2040	116,361	46,596	21,870	184,827	0	0	0	184,827
2041	119,852	47,046	22,356	189,254	0	0	0	189,254
2042	115,231	44,331	22,842	182,404	0	0	0	182,404
2043	110,210	41,556	23,814	175,580	0	0	0	175,580
2044	104,804	38,724	24,300	167,828	0	0	0	167,828
2045	107,940	39,082	25,272	172,294	0	0	0	172,294
2046	111,183	39,622	25,758	176,563	0	0	0	176,563
2047	76,501	26,729	17,820	121,050	0	0	0	121,050
2048	39,479	13,552	9,234	62,265	0	0	0	62,265
2049	0	0	0	0	0	0	0	0
			Total =	$3,528,595			$1,014,780	$2,513,815
			NPV =	$1,845,833			$949,297	896,536

Total NPV =	$896,536
Benefit/Cost Ratio =	1.94

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: **Total Residential Furnaces - South Dakota**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$16,879	$17,329	$17,779
16b) Incentive Costs =	105,500	107,000	108,500
16c) Total Utility Project Costs =	$122,379	$124,329	$126,279
17) Direct Participant Costs ($/Part.) =	$646	$655	$664
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	15.646	15.722	15.791
22) Avg Non-Gas Fuel Units/Part. Saved =	470	470	470
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	345	345	345
24) Total Annual Dk Saved =	5,398	5,424	5,448
25) Incentive/Participant =	$306	$310	$314
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$317,535	1.39
Utility Cost Test	$777,604	3.23
Societal Test	$2,859,545	5.01
Participant Test	$1,676,496	3.75
Total Resource Cost Test	$646,065	1.95

Table 1
Ratepayer Impact Measure Test

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

		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	2027	5,398	$3.518	$18,990	$0.000	$0	$18,990	54.0	$182	$9,828	$28,818	$2.608	$11,122	$16,879	$105,500	$133,501	($104,683)
2	2028	10,822	3.624	39,220	0.000	0	39,220	108.2	184	19,909	59,129	2.686	22,964	17,329	107,000	147,293	(88,164)
3	2029	16,270	3.733	60,736	0.000	0	60,736	162.6	185	30,082	90,818	2.767	35,566	17,779	108,500	161,845	(71,027)
4	2030	16,270	3.845	62,558	0.000	0	62,558	162.6	187	30,406	92,964	2.850	36,632	0	0	36,632	56,332
5	2031	16,270	3.960	64,430	0.000	0	64,430	162.6	189	30,731	95,161	2.935	37,725	0	0	37,725	57,436
6	2032	16,270	4.079	66,364	0.000	0	66,364	162.6	191	31,057	97,421	3.023	38,855	0	0	38,855	58,566
7	2033	16,270	4.201	68,351	0.000	0	68,351	162.6	193	31,382	99,733	3.114	40,024	0	0	40,024	59,709
8	2034	16,270	4.327	70,401	0.000	0	70,401	162.6	195	31,708	102,109	3.207	41,221	0	0	41,221	60,888
9	2035	16,270	4.457	72,515	0.000	0	72,515	162.6	197	32,032	104,547	3.304	42,468	0	0	42,468	62,079
10	2036	16,270	4.591	74,696	0.000	0	74,696	162.6	199	32,357	107,053	3.403	43,740	0	0	43,740	63,313
11	2037	16,270	4.729	76,941	0.000	0	76,941	162.6	201	32,683	109,624	3.505	45,051	0	0	45,051	64,573
12	2038	16,270	4.870	79,235	0.000	0	79,235	162.6	203	33,008	112,243	3.610	46,401	0	0	46,401	65,842
13	2039	16,270	5.017	81,627	0.000	0	81,627	162.6	205	33,334	114,961	3.718	47,788	0	0	47,788	67,173
14	2040	16,270	5.167	84,067	0.000	0	84,067	162.6	207	33,658	117,725	3.830	49,228	0	0	49,228	68,497
15	2041	16,270	5.322	86,589	0.000	0	86,589	162.6	209	33,983	120,572	3.945	50,707	0	0	50,707	69,865
16	2042	16,270	5.482	89,192	0.000	0	89,192	162.6	211	34,309	123,501	4.063	52,223	0	0	52,223	71,278
17	2043	16,270	5.646	91,861	0.000	0	91,861	162.6	213	34,634	126,495	4.185	53,791	0	0	53,791	72,704
18	2044	16,270	5.816	94,626	0.000	0	94,626	162.6	215	34,960	129,586	4.311	55,412	0	0	55,412	74,174
19	2045	16,270	5.990	97,457	0.000	0	97,457	162.6	217	35,284	132,741	4.440	57,069	0	0	57,069	75,672
20	2046	16,270	6.170	100,385	0.000	0	100,385	162.6	220	35,772	136,157	4.573	58,777	0	0	58,777	77,380
21	2047	10,872	6.355	69,091	0.000	0	69,091	108.8	222	24,154	93,245	4.710	40,454	0	0	40,454	52,791
22	2048	5,448	6.545	35,657	0.000	0	35,657	54.6	224	12,230	47,887	4.852	20,881	0	0	20,881	27,006
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	325,400									$2,242,490					$1,301,086	$941,404
									NPV =		$1,126,444					$808,909	$317,535

Total NPV = $317,535
Benefit/Cost Ratio = 1.39

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: **Total Residential Furnaces - South Dakota**

	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)
2027	$18,990	$9,828	$28,818	$16,879	$105,500	$122,379	($93,561)
2028	39,220	19,909	59,129	17,329	107,000	124,329	(65,200)
2029	60,736	30,082	90,818	17,779	108,500	126,279	(35,461)
2030	62,558	30,406	92,964	0	0	0	92,964
2031	64,430	30,731	95,161	0	0	0	95,161
2032	66,364	31,057	97,421	0	0	0	97,421
2033	68,351	31,382	99,733	0	0	0	99,733
2034	70,401	31,708	102,109	0	0	0	102,109
2035	72,515	32,032	104,547	0	0	0	104,547
2036	74,696	32,357	107,053	0	0	0	107,053
2037	76,941	32,683	109,624	0	0	0	109,624
2038	79,235	33,008	112,243	0	0	0	112,243
2039	81,627	33,334	114,961	0	0	0	114,961
2040	84,067	33,658	117,725	0	0	0	117,725
2041	86,589	33,983	120,572	0	0	0	120,572
2042	89,192	34,309	123,501	0	0	0	123,501
2043	91,861	34,634	126,495	0	0	0	126,495
2044	94,626	34,960	129,586	0	0	0	129,586
2045	97,457	35,284	132,741	0	0	0	132,741
2046	100,385	35,772	136,157	0	0	0	136,157
2047	69,091	24,154	93,245	0	0	0	93,245
2048	35,657	12,230	47,887	0	0	0	47,887
2049	0	0	0	0	0	0	0
Total =			$2,242,490			$372,987	$1,869,503
		NPV =	$1,126,444			$348,840	$777,604

Total NPV = $777,604
Benefit/Cost Ratio = 3.23

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 Residential Furnaces - South Dakota**

	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)
2027	$18,990	$9,828	$0.030	$4,860	$4.614	$24,906	$58,584	$122,379	$117,340	$239,719	($181,135)
2028	39,220	19,909	0.031	10,044	4.721	51,091	120,264	124,329	118,960	243,289	(123,025)
2029	60,736	30,082	0.032	15,552	4.830	78,585	184,955	126,279	120,580	246,859	(61,904)
2030	62,558	30,406	0.033	16,038	4.941	80,389	189,391	0	0	0	189,391
2031	64,430	30,731	0.034	16,524	5.056	82,261	193,946	0	0	0	193,946
2032	66,364	31,057	0.035	17,010	5.172	84,149	198,580	0	0	0	198,580
2033	68,351	31,382	0.036	17,496	5.292	86,101	203,330	0	0	0	203,330
2034	70,401	31,708	0.037	17,982	5.414	88,086	208,177	0	0	0	208,177
2035	72,515	32,032	0.039	18,954	5.539	90,120	213,621	0	0	0	213,621
2036	74,696	32,357	0.040	19,440	5.667	92,203	218,696	0	0	0	218,696
2037	76,941	32,683	0.041	19,926	5.798	94,333	223,883	0	0	0	223,883
2038	79,235	33,008	0.042	20,412	5.932	96,514	229,169	0	0	0	229,169
2039	81,627	33,334	0.043	20,898	6.069	98,743	234,602	0	0	0	234,602
2040	84,067	33,658	0.045	21,870	6.209	101,020	240,615	0	0	0	240,615
2041	86,589	33,983	0.046	22,356	6.353	103,363	246,291	0	0	0	246,291
2042	89,192	34,309	0.047	22,842	6.499	105,739	252,082	0	0	0	252,082
2043	91,861	34,634	0.049	23,814	6.649	108,180	258,489	0	0	0	258,489
2044	94,626	34,960	0.050	24,300	6.803	110,684	264,570	0	0	0	264,570
2045	97,457	35,284	0.052	25,272	6.960	113,240	271,253	0	0	0	271,253
2046	100,385	35,772	0.053	25,758	7.121	115,858	277,773	0	0	0	277,773
2047	69,091	24,154	0.055	17,820	7.285	79,202	190,267	0	0	0	190,267
2048	35,657	12,230	0.057	9,234	7.454	40,609	97,730	0	0	0	97,730
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$4,576,268			$729,867	$3,846,401
						NPV =	$3,573,036			$713,491	$2,859,545

Total NPV = $2,859,545
Benefit/Cost Ratio = 5.01

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: **Total Residential Furnaces - South Dakota**

	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)
2027	$105,500	5,398	$8.567	$46,245	$0.139	$22,518	$174,263	$222,840	($48,577)
2028	107,000	10,822	8.824	95,493	0.143	46,332	248,825	225,960	22,865
2029	108,500	16,270	9.088	147,861	0.147	71,442	327,803	229,080	98,723
2030	0	16,270	9.361	152,304	0.152	73,872	226,176	0	226,176
2031	0	16,270	9.642	156,875	0.156	75,816	232,691	0	232,691
2032	0	16,270	9.931	161,577	0.161	78,246	239,823	0	239,823
2033	0	16,270	10.229	166,426	0.166	80,676	247,102	0	247,102
2034	0	16,270	10.536	171,420	0.171	83,106	254,526	0	254,526
2035	0	16,270	10.852	176,562	0.176	85,536	262,098	0	262,098
2036	0	16,270	11.177	181,850	0.181	87,966	269,816	0	269,816
2037	0	16,270	11.513	187,316	0.187	90,882	278,198	0	278,198
2038	0	16,270	11.858	192,930	0.192	93,312	286,242	0	286,242
2039	0	16,270	12.214	198,722	0.198	96,228	294,950	0	294,950
2040	0	16,270	12.580	204,677	0.204	99,144	303,821	0	303,821
2041	0	16,270	12.958	210,826	0.210	102,060	312,886	0	312,886
2042	0	16,270	13.346	217,140	0.217	105,462	322,602	0	322,602
2043	0	16,270	13.747	223,663	0.223	108,378	332,041	0	332,041
2044	0	16,270	14.159	230,367	0.230	111,780	342,147	0	342,147
2045	0	16,270	14.584	237,281	0.237	115,182	352,463	0	352,463
2046	0	16,270	15.021	244,392	0.244	118,584	362,976	0	362,976
2047	0	10,872	15.472	168,211	0.251	81,324	249,535	0	249,535
2048	0	5,448	15.936	86,819	0.259	41,958	128,777	0	128,777
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		325,400					$6,049,761	$677,880	$5,371,881
						NPV =	$2,286,253	$609,757	1,676,496

Total NPV = $1,676,496
Benefit/Cost Ratio = 3.75

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

Table 5
Total Resource Cost Test

Compai **Montana-Dakota Utilities Co.**
Project: **Total Residential Furnaces - South Dakota**

	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)
2027	$18,990	$9,828	$4,860	$33,678	$122,379	$117,340	$239,719	($206,041)
2028	39,220	19,909	10,044	69,173	124,329	118,960	243,289	(174,116)
2029	60,736	30,082	15,552	106,370	126,279	120,580	246,859	(140,489)
2030	62,558	30,406	16,038	109,002	0	0	0	109,002
2031	64,430	30,731	16,524	111,685	0	0	0	111,685
2032	66,364	31,057	17,010	114,431	0	0	0	114,431
2033	68,351	31,382	17,496	117,229	0	0	0	117,229
2034	70,401	31,708	17,982	120,091	0	0	0	120,091
2035	72,515	32,032	18,954	123,501	0	0	0	123,501
2036	74,696	32,357	19,440	126,493	0	0	0	126,493
2037	76,941	32,683	19,926	129,550	0	0	0	129,550
2038	79,235	33,008	20,412	132,655	0	0	0	132,655
2039	81,627	33,334	20,898	135,859	0	0	0	135,859
2040	84,067	33,658	21,870	139,595	0	0	0	139,595
2041	86,589	33,983	22,356	142,928	0	0	0	142,928
2042	89,192	34,309	22,842	146,343	0	0	0	146,343
2043	91,861	34,634	23,814	150,309	0	0	0	150,309
2044	94,626	34,960	24,300	153,886	0	0	0	153,886
2045	97,457	35,284	25,272	158,013	0	0	0	158,013
2046	100,385	35,772	25,758	161,915	0	0	0	161,915
2047	69,091	24,154	17,820	111,065	0	0	0	111,065
2048	35,657	12,230	9,234	57,121	0	0	0	57,121
2049	0	0	0	0	0	0	0	0
			Total =	$2,650,892			$729,867	$1,921,025
			NPV =	$1,328,712			$682,647	646,065

Total NPV = $646,065
Benefit/Cost Ratio = 1.95

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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%-96.9% AFUE Furnace - New**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$1,919	$1,821	$1,720
16b) Incentive Costs =	12,000	11,250	10,500
16c) Total Utility Project Costs =	$13,919	$13,071	$12,220
17) Direct Participant Costs ($/Part.) =	$165	$165	$165
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	5.700	5.700	5.700
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	80	75	70
24) Total Annual Dk Saved =	456	428	399
25) Incentive/Participant =	$150	$150	$150
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$15,821	1.22
Utility Cost Test	$52,168	2.42
Societal Test	$214,979	6.16
Participant Test	$103,455	4.08
Total Resource Cost Test	$49,000	2.23

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95%-96.9% 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	2027	456	$3.518	$1,604	$0.000	$0	$1,604	4.6	$182	$837	$2,441	$2.608	$940	$1,919	$12,000	$14,859	($12,418)
2	2028	884	3.624	3,204	0.000	0	3,204	8.8	184	1,619	4,823	2.686	1,876	1,821	11,250	14,947	(10,124)
3	2029	1,283	3.733	4,789	0.000	0	4,789	12.8	185	2,368	7,157	2.767	2,805	1,720	10,500	15,025	(7,868)
4	2030	1,283	3.845	4,933	0.000	0	4,933	12.8	187	2,394	7,327	2.850	2,889	0	0	2,889	4,438
5	2031	1,283	3.960	5,081	0.000	0	5,081	12.8	189	2,419	7,500	2.935	2,975	0	0	2,975	4,525
6	2032	1,283	4.079	5,233	0.000	0	5,233	12.8	191	2,445	7,678	3.023	3,064	0	0	3,064	4,614
7	2033	1,283	4.201	5,390	0.000	0	5,390	12.8	193	2,470	7,860	3.114	3,156	0	0	3,156	4,704
8	2034	1,283	4.327	5,552	0.000	0	5,552	12.8	195	2,496	8,048	3.207	3,251	0	0	3,251	4,797
9	2035	1,283	4.457	5,718	0.000	0	5,718	12.8	197	2,522	8,240	3.304	3,349	0	0	3,349	4,891
10	2036	1,283	4.591	5,890	0.000	0	5,890	12.8	199	2,547	8,437	3.403	3,449	0	0	3,449	4,988
11	2037	1,283	4.729	6,067	0.000	0	6,067	12.8	201	2,573	8,640	3.505	3,553	0	0	3,553	5,087
12	2038	1,283	4.870	6,248	0.000	0	6,248	12.8	203	2,598	8,846	3.610	3,659	0	0	3,659	5,187
13	2039	1,283	5.017	6,437	0.000	0	6,437	12.8	205	2,624	9,061	3.718	3,768	0	0	3,768	5,293
14	2040	1,283	5.167	6,629	0.000	0	6,629	12.8	207	2,650	9,279	3.830	3,882	0	0	3,882	5,397
15	2041	1,283	5.322	6,828	0.000	0	6,828	12.8	209	2,675	9,503	3.945	3,999	0	0	3,999	5,504
16	2042	1,283	5.482	7,033	0.000	0	7,033	12.8	211	2,701	9,734	4.063	4,118	0	0	4,118	5,616
17	2043	1,283	5.646	7,244	0.000	0	7,244	12.8	213	2,726	9,970	4.185	4,242	0	0	4,242	5,728
18	2044	1,283	5.816	7,462	0.000	0	7,462	12.8	215	2,752	10,214	4.311	4,370	0	0	4,370	5,844
19	2045	1,283	5.990	7,685	0.000	0	7,685	12.8	217	2,778	10,463	4.440	4,500	0	0	4,500	5,963
20	2046	1,283	6.170	7,916	0.000	0	7,916	12.8	220	2,816	10,732	4.573	4,635	0	0	4,635	6,097
21	2047	827	6.355	5,256	0.000	0	5,256	8.3	222	1,843	7,099	4.710	3,077	0	0	3,077	4,022
22	2048	399	6.545	2,611	0.000	0	2,611	4.0	224	896	3,507	4.852	1,529	0	0	1,529	1,978
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	25,660									$176,559					$112,296	$64,263
									NPV =		$88,973					$73,152	$15,821

Total NPV = $15,821
Benefit/Cost Ratio = 1.22

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%-96.9% 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)
2027	$1,604	$837	$2,441	$1,919	$12,000	$13,919	($11,478)
2028	3,204	1,619	4,823	1,821	11,250	13,071	(8,248)
2029	4,789	2,368	7,157	1,720	10,500	12,220	(5,063)
2030	4,933	2,394	7,327	0	0	0	7,327
2031	5,081	2,419	7,500	0	0	0	7,500
2032	5,233	2,445	7,678	0	0	0	7,678
2033	5,390	2,470	7,860	0	0	0	7,860
2034	5,552	2,496	8,048	0	0	0	8,048
2035	5,718	2,522	8,240	0	0	0	8,240
2036	5,890	2,547	8,437	0	0	0	8,437
2037	6,067	2,573	8,640	0	0	0	8,640
2038	6,248	2,598	8,846	0	0	0	8,846
2039	6,437	2,624	9,061	0	0	0	9,061
2040	6,629	2,650	9,279	0	0	0	9,279
2041	6,828	2,675	9,503	0	0	0	9,503
2042	7,033	2,701	9,734	0	0	0	9,734
2043	7,244	2,726	9,970	0	0	0	9,970
2044	7,462	2,752	10,214	0	0	0	10,214
2045	7,685	2,778	10,463	0	0	0	10,463
2046	7,916	2,816	10,732	0	0	0	10,732
2047	5,256	1,843	7,099	0	0	0	7,099
2048	2,611	896	3,507	0	0	0	3,507
2049	0	0	0	0	0	0	0
Total =			$176,559			$39,210	$137,349
		NPV =	$88,973			$36,805	$52,168

Total NPV = $52,168
Benefit/Cost Ratio = 2.42

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%-96.9% 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)
2027	$1,604	$837	$0.030	$0	$4.614	$2,104	$4,545	$13,919	$1,200	$15,119	($10,574)
2028	3,204	1,619	0.031	0	4.721	4,173	8,996	13,071	1,125	14,196	(5,200)
2029	4,789	2,368	0.032	0	4.830	6,197	13,354	12,220	1,050	13,270	84
2030	4,933	2,394	0.033	0	4.941	6,339	13,666	0	0	0	13,666
2031	5,081	2,419	0.034	0	5.056	6,487	13,987	0	0	0	13,987
2032	5,233	2,445	0.035	0	5.172	6,636	14,314	0	0	0	14,314
2033	5,390	2,470	0.036	0	5.292	6,790	14,650	0	0	0	14,650
2034	5,552	2,496	0.037	0	5.414	6,946	14,994	0	0	0	14,994
2035	5,718	2,522	0.039	0	5.539	7,107	15,347	0	0	0	15,347
2036	5,890	2,547	0.040	0	5.667	7,271	15,708	0	0	0	15,708
2037	6,067	2,573	0.041	0	5.798	7,439	16,079	0	0	0	16,079
2038	6,248	2,598	0.042	0	5.932	7,611	16,457	0	0	0	16,457
2039	6,437	2,624	0.043	0	6.069	7,787	16,848	0	0	0	16,848
2040	6,629	2,650	0.045	0	6.209	7,966	17,245	0	0	0	17,245
2041	6,828	2,675	0.046	0	6.353	8,151	17,654	0	0	0	17,654
2042	7,033	2,701	0.047	0	6.499	8,338	18,072	0	0	0	18,072
2043	7,244	2,726	0.049	0	6.649	8,531	18,501	0	0	0	18,501
2044	7,462	2,752	0.050	0	6.803	8,728	18,942	0	0	0	18,942
2045	7,685	2,778	0.052	0	6.960	8,930	19,393	0	0	0	19,393
2046	7,916	2,816	0.053	0	7.121	9,136	19,868	0	0	0	19,868
2047	5,256	1,843	0.055	0	7.285	6,025	13,124	0	0	0	13,124
2048	2,611	896	0.057	0	7.454	2,974	6,481	0	0	0	6,481
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$328,225			$42,585	$285,640
						NPV =	$256,659			$41,680	$214,979

Total NPV = $214,979
Benefit/Cost Ratio = 6.16

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: **Residential 95%-96.9% 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)
2027	$12,000	456	$8.567	$3,907	$0.139	$0	$15,907	$13,200	$2,707
2028	11,250	884	8.824	7,800	0.143	0	19,050	12,375	6,675
2029	10,500	1,283	9.088	11,660	0.147	0	22,160	11,550	10,610
2030	0	1,283	9.361	12,010	0.152	0	12,010	0	12,010
2031	0	1,283	9.642	12,371	0.156	0	12,371	0	12,371
2032	0	1,283	9.931	12,741	0.161	0	12,741	0	12,741
2033	0	1,283	10.229	13,124	0.166	0	13,124	0	13,124
2034	0	1,283	10.536	13,518	0.171	0	13,518	0	13,518
2035	0	1,283	10.852	13,923	0.176	0	13,923	0	13,923
2036	0	1,283	11.177	14,340	0.181	0	14,340	0	14,340
2037	0	1,283	11.513	14,771	0.187	0	14,771	0	14,771
2038	0	1,283	11.858	15,214	0.192	0	15,214	0	15,214
2039	0	1,283	12.214	15,671	0.198	0	15,671	0	15,671
2040	0	1,283	12.580	16,140	0.204	0	16,140	0	16,140
2041	0	1,283	12.958	16,625	0.210	0	16,625	0	16,625
2042	0	1,283	13.346	17,123	0.217	0	17,123	0	17,123
2043	0	1,283	13.747	17,637	0.223	0	17,637	0	17,637
2044	0	1,283	14.159	18,166	0.230	0	18,166	0	18,166
2045	0	1,283	14.584	18,711	0.237	0	18,711	0	18,711
2046	0	1,283	15.021	19,272	0.244	0	19,272	0	19,272
2047	0	827	15.472	12,795	0.251	0	12,795	0	12,795
2048	0	399	15.936	6,358	0.259	0	6,358	0	6,358
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		25,660					$337,627	$37,125	$300,502
						NPV =	$137,044	$33,589	103,455

Total NPV = $103,455
Benefit/Cost Ratio = 4.08

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

Table 5
Total Resource Cost Test

Compai **Montana-Dakota Utilities Co.**
Project: **Residential 95%-96.9% 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)
2027	$1,604	$837	$0	$2,441	$13,919	$1,200	$15,119	($12,678)
2028	3,204	1,619	0	4,823	13,071	1,125	14,196	(9,373)
2029	4,789	2,368	0	7,157	12,220	1,050	13,270	(6,113)
2030	4,933	2,394	0	7,327	0	0	0	7,327
2031	5,081	2,419	0	7,500	0	0	0	7,500
2032	5,233	2,445	0	7,678	0	0	0	7,678
2033	5,390	2,470	0	7,860	0	0	0	7,860
2034	5,552	2,496	0	8,048	0	0	0	8,048
2035	5,718	2,522	0	8,240	0	0	0	8,240
2036	5,890	2,547	0	8,437	0	0	0	8,437
2037	6,067	2,573	0	8,640	0	0	0	8,640
2038	6,248	2,598	0	8,846	0	0	0	8,846
2039	6,437	2,624	0	9,061	0	0	0	9,061
2040	6,629	2,650	0	9,279	0	0	0	9,279
2041	6,828	2,675	0	9,503	0	0	0	9,503
2042	7,033	2,701	0	9,734	0	0	0	9,734
2043	7,244	2,726	0	9,970	0	0	0	9,970
2044	7,462	2,752	0	10,214	0	0	0	10,214
2045	7,685	2,778	0	10,463	0	0	0	10,463
2046	7,916	2,816	0	10,732	0	0	0	10,732
2047	5,256	1,843	0	7,099	0	0	0	7,099
2048	2,611	896	0	3,507	0	0	0	3,507
2049	0	0	0	0	0	0	0	0
			Total =	$176,559			$42,585	$133,974
			NPV =	$88,973			$39,973	49,000

Total NPV =	$49,000
Benefit/Cost Ratio =	2.23

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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%-96.9% AFUE Furnace - Replacement**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$6,959	$6,803	$6,637
16b) Incentive Costs =	43,500	42,000	40,500
16c) Total Utility Project Costs =	$50,459	$48,803	$47,137
17) Direct Participant Costs ($/Part.) =	$736	$736	$736
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	19.600	19.600	19.600
22) Avg Non-Gas Fuel Units/Part. Saved =	720	720	720
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	145	140	135
24) Total Annual Dk Saved =	2,842	2,744	2,646
25) Incentive/Participant =	$300	$300	$300
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$200,428	1.54
Utility Cost Test	$433,442	4.16
Societal Test	$1,522,373	5.72
Participant Test	$923,365	4.31
Total Resource Cost Test	$387,748	2.26

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 95%-96.9% 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	2027	2,842	$3.518	$9,998	$0.000	$0	$9,998	28.4	$182	$5,169	$15,167	$2.608	$5,855	$6,959	$43,500	$56,314	($41,147)
2	2028	5,586	3.624	20,244	0.000	0	20,244	55.9	184	10,286	30,530	2.686	11,853	6,803	42,000	60,656	(30,126)
3	2029	8,232	3.733	30,730	0.000	0	30,730	82.3	185	15,226	45,956	2.767	17,995	6,637	40,500	65,132	(19,176)
4	2030	8,232	3.845	31,652	0.000	0	31,652	82.3	187	15,390	47,042	2.850	18,534	0	0	18,534	28,508
5	2031	8,232	3.960	32,599	0.000	0	32,599	82.3	189	15,555	48,154	2.935	19,087	0	0	19,087	29,067
6	2032	8,232	4.079	33,578	0.000	0	33,578	82.3	191	15,719	49,297	3.023	19,659	0	0	19,659	29,638
7	2033	8,232	4.201	34,583	0.000	0	34,583	82.3	193	15,884	50,467	3.114	20,251	0	0	20,251	30,216
8	2034	8,232	4.327	35,620	0.000	0	35,620	82.3	195	16,049	51,669	3.207	20,856	0	0	20,856	30,813
9	2035	8,232	4.457	36,690	0.000	0	36,690	82.3	197	16,213	52,903	3.304	21,487	0	0	21,487	31,416
10	2036	8,232	4.591	37,793	0.000	0	37,793	82.3	199	16,378	54,171	3.403	22,131	0	0	22,131	32,040
11	2037	8,232	4.729	38,929	0.000	0	38,929	82.3	201	16,542	55,471	3.505	22,794	0	0	22,794	32,677
12	2038	8,232	4.870	40,090	0.000	0	40,090	82.3	203	16,707	56,797	3.610	23,477	0	0	23,477	33,320
13	2039	8,232	5.017	41,300	0.000	0	41,300	82.3	205	16,872	58,172	3.718	24,179	0	0	24,179	33,993
14	2040	8,232	5.167	42,535	0.000	0	42,535	82.3	207	17,036	59,571	3.830	24,908	0	0	24,908	34,663
15	2041	8,232	5.322	43,811	0.000	0	43,811	82.3	209	17,201	61,012	3.945	25,655	0	0	25,655	35,357
16	2042	8,232	5.482	45,128	0.000	0	45,128	82.3	211	17,365	62,493	4.063	26,423	0	0	26,423	36,070
17	2043	8,232	5.646	46,478	0.000	0	46,478	82.3	213	17,530	64,008	4.185	27,216	0	0	27,216	36,792
18	2044	8,232	5.816	47,877	0.000	0	47,877	82.3	215	17,695	65,572	4.311	28,036	0	0	28,036	37,536
19	2045	8,232	5.990	49,310	0.000	0	49,310	82.3	217	17,859	67,169	4.440	28,875	0	0	28,875	38,294
20	2046	8,232	6.170	50,791	0.000	0	50,791	82.3	220	18,106	68,897	4.573	29,739	0	0	29,739	39,158
21	2047	5,390	6.355	34,253	0.000	0	34,253	53.9	222	11,966	46,219	4.710	20,056	0	0	20,056	26,163
22	2048	2,646	6.545	17,318	0.000	0	17,318	26.5	224	5,936	23,254	4.852	10,142	0	0	10,142	13,112
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	164,640									$1,133,991					$615,607	$518,384
									NPV =		$570,671					$370,243	$200,428

Total NPV = $200,428
Benefit/Cost Ratio = 1.54

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: **Residential 95%-96.9% 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)
2027	$9,998	$5,169	$15,167	$6,959	$43,500	$50,459	($35,292)
2028	20,244	10,286	30,530	6,803	42,000	48,803	(18,273)
2029	30,730	15,226	45,956	6,637	40,500	47,137	(1,181)
2030	31,652	15,390	47,042	0	0	0	47,042
2031	32,599	15,555	48,154	0	0	0	48,154
2032	33,578	15,719	49,297	0	0	0	49,297
2033	34,583	15,884	50,467	0	0	0	50,467
2034	35,620	16,049	51,669	0	0	0	51,669
2035	36,690	16,213	52,903	0	0	0	52,903
2036	37,793	16,378	54,171	0	0	0	54,171
2037	38,929	16,542	55,471	0	0	0	55,471
2038	40,090	16,707	56,797	0	0	0	56,797
2039	41,300	16,872	58,172	0	0	0	58,172
2040	42,535	17,036	59,571	0	0	0	59,571
2041	43,811	17,201	61,012	0	0	0	61,012
2042	45,128	17,365	62,493	0	0	0	62,493
2043	46,478	17,530	64,008	0	0	0	64,008
2044	47,877	17,695	65,572	0	0	0	65,572
2045	49,310	17,859	67,169	0	0	0	67,169
2046	50,791	18,106	68,897	0	0	0	68,897
2047	34,253	11,966	46,219	0	0	0	46,219
2048	17,318	5,936	23,254	0	0	0	23,254
2049	0	0	0	0	0	0	0
Total =			$1,133,991			$146,399	$987,592
		NPV =	$570,671			$137,229	$433,442

Total NPV = $433,442
Benefit/Cost Ratio = 4.16

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%-96.9% 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)
2027	$9,998	$5,169	$0.030	$3,132	$4.614	$13,113	$31,412	$50,459	$63,220	$113,679	($82,267)
2028	20,244	10,286	0.031	6,361	4.721	26,372	63,263	48,803	61,040	109,843	(46,580)
2029	30,730	15,226	0.032	9,677	4.830	39,761	95,394	47,137	58,860	105,997	(10,603)
2030	31,652	15,390	0.033	9,979	4.941	40,674	97,695	0	0	0	97,695
2031	32,599	15,555	0.034	10,282	5.056	41,621	100,057	0	0	0	100,057
2032	33,578	15,719	0.035	10,584	5.172	42,576	102,457	0	0	0	102,457
2033	34,583	15,884	0.036	10,886	5.292	43,564	104,917	0	0	0	104,917
2034	35,620	16,049	0.037	11,189	5.414	44,568	107,426	0	0	0	107,426
2035	36,690	16,213	0.039	11,794	5.539	45,597	110,294	0	0	0	110,294
2036	37,793	16,378	0.040	12,096	5.667	46,651	112,918	0	0	0	112,918
2037	38,929	16,542	0.041	12,398	5.798	47,729	115,598	0	0	0	115,598
2038	40,090	16,707	0.042	12,701	5.932	48,832	118,330	0	0	0	118,330
2039	41,300	16,872	0.043	13,003	6.069	49,960	121,135	0	0	0	121,135
2040	42,535	17,036	0.045	13,608	6.209	51,112	124,291	0	0	0	124,291
2041	43,811	17,201	0.046	13,910	6.353	52,298	127,220	0	0	0	127,220
2042	45,128	17,365	0.047	14,213	6.499	53,500	130,206	0	0	0	130,206
2043	46,478	17,530	0.049	14,818	6.649	54,735	133,561	0	0	0	133,561
2044	47,877	17,695	0.050	15,120	6.803	56,002	136,694	0	0	0	136,694
2045	49,310	17,859	0.052	15,725	6.960	57,295	140,189	0	0	0	140,189
2046	50,791	18,106	0.053	16,027	7.121	58,620	143,544	0	0	0	143,544
2047	34,253	11,966	0.055	10,890	7.285	39,266	96,375	0	0	0	96,375
2048	17,318	5,936	0.057	5,540	7.454	19,723	48,517	0	0	0	48,517
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$2,361,493			$329,519	$2,031,974
						NPV =	$1,844,740			$322,367	$1,522,373

Total NPV = $1,522,373
Benefit/Cost Ratio = 5.72

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: **Residential 95%-96.9% 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)
2027	$43,500	2,842	$8.567	$24,347	$0.139	$14,512	$82,359	$106,720	($24,361)
2028	42,000	5,586	8.824	49,291	0.143	29,344	120,635	103,040	17,595
2029	40,500	8,232	9.088	74,812	0.147	44,453	159,765	99,360	60,405
2030	0	8,232	9.361	77,060	0.152	45,965	123,025	0	123,025
2031	0	8,232	9.642	79,373	0.156	47,174	126,547	0	126,547
2032	0	8,232	9.931	81,752	0.161	48,686	130,438	0	130,438
2033	0	8,232	10.229	84,205	0.166	50,198	134,403	0	134,403
2034	0	8,232	10.536	86,732	0.171	51,710	138,442	0	138,442
2035	0	8,232	10.852	89,334	0.176	53,222	142,556	0	142,556
2036	0	8,232	11.177	92,009	0.181	54,734	146,743	0	146,743
2037	0	8,232	11.513	94,775	0.187	56,549	151,324	0	151,324
2038	0	8,232	11.858	97,615	0.192	58,061	155,676	0	155,676
2039	0	8,232	12.214	100,546	0.198	59,875	160,421	0	160,421
2040	0	8,232	12.580	103,559	0.204	61,690	165,249	0	165,249
2041	0	8,232	12.958	106,670	0.210	63,504	170,174	0	170,174
2042	0	8,232	13.346	109,864	0.217	65,621	175,485	0	175,485
2043	0	8,232	13.747	113,165	0.223	67,435	180,600	0	180,600
2044	0	8,232	14.159	116,557	0.230	69,552	186,109	0	186,109
2045	0	8,232	14.584	120,055	0.237	71,669	191,724	0	191,724
2046	0	8,232	15.021	123,653	0.244	73,786	197,439	0	197,439
2047	0	5,390	15.472	83,394	0.251	49,698	133,092	0	133,092
2048	0	2,646	15.936	42,167	0.259	25,175	67,342	0	67,342
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		164,640					$3,239,548	$309,120	$2,930,428
						NPV =	$1,202,419	$279,054	923,365

Total NPV = $923,365
Benefit/Cost Ratio = 4.31

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

Table 5
Total Resource Cost Test

Compai **Montana-Dakota Utilities Co.**
Project: **Residential 95%-96.9% 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)
2027	$9,998	$5,169	$3,132	$18,299	$50,459	$63,220	$113,679	($95,380)
2028	20,244	10,286	6,361	36,891	48,803	61,040	109,843	(72,952)
2029	30,730	15,226	9,677	55,633	47,137	58,860	105,997	(50,364)
2030	31,652	15,390	9,979	57,021	0	0	0	57,021
2031	32,599	15,555	10,282	58,436	0	0	0	58,436
2032	33,578	15,719	10,584	59,881	0	0	0	59,881
2033	34,583	15,884	10,886	61,353	0	0	0	61,353
2034	35,620	16,049	11,189	62,858	0	0	0	62,858
2035	36,690	16,213	11,794	64,697	0	0	0	64,697
2036	37,793	16,378	12,096	66,267	0	0	0	66,267
2037	38,929	16,542	12,398	67,869	0	0	0	67,869
2038	40,090	16,707	12,701	69,498	0	0	0	69,498
2039	41,300	16,872	13,003	71,175	0	0	0	71,175
2040	42,535	17,036	13,608	73,179	0	0	0	73,179
2041	43,811	17,201	13,910	74,922	0	0	0	74,922
2042	45,128	17,365	14,213	76,706	0	0	0	76,706
2043	46,478	17,530	14,818	78,826	0	0	0	78,826
2044	47,877	17,695	15,120	80,692	0	0	0	80,692
2045	49,310	17,859	15,725	82,894	0	0	0	82,894
2046	50,791	18,106	16,027	84,924	0	0	0	84,924
2047	34,253	11,966	10,890	57,109	0	0	0	57,109
2048	17,318	5,936	5,540	28,794	0	0	0	28,794
2049	0	0	0	0	0	0	0	0
			Total =	$1,387,924			$329,519	$1,058,405
			NPV =	$696,639			$308,891	387,748

Total NPV =	$387,748
Benefit/Cost Ratio =	2.26

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 97+% AFUE Furnace - New**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$1,600	$1,821	$2,048
16b) Incentive Costs =	10,000	11,250	12,500
16c) Total Utility Project Costs =	$11,600	$13,071	$14,548
17) Direct Participant Costs ($/Part.) =	$477	$477	$477
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	8.100	8.100	8.100
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	40	45	50
24) Total Annual Dk Saved =	324	365	405
25) Incentive/Participant =	$250	$250	$250
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$8,070	1.12
Utility Cost Test	$38,921	2.07
Societal Test	$150,628	3.21
Participant Test	$62,600	2.09
Total Resource Cost Test	$10,384	1.16

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 97+% 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	2027	324	$3.518	$1,140	$0.000	$0	$1,140	3.2	$182	$582	$1,722	$2.608	$668	$1,600	$10,000	$12,268	($10,546)
2	2028	689	3.624	2,497	0.000	0	2,497	6.9	184	1,270	3,767	2.686	1,462	1,821	11,250	14,533	(10,766)
3	2029	1,094	3.733	4,084	0.000	0	4,084	10.9	185	2,017	6,101	2.767	2,391	2,048	12,500	16,939	(10,838)
4	2030	1,094	3.845	4,206	0.000	0	4,206	10.9	187	2,038	6,244	2.850	2,463	0	0	2,463	3,781
5	2031	1,094	3.960	4,332	0.000	0	4,332	10.9	189	2,060	6,392	2.935	2,537	0	0	2,537	3,855
6	2032	1,094	4.079	4,462	0.000	0	4,462	10.9	191	2,082	6,544	3.023	2,613	0	0	2,613	3,931
7	2033	1,094	4.201	4,596	0.000	0	4,596	10.9	193	2,104	6,700	3.114	2,691	0	0	2,691	4,009
8	2034	1,094	4.327	4,734	0.000	0	4,734	10.9	195	2,126	6,860	3.207	2,772	0	0	2,772	4,088
9	2035	1,094	4.457	4,876	0.000	0	4,876	10.9	197	2,147	7,023	3.304	2,856	0	0	2,856	4,167
10	2036	1,094	4.591	5,023	0.000	0	5,023	10.9	199	2,169	7,192	3.403	2,941	0	0	2,941	4,251
11	2037	1,094	4.729	5,174	0.000	0	5,174	10.9	201	2,191	7,365	3.505	3,029	0	0	3,029	4,336
12	2038	1,094	4.870	5,328	0.000	0	5,328	10.9	203	2,213	7,541	3.610	3,120	0	0	3,120	4,421
13	2039	1,094	5.017	5,489	0.000	0	5,489	10.9	205	2,235	7,724	3.718	3,213	0	0	3,213	4,511
14	2040	1,094	5.167	5,653	0.000	0	5,653	10.9	207	2,256	7,909	3.830	3,310	0	0	3,310	4,599
15	2041	1,094	5.322	5,822	0.000	0	5,822	10.9	209	2,278	8,100	3.945	3,410	0	0	3,410	4,690
16	2042	1,094	5.482	5,997	0.000	0	5,997	10.9	211	2,300	8,297	4.063	3,511	0	0	3,511	4,786
17	2043	1,094	5.646	6,177	0.000	0	6,177	10.9	213	2,322	8,499	4.185	3,617	0	0	3,617	4,882
18	2044	1,094	5.816	6,363	0.000	0	6,363	10.9	215	2,344	8,707	4.311	3,726	0	0	3,726	4,981
19	2045	1,094	5.990	6,553	0.000	0	6,553	10.9	217	2,365	8,918	4.440	3,837	0	0	3,837	5,081
20	2046	1,094	6.170	6,750	0.000	0	6,750	10.9	220	2,398	9,148	4.573	3,952	0	0	3,952	5,196
21	2047	770	6.355	4,893	0.000	0	4,893	7.7	222	1,709	6,602	4.710	2,865	0	0	2,865	3,737
22	2048	405	6.545	2,651	0.000	0	2,651	4.1	224	918	3,569	4.852	1,552	0	0	1,552	2,017
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	21,880									$150,924					$101,755	$49,169
									NPV =		$75,440					$67,371	$8,070

Total NPV = $8,070
Benefit/Cost Ratio = 1.12

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 97+% 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)
2027	$1,140	$582	$1,722	$1,600	$10,000	$11,600	($9,878)
2028	2,497	1,270	3,767	1,821	11,250	13,071	(9,304)
2029	4,084	2,017	6,101	2,048	12,500	14,548	(8,447)
2030	4,206	2,038	6,244	0	0	0	6,244
2031	4,332	2,060	6,392	0	0	0	6,392
2032	4,462	2,082	6,544	0	0	0	6,544
2033	4,596	2,104	6,700	0	0	0	6,700
2034	4,734	2,126	6,860	0	0	0	6,860
2035	4,876	2,147	7,023	0	0	0	7,023
2036	5,023	2,169	7,192	0	0	0	7,192
2037	5,174	2,191	7,365	0	0	0	7,365
2038	5,328	2,213	7,541	0	0	0	7,541
2039	5,489	2,235	7,724	0	0	0	7,724
2040	5,653	2,256	7,909	0	0	0	7,909
2041	5,822	2,278	8,100	0	0	0	8,100
2042	5,997	2,300	8,297	0	0	0	8,297
2043	6,177	2,322	8,499	0	0	0	8,499
2044	6,363	2,344	8,707	0	0	0	8,707
2045	6,553	2,365	8,918	0	0	0	8,918
2046	6,750	2,398	9,148	0	0	0	9,148
2047	4,893	1,709	6,602	0	0	0	6,602
2048	2,651	918	3,569	0	0	0	3,569
2049	0	0	0	0	0	0	0
Total =			$150,924			$39,219	$111,705
		NPV =	$75,440			$36,519	$38,921

Total NPV = $38,921
Benefit/Cost Ratio = 2.07

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 97+% 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)
2027	$1,140	$582	$0.030	$0	$4.614	$1,495	$3,217	$11,600	$9,080	$20,680	($17,463)
2028	2,497	1,270	0.031	0	4.721	3,253	7,020	13,071	10,215	23,286	(16,266)
2029	4,084	2,017	0.032	0	4.830	5,284	11,385	14,548	11,350	25,898	(14,513)
2030	4,206	2,038	0.033	0	4.941	5,405	11,649	0	0	0	11,649
2031	4,332	2,060	0.034	0	5.056	5,531	11,923	0	0	0	11,923
2032	4,462	2,082	0.035	0	5.172	5,658	12,202	0	0	0	12,202
2033	4,596	2,104	0.036	0	5.292	5,789	12,489	0	0	0	12,489
2034	4,734	2,126	0.037	0	5.414	5,923	12,783	0	0	0	12,783
2035	4,876	2,147	0.039	0	5.539	6,060	13,083	0	0	0	13,083
2036	5,023	2,169	0.040	0	5.667	6,200	13,392	0	0	0	13,392
2037	5,174	2,191	0.041	0	5.798	6,343	13,708	0	0	0	13,708
2038	5,328	2,213	0.042	0	5.932	6,490	14,031	0	0	0	14,031
2039	5,489	2,235	0.043	0	6.069	6,639	14,363	0	0	0	14,363
2040	5,653	2,256	0.045	0	6.209	6,793	14,702	0	0	0	14,702
2041	5,822	2,278	0.046	0	6.353	6,950	15,050	0	0	0	15,050
2042	5,997	2,300	0.047	0	6.499	7,110	15,407	0	0	0	15,407
2043	6,177	2,322	0.049	0	6.649	7,274	15,773	0	0	0	15,773
2044	6,363	2,344	0.050	0	6.803	7,442	16,149	0	0	0	16,149
2045	6,553	2,365	0.052	0	6.960	7,614	16,532	0	0	0	16,532
2046	6,750	2,398	0.053	0	7.121	7,790	16,938	0	0	0	16,938
2047	4,893	1,709	0.055	0	7.285	5,609	12,211	0	0	0	12,211
2048	2,651	918	0.057	0	7.454	3,019	6,588	0	0	0	6,588
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$280,595			$69,864	$210,731
						NPV =	$218,824			$68,196	$150,628

Total NPV = $150,628
Benefit/Cost Ratio = 3.21

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 97+% 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)
2027	$10,000	324	$8.567	$2,776	$0.139	$0	$12,776	$19,080	($6,304)
2028	11,250	689	8.824	6,080	0.143	0	17,330	21,465	(4,135)
2029	12,500	1,094	9.088	9,942	0.147	0	22,442	23,850	(1,408)
2030	0	1,094	9.361	10,241	0.152	0	10,241	0	10,241
2031	0	1,094	9.642	10,548	0.156	0	10,548	0	10,548
2032	0	1,094	9.931	10,865	0.161	0	10,865	0	10,865
2033	0	1,094	10.229	11,191	0.166	0	11,191	0	11,191
2034	0	1,094	10.536	11,526	0.171	0	11,526	0	11,526
2035	0	1,094	10.852	11,872	0.176	0	11,872	0	11,872
2036	0	1,094	11.177	12,228	0.181	0	12,228	0	12,228
2037	0	1,094	11.513	12,595	0.187	0	12,595	0	12,595
2038	0	1,094	11.858	12,973	0.192	0	12,973	0	12,973
2039	0	1,094	12.214	13,362	0.198	0	13,362	0	13,362
2040	0	1,094	12.580	13,763	0.204	0	13,763	0	13,763
2041	0	1,094	12.958	14,176	0.210	0	14,176	0	14,176
2042	0	1,094	13.346	14,601	0.217	0	14,601	0	14,601
2043	0	1,094	13.747	15,039	0.223	0	15,039	0	15,039
2044	0	1,094	14.159	15,490	0.230	0	15,490	0	15,490
2045	0	1,094	14.584	15,955	0.237	0	15,955	0	15,955
2046	0	1,094	15.021	16,433	0.244	0	16,433	0	16,433
2047	0	770	15.472	11,913	0.251	0	11,913	0	11,913
2048	0	405	15.936	6,454	0.259	0	6,454	0	6,454
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		21,880					$293,773	$64,395	$229,378
						NPV =	$120,115	$57,515	62,600

Total NPV =	$62,600
Benefit/Cost Ratio =	2.09

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Residential 97+% 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)
2027	$1,140	$582	$0	$1,722	$11,600	$9,080	$20,680	($18,958)
2028	2,497	1,270	0	3,767	13,071	10,215	23,286	(19,519)
2029	4,084	2,017	0	6,101	14,548	11,350	25,898	(19,797)
2030	4,206	2,038	0	6,244	0	0	0	6,244
2031	4,332	2,060	0	6,392	0	0	0	6,392
2032	4,462	2,082	0	6,544	0	0	0	6,544
2033	4,596	2,104	0	6,700	0	0	0	6,700
2034	4,734	2,126	0	6,860	0	0	0	6,860
2035	4,876	2,147	0	7,023	0	0	0	7,023
2036	5,023	2,169	0	7,192	0	0	0	7,192
2037	5,174	2,191	0	7,365	0	0	0	7,365
2038	5,328	2,213	0	7,541	0	0	0	7,541
2039	5,489	2,235	0	7,724	0	0	0	7,724
2040	5,653	2,256	0	7,909	0	0	0	7,909
2041	5,822	2,278	0	8,100	0	0	0	8,100
2042	5,997	2,300	0	8,297	0	0	0	8,297
2043	6,177	2,322	0	8,499	0	0	0	8,499
2044	6,363	2,344	0	8,707	0	0	0	8,707
2045	6,553	2,365	0	8,918	0	0	0	8,918
2046	6,750	2,398	0	9,148	0	0	0	9,148
2047	4,893	1,709	0	6,602	0	0	0	6,602
2048	2,651	918	0	3,569	0	0	0	3,569
2049	0	0	0	0	0	0	0	0
			Total =	$150,924			$69,864	$81,060
			NPV =	$75,440			$65,057	10,384

Total NPV =	$10,384
Benefit/Cost Ratio =	1.16

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 97% AFUE Furnace - Replacement**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$6,401	$6,884	$7,374
16b) Incentive Costs =	40,000	42,500	45,000
16c) Total Utility Project Costs =	$46,401	$49,384	$52,374
17) Direct Participant Costs ($/Part.) =	$1,048	$1,048	$1,048
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	22.200	22.200	22.200
22) Avg Non-Gas Fuel Units/Part. Saved =	720	720	720
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	80	85	90
24) Total Annual Dk Saved =	1,776	1,887	1,998
25) Incentive/Participant =	$500	$500	$500
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$93,216	1.31
Utility Cost Test	$253,072	2.83
Societal Test	$971,565	4.45
Participant Test	$587,075	3.45
Total Resource Cost Test	$198,934	1.74

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Residential 97% 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	2027	1,776	$3.518	$6,248	$0.000	$0	$6,248	17.8	$182	$3,240	$9,488	$2.608	$3,659	$6,401	$40,000	$50,060	($40,572)
2	2028	3,663	3.624	13,275	0.000	0	13,275	36.6	184	6,734	20,009	2.686	7,773	6,884	42,500	57,157	(37,148)
3	2029	5,661	3.733	21,133	0.000	0	21,133	56.6	185	10,471	31,604	2.767	12,375	7,374	45,000	64,749	(33,145)
4	2030	5,661	3.845	21,767	0.000	0	21,767	56.6	187	10,584	32,351	2.850	12,746	0	0	12,746	19,605
5	2031	5,661	3.960	22,418	0.000	0	22,418	56.6	189	10,697	33,115	2.935	13,126	0	0	13,126	19,989
6	2032	5,661	4.079	23,091	0.000	0	23,091	56.6	191	10,811	33,902	3.023	13,519	0	0	13,519	20,383
7	2033	5,661	4.201	23,782	0.000	0	23,782	56.6	193	10,924	34,706	3.114	13,926	0	0	13,926	20,780
8	2034	5,661	4.327	24,495	0.000	0	24,495	56.6	195	11,037	35,532	3.207	14,342	0	0	14,342	21,190
9	2035	5,661	4.457	25,231	0.000	0	25,231	56.6	197	11,150	36,381	3.304	14,776	0	0	14,776	21,605
10	2036	5,661	4.591	25,990	0.000	0	25,990	56.6	199	11,263	37,253	3.403	15,219	0	0	15,219	22,034
11	2037	5,661	4.729	26,771	0.000	0	26,771	56.6	201	11,377	38,148	3.505	15,675	0	0	15,675	22,473
12	2038	5,661	4.870	27,569	0.000	0	27,569	56.6	203	11,490	39,059	3.610	16,145	0	0	16,145	22,914
13	2039	5,661	5.017	28,401	0.000	0	28,401	56.6	205	11,603	40,004	3.718	16,628	0	0	16,628	23,376
14	2040	5,661	5.167	29,250	0.000	0	29,250	56.6	207	11,716	40,966	3.830	17,128	0	0	17,128	23,838
15	2041	5,661	5.322	30,128	0.000	0	30,128	56.6	209	11,829	41,957	3.945	17,643	0	0	17,643	24,314
16	2042	5,661	5.482	31,034	0.000	0	31,034	56.6	211	11,943	42,977	4.063	18,171	0	0	18,171	24,806
17	2043	5,661	5.646	31,962	0.000	0	31,962	56.6	213	12,056	44,018	4.185	18,716	0	0	18,716	25,302
18	2044	5,661	5.816	32,924	0.000	0	32,924	56.6	215	12,169	45,093	4.311	19,280	0	0	19,280	25,813
19	2045	5,661	5.990	33,909	0.000	0	33,909	56.6	217	12,282	46,191	4.440	19,857	0	0	19,857	26,334
20	2046	5,661	6.170	34,928	0.000	0	34,928	56.6	220	12,452	47,380	4.573	20,451	0	0	20,451	26,929
21	2047	3,885	6.355	24,689	0.000	0	24,689	38.9	222	8,636	33,325	4.710	14,456	0	0	14,456	18,869
22	2048	1,998	6.545	13,077	0.000	0	13,077	20.0	224	4,480	17,557	4.852	7,658	0	0	7,658	9,899
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	113,220									$781,016					$471,428	$309,588
									NPV =		$391,359					$298,143	$93,216

Total NPV = $93,216
Benefit/Cost Ratio = 1.31

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: **Residential 97% 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)
2027	$6,248	$3,240	$9,488	$6,401	$40,000	$46,401	($36,913)
2028	13,275	6,734	20,009	6,884	42,500	49,384	(29,375)
2029	21,133	10,471	31,604	7,374	45,000	52,374	(20,770)
2030	21,767	10,584	32,351	0	0	0	32,351
2031	22,418	10,697	33,115	0	0	0	33,115
2032	23,091	10,811	33,902	0	0	0	33,902
2033	23,782	10,924	34,706	0	0	0	34,706
2034	24,495	11,037	35,532	0	0	0	35,532
2035	25,231	11,150	36,381	0	0	0	36,381
2036	25,990	11,263	37,253	0	0	0	37,253
2037	26,771	11,377	38,148	0	0	0	38,148
2038	27,569	11,490	39,059	0	0	0	39,059
2039	28,401	11,603	40,004	0	0	0	40,004
2040	29,250	11,716	40,966	0	0	0	40,966
2041	30,128	11,829	41,957	0	0	0	41,957
2042	31,034	11,943	42,977	0	0	0	42,977
2043	31,962	12,056	44,018	0	0	0	44,018
2044	32,924	12,169	45,093	0	0	0	45,093
2045	33,909	12,282	46,191	0	0	0	46,191
2046	34,928	12,452	47,380	0	0	0	47,380
2047	24,689	8,636	33,325	0	0	0	33,325
2048	13,077	4,480	17,557	0	0	0	17,557
2049	0	0	0	0	0	0	0
Total =			$781,016			$148,159	$632,857
		NPV =	$391,359			$138,287	$253,072

Total NPV = $253,072
Benefit/Cost Ratio = 2.83

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 97% 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)
2027	$6,248	$3,240	$0.030	$1,728	$4.614	$8,194	$19,410	$46,401	$43,840	$90,241	($70,831)
2028	13,275	6,734	0.031	3,683	4.721	17,293	40,985	49,384	46,580	95,964	(54,979)
2029	21,133	10,471	0.032	5,875	4.830	27,343	64,822	52,374	49,320	101,694	(36,872)
2030	21,767	10,584	0.033	6,059	4.941	27,971	66,381	0	0	0	66,381
2031	22,418	10,697	0.034	6,242	5.056	28,622	67,979	0	0	0	67,979
2032	23,091	10,811	0.035	6,426	5.172	29,279	69,607	0	0	0	69,607
2033	23,782	10,924	0.036	6,610	5.292	29,958	71,274	0	0	0	71,274
2034	24,495	11,037	0.037	6,793	5.414	30,649	72,974	0	0	0	72,974
2035	25,231	11,150	0.039	7,160	5.539	31,356	74,897	0	0	0	74,897
2036	25,990	11,263	0.040	7,344	5.667	32,081	76,678	0	0	0	76,678
2037	26,771	11,377	0.041	7,528	5.798	32,822	78,498	0	0	0	78,498
2038	27,569	11,490	0.042	7,711	5.932	33,581	80,351	0	0	0	80,351
2039	28,401	11,603	0.043	7,895	6.069	34,357	82,256	0	0	0	82,256
2040	29,250	11,716	0.045	8,262	6.209	35,149	84,377	0	0	0	84,377
2041	30,128	11,829	0.046	8,446	6.353	35,964	86,367	0	0	0	86,367
2042	31,034	11,943	0.047	8,629	6.499	36,791	88,397	0	0	0	88,397
2043	31,962	12,056	0.049	8,996	6.649	37,640	90,654	0	0	0	90,654
2044	32,924	12,169	0.050	9,180	6.803	38,512	92,785	0	0	0	92,785
2045	33,909	12,282	0.052	9,547	6.960	39,401	95,139	0	0	0	95,139
2046	34,928	12,452	0.053	9,731	7.121	40,312	97,423	0	0	0	97,423
2047	24,689	8,636	0.055	6,930	7.285	28,302	68,557	0	0	0	68,557
2048	13,077	4,480	0.057	3,694	7.454	14,893	36,144	0	0	0	36,144
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$1,605,955			$287,899	$1,318,056
						NPV =	$1,252,813			$281,248	$971,565

Total NPV = $971,565
Benefit/Cost Ratio = 4.45

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 97% 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)
2027	$40,000	1,776	$8.567	$15,215	$0.139	$8,006	$63,221	$83,840	($20,619)
2028	42,500	3,663	8.824	32,322	0.143	16,988	91,810	89,080	2,730
2029	45,000	5,661	9.088	51,447	0.147	26,989	123,436	94,320	29,116
2030	0	5,661	9.361	52,993	0.152	27,907	80,900	0	80,900
2031	0	5,661	9.642	54,583	0.156	28,642	83,225	0	83,225
2032	0	5,661	9.931	56,219	0.161	29,560	85,779	0	85,779
2033	0	5,661	10.229	57,906	0.166	30,478	88,384	0	88,384
2034	0	5,661	10.536	59,644	0.171	31,396	91,040	0	91,040
2035	0	5,661	10.852	61,433	0.176	32,314	93,747	0	93,747
2036	0	5,661	11.177	63,273	0.181	33,232	96,505	0	96,505
2037	0	5,661	11.513	65,175	0.187	34,333	99,508	0	99,508
2038	0	5,661	11.858	67,128	0.192	35,251	102,379	0	102,379
2039	0	5,661	12.214	69,143	0.198	36,353	105,496	0	105,496
2040	0	5,661	12.580	71,215	0.204	37,454	108,669	0	108,669
2041	0	5,661	12.958	73,355	0.210	38,556	111,911	0	111,911
2042	0	5,661	13.346	75,552	0.217	39,841	115,393	0	115,393
2043	0	5,661	13.747	77,822	0.223	40,943	118,765	0	118,765
2044	0	5,661	14.159	80,154	0.230	42,228	122,382	0	122,382
2045	0	5,661	14.584	82,560	0.237	43,513	126,073	0	126,073
2046	0	5,661	15.021	85,034	0.244	44,798	129,832	0	129,832
2047	0	3,885	15.472	60,109	0.251	31,626	91,735	0	91,735
2048	0	1,998	15.936	31,840	0.259	16,783	48,623	0	48,623
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		113,220					$2,178,813	$267,240	$1,911,573
						NPV =	$826,675	$239,600	587,075

Total NPV =	$587,075
Benefit/Cost Ratio =	3.45

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Residential 97% 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)
2027	$6,248	$3,240	$1,728	$11,216	$46,401	$43,840	$90,241	($79,025)
2028	13,275	6,734	3,683	23,692	49,384	46,580	95,964	(72,272)
2029	21,133	10,471	5,875	37,479	52,374	49,320	101,694	(64,215)
2030	21,767	10,584	6,059	38,410	0	0	0	38,410
2031	22,418	10,697	6,242	39,357	0	0	0	39,357
2032	23,091	10,811	6,426	40,328	0	0	0	40,328
2033	23,782	10,924	6,610	41,316	0	0	0	41,316
2034	24,495	11,037	6,793	42,325	0	0	0	42,325
2035	25,231	11,150	7,160	43,541	0	0	0	43,541
2036	25,990	11,263	7,344	44,597	0	0	0	44,597
2037	26,771	11,377	7,528	45,676	0	0	0	45,676
2038	27,569	11,490	7,711	46,770	0	0	0	46,770
2039	28,401	11,603	7,895	47,899	0	0	0	47,899
2040	29,250	11,716	8,262	49,228	0	0	0	49,228
2041	30,128	11,829	8,446	50,403	0	0	0	50,403
2042	31,034	11,943	8,629	51,606	0	0	0	51,606
2043	31,962	12,056	8,996	53,014	0	0	0	53,014
2044	32,924	12,169	9,180	54,273	0	0	0	54,273
2045	33,909	12,282	9,547	55,738	0	0	0	55,738
2046	34,928	12,452	9,731	57,111	0	0	0	57,111
2047	24,689	8,636	6,930	40,255	0	0	0	40,255
2048	13,077	4,480	3,694	21,251	0	0	0	21,251
2049	0	0	0	0	0	0	0	0
			Total =	$935,485			$287,899	$647,586
			NPV =	$467,659			$268,725	198,934

Total NPV =	$198,934
Benefit/Cost Ratio =	1.74

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 - Tier 1**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$120	$120	$123
16b) Incentive Costs =	750	750	750
16c) Total Utility Project Costs =	$870	$870	$873
17) Direct Participant Costs ($/Part.) =	$30	$30	$30
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	10	10	10
21) Avg. Dk/Part. Saved =	2.300	2.300	2.300
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	50	50	50
24) Total Annual Dk Saved =	115	115	115
25) Incentive/Participant =	$15	$15	$15
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$6,361	1.77
Utility Cost Test	$12,160	5.97
Societal Test	$29,736	7.25
Participant Test	$17,623	5.35
Total Resource Cost Test	$10,054	3.21

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats - Tier 1**

		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	2027	115	$3.518	$405	$0.000	$0	$405	1.2	$182	$218	$623	$2.608	$237	$120	$750	$1,107	($484)
2	2028	230	3.624	834	0.000	0	834	2.3	184	423	1,257	2.686	488	120	750	1,358	(101)
3	2029	345	3.733	1,288	0.000	0	1,288	3.5	185	648	1,936	2.767	754	123	750	1,627	309
4	2030	345	3.845	1,327	0.000	0	1,327	3.5	187	655	1,982	2.850	777	0	0	777	1,205
5	2031	345	3.960	1,366	0.000	0	1,366	3.5	189	662	2,028	2.935	800	0	0	800	1,228
6	2032	345	4.079	1,407	0.000	0	1,407	3.5	191	669	2,076	3.023	824	0	0	824	1,252
7	2033	345	4.201	1,449	0.000	0	1,449	3.5	193	676	2,125	3.114	849	0	0	849	1,276
8	2034	345	4.327	1,493	0.000	0	1,493	3.5	195	683	2,176	3.207	874	0	0	874	1,302
9	2035	345	4.457	1,538	0.000	0	1,538	3.5	197	690	2,228	3.304	901	0	0	901	1,327
10	2036	345	4.591	1,584	0.000	0	1,584	3.5	199	697	2,281	3.403	927	0	0	927	1,354
11	2037	230	4.729	1,088	0.000	0	1,088	2.3	201	462	1,550	3.505	637	0	0	637	913
12	2038	115	4.870	560	0.000	0	560	1.2	203	244	804	3.610	328	0	0	328	476
13	2039	0	5.017	0	0.000	0	0	0.0	205	0	0	3.718	0	0	0	0	0
14	2040	0	5.167	0	0.000	0	0	0.0	207	0	0	3.830	0	0	0	0	0
15	2041	0	5.322	0	0.000	0	0	0.0	209	0	0	3.945	0	0	0	0	0
16	2042	0	5.482	0	0.000	0	0	0.0	211	0	0	4.063	0	0	0	0	0
17	2043	0	5.646	0	0.000	0	0	0.0	213	0	0	4.185	0	0	0	0	0
18	2044	0	5.816	0	0.000	0	0	0.0	215	0	0	4.311	0	0	0	0	0
19	2045	0	5.990	0	0.000	0	0	0.0	217	0	0	4.440	0	0	0	0	0
20	2046	0	6.170	0	0.000	0	0	0.0	220	0	0	4.573	0	0	0	0	0
21	2047	0	6.355	0	0.000	0	0	0.0	222	0	0	4.710	0	0	0	0	0
22	2048	0	6.545	0	0.000	0	0	0.0	224	0	0	4.852	0	0	0	0	0
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	3,450									$21,066					$11,009	$10,057
									NPV =		$14,605					$8,245	$6,361

Total NPV = $6,361
Benefit/Cost Ratio = 1.77

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: **Programmable Thermostats - Tier 1**

	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)
2027	$405	$218	$623	$120	$750	$870	($247)
2028	834	423	1,257	120	750	870	387
2029	1,288	648	1,936	123	750	873	1,063
2030	1,327	655	1,982	0	0	0	1,982
2031	1,366	662	2,028	0	0	0	2,028
2032	1,407	669	2,076	0	0	0	2,076
2033	1,449	676	2,125	0	0	0	2,125
2034	1,493	683	2,176	0	0	0	2,176
2035	1,538	690	2,228	0	0	0	2,228
2036	1,584	697	2,281	0	0	0	2,281
2037	1,088	462	1,550	0	0	0	1,550
2038	560	244	804	0	0	0	804
2039	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0
Total =			$21,066			$2,613	$18,453
		NPV =	$14,605			$2,445	$12,160

Total NPV = $12,160
Benefit/Cost Ratio = 5.97

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: **Programmable Thermostats - Tier 1**

	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)
2027	$405	$218	$0.030	$0	$4.614	$531	$1,154	$870	$750	$1,620	($466)
2028	834	423	0.031	0	4.721	1,086	2,343	870	750	1,620	723
2029	1,288	648	0.032	0	4.830	1,666	3,602	873	750	1,623	1,979
2030	1,327	655	0.033	0	4.941	1,705	3,687	0	0	0	3,687
2031	1,366	662	0.034	0	5.056	1,744	3,772	0	0	0	3,772
2032	1,407	669	0.035	0	5.172	1,784	3,860	0	0	0	3,860
2033	1,449	676	0.036	0	5.292	1,826	3,951	0	0	0	3,951
2034	1,493	683	0.037	0	5.414	1,868	4,044	0	0	0	4,044
2035	1,538	690	0.039	0	5.539	1,911	4,139	0	0	0	4,139
2036	1,584	697	0.040	0	5.667	1,955	4,236	0	0	0	4,236
2037	1,088	462	0.041	0	5.798	1,334	2,884	0	0	0	2,884
2038	560	244	0.042	0	5.932	682	1,486	0	0	0	1,486
2039	0	0	0.043	0	6.069	0	0	0	0	0	0
2040	0	0	0.045	0	6.209	0	0	0	0	0	0
2041	0	0	0.046	0	6.353	0	0	0	0	0	0
2042	0	0	0.047	0	6.499	0	0	0	0	0	0
2043	0	0	0.049	0	6.649	0	0	0	0	0	0
2044	0	0	0.050	0	6.803	0	0	0	0	0	0
2045	0	0	0.052	0	6.960	0	0	0	0	0	0
2046	0	0	0.053	0	7.121	0	0	0	0	0	0
2047	0	0	0.055	0	7.285	0	0	0	0	0	0
2048	0	0	0.057	0	7.454	0	0	0	0	0	0
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$39,158			$4,863	$34,295
						NPV =	$34,491			$4,755	$29,736

Total NPV = $29,736
Benefit/Cost Ratio = 7.25

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: **Programmable Thermostats - Tier 1**

	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)
2027	$750	115	$8.567	$985	$0.139	$0	$1,735	$1,500	$235
2028	750	230	8.824	2,030	0.143	0	2,780	1,500	1,280
2029	750	345	9.088	3,135	0.147	0	3,885	1,500	2,385
2030	0	345	9.361	3,230	0.152	0	3,230	0	3,230
2031	0	345	9.642	3,326	0.156	0	3,326	0	3,326
2032	0	345	9.931	3,426	0.161	0	3,426	0	3,426
2033	0	345	10.229	3,529	0.166	0	3,529	0	3,529
2034	0	345	10.536	3,635	0.171	0	3,635	0	3,635
2035	0	345	10.852	3,744	0.176	0	3,744	0	3,744
2036	0	345	11.177	3,856	0.181	0	3,856	0	3,856
2037	0	230	11.513	2,648	0.187	0	2,648	0	2,648
2038	0	115	11.858	1,364	0.192	0	1,364	0	1,364
2039	0	0	12.214	0	0.198	0	0	0	0
2040	0	0	12.580	0	0.204	0	0	0	0
2041	0	0	12.958	0	0.210	0	0	0	0
2042	0	0	13.346	0	0.217	0	0	0	0
2043	0	0	13.747	0	0.223	0	0	0	0
2044	0	0	14.159	0	0.230	0	0	0	0
2045	0	0	14.584	0	0.237	0	0	0	0
2046	0	0	15.021	0	0.244	0	0	0	0
2047	0	0	15.472	0	0.251	0	0	0	0
2048	0	0	15.936	0	0.259	0	0	0	0
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		3,450					$37,158	$4,500	$32,658
						NPV =	$21,675	$4,052	17,623

Total NPV = $17,623
Benefit/Cost Ratio = 5.35

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

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats - Tier 1**

	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)
2027	$405	$218	$0	$623	$870	$750	$1,620	($997)
2028	834	423	0	1,257	870	750	1,620	(363)
2029	1,288	648	0	1,936	873	750	1,623	313
2030	1,327	655	0	1,982	0	0	0	1,982
2031	1,366	662	0	2,028	0	0	0	2,028
2032	1,407	669	0	2,076	0	0	0	2,076
2033	1,449	676	0	2,125	0	0	0	2,125
2034	1,493	683	0	2,176	0	0	0	2,176
2035	1,538	690	0	2,228	0	0	0	2,228
2036	1,584	697	0	2,281	0	0	0	2,281
2037	1,088	462	0	1,550	0	0	0	1,550
2038	560	244	0	804	0	0	0	804
2039	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0
			Total =	$21,066			$4,863	$16,203
			NPV =	$14,605			$4,551	10,054

Total NPV =	$10,054
Benefit/Cost Ratio =	3.21

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 - Tier 2**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$8.317
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13497
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$1,441	$1,458	$1,474
16b) Incentive Costs =	9,000	9,000	9,000
16c) Total Utility Project Costs =	$10,441	$10,458	$10,474
17) Direct Participant Costs ($/Part.) =	$155	$155	$155
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	10	10	10
21) Avg. Dk/Part. Saved =	6.300	6.300	6.300
22) Avg Non-Gas Fuel Units/Part. Saved =	41	41	41
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	150	150	150
24) Total Annual Dk Saved =	945	945	945
25) Incentive/Participant =	$60	$60	$60
26) Distribution Delivery Charge			$2.532
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$42,495	1.55
Utility Cost Test	$90,145	4.07
Societal Test	$216,109	3.98
Participant Test	$140,002	3.23
Total Resource Cost Test	$54,692	1.79

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats - Tier 2**

		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	2027	945	$3.518	$3,325	$0.000	$0	$3,325	9.5	$182	$1,729	$5,054	$2.608	$1,947	$1,441	$9,000	$12,388	($7,334)
2	2028	1,890	3.624	6,849	0.000	0	6,849	18.9	184	3,478	10,327	2.686	4,010	1,458	9,000	14,468	(4,141)
3	2029	2,835	3.733	10,583	0.000	0	10,583	28.4	185	5,254	15,837	2.767	6,197	1,474	9,000	16,671	(834)
4	2030	2,835	3.845	10,901	0.000	0	10,901	28.4	187	5,311	16,212	2.850	6,383	0	0	6,383	9,829
5	2031	2,835	3.960	11,227	0.000	0	11,227	28.4	189	5,368	16,595	2.935	6,573	0	0	6,573	10,022
6	2032	2,835	4.079	11,564	0.000	0	11,564	28.4	191	5,424	16,988	3.023	6,770	0	0	6,770	10,218
7	2033	2,835	4.201	11,910	0.000	0	11,910	28.4	193	5,481	17,391	3.114	6,974	0	0	6,974	10,417
8	2034	2,835	4.327	12,267	0.000	0	12,267	28.4	195	5,538	17,805	3.207	7,183	0	0	7,183	10,622
9	2035	2,835	4.457	12,636	0.000	0	12,636	28.4	197	5,595	18,231	3.304	7,400	0	0	7,400	10,831
10	2036	2,835	4.591	13,015	0.000	0	13,015	28.4	199	5,652	18,667	3.403	7,622	0	0	7,622	11,045
11	2037	1,890	4.729	8,938	0.000	0	8,938	18.9	201	3,799	12,737	3.505	5,233	0	0	5,233	7,504
12	2038	945	4.870	4,602	0.000	0	4,602	9.5	203	1,929	6,531	3.610	2,695	0	0	2,695	3,836
13	2039	0	5.017	0	0.000	0	0	0.0	205	0	0	3.718	0	0	0	0	0
14	2040	0	5.167	0	0.000	0	0	0.0	207	0	0	3.830	0	0	0	0	0
15	2041	0	5.322	0	0.000	0	0	0.0	209	0	0	3.945	0	0	0	0	0
16	2042	0	5.482	0	0.000	0	0	0.0	211	0	0	4.063	0	0	0	0	0
17	2043	0	5.646	0	0.000	0	0	0.0	213	0	0	4.185	0	0	0	0	0
18	2044	0	5.816	0	0.000	0	0	0.0	215	0	0	4.311	0	0	0	0	0
19	2045	0	5.990	0	0.000	0	0	0.0	217	0	0	4.440	0	0	0	0	0
20	2046	0	6.170	0	0.000	0	0	0.0	220	0	0	4.573	0	0	0	0	0
21	2047	0	6.355	0	0.000	0	0	0.0	222	0	0	4.710	0	0	0	0	0
22	2048	0	6.545	0	0.000	0	0	0.0	224	0	0	4.852	0	0	0	0	0
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	4.997	0	0	0	0	0
	Total =	28,350									$172,375					$100,360	$72,015
									NPV =		$119,506					$77,010	$42,495

Total NPV = $42,495
Benefit/Cost Ratio = 1.55

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 - Tier 2**

	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)
2027	$3,325	$1,729	$5,054	$1,441	$9,000	$10,441	($5,387)
2028	6,849	3,478	10,327	1,458	9,000	10,458	(131)
2029	10,583	5,254	15,837	1,474	9,000	10,474	5,363
2030	10,901	5,311	16,212	0	0	0	16,212
2031	11,227	5,368	16,595	0	0	0	16,595
2032	11,564	5,424	16,988	0	0	0	16,988
2033	11,910	5,481	17,391	0	0	0	17,391
2034	12,267	5,538	17,805	0	0	0	17,805
2035	12,636	5,595	18,231	0	0	0	18,231
2036	13,015	5,652	18,667	0	0	0	18,667
2037	8,938	3,799	12,737	0	0	0	12,737
2038	4,602	1,929	6,531	0	0	0	6,531
2039	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0
Total =			$172,375			$31,373	$141,002
		NPV =	$119,506			$29,361	$90,145

Total NPV = $90,145
Benefit/Cost Ratio = 4.07

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 - Tier 2**

	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)
2027	$3,325	$1,729	$0.030	$185	$4.614	$4,360	$9,599	$10,441	$14,250	$24,691	($15,092)
2028	6,849	3,478	0.031	381	4.721	8,923	19,631	10,458	14,250	24,708	(5,077)
2029	10,583	5,254	0.032	590	4.830	13,693	30,120	10,474	14,250	24,724	5,396
2030	10,901	5,311	0.033	609	4.941	14,008	30,829	0	0	0	30,829
2031	11,227	5,368	0.034	627	5.056	14,334	31,556	0	0	0	31,556
2032	11,564	5,424	0.035	646	5.172	14,663	32,297	0	0	0	32,297
2033	11,910	5,481	0.036	664	5.292	15,003	33,058	0	0	0	33,058
2034	12,267	5,538	0.037	683	5.414	15,349	33,837	0	0	0	33,837
2035	12,636	5,595	0.039	720	5.539	15,703	34,654	0	0	0	34,654
2036	13,015	5,652	0.040	738	5.667	16,066	35,471	0	0	0	35,471
2037	8,938	3,799	0.041	504	5.798	10,958	24,199	0	0	0	24,199
2038	4,602	1,929	0.042	258	5.932	5,606	12,395	0	0	0	12,395
2039	0	0	0.043	0	6.069	0	0	0	0	0	0
2040	0	0	0.045	0	6.209	0	0	0	0	0	0
2041	0	0	0.046	0	6.353	0	0	0	0	0	0
2042	0	0	0.047	0	6.499	0	0	0	0	0	0
2043	0	0	0.049	0	6.649	0	0	0	0	0	0
2044	0	0	0.050	0	6.803	0	0	0	0	0	0
2045	0	0	0.052	0	6.960	0	0	0	0	0	0
2046	0	0	0.053	0	7.121	0	0	0	0	0	0
2047	0	0	0.055	0	7.285	0	0	0	0	0	0
2048	0	0	0.057	0	7.454	0	0	0	0	0	0
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$327,646			$74,123	$253,523
						NPV =	$288,584			$72,475	$216,109

Total NPV = $216,109
Benefit/Cost Ratio = 3.98

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 - Tier 2**

	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)
2027	$9,000	945	$8.567	$8,096	$0.139	$855	$17,951	$23,250	($5,299)
2028	9,000	1,890	8.824	16,677	0.143	1,759	27,436	23,250	4,186
2029	9,000	2,835	9.088	25,764	0.147	2,712	37,476	23,250	14,226
2030	0	2,835	9.361	26,538	0.152	2,804	29,342	0	29,342
2031	0	2,835	9.642	27,335	0.156	2,878	30,213	0	30,213
2032	0	2,835	9.931	28,154	0.161	2,970	31,124	0	31,124
2033	0	2,835	10.229	28,999	0.166	3,063	32,062	0	32,062
2034	0	2,835	10.536	29,870	0.171	3,155	33,025	0	33,025
2035	0	2,835	10.852	30,765	0.176	3,247	34,012	0	34,012
2036	0	2,835	11.177	31,687	0.181	3,339	35,026	0	35,026
2037	0	1,890	11.513	21,760	0.187	2,300	24,060	0	24,060
2038	0	945	11.858	11,206	0.192	1,181	12,387	0	12,387
2039	0	0	12.214	0	0.198	0	0	0	0
2040	0	0	12.580	0	0.204	0	0	0	0
2041	0	0	12.958	0	0.210	0	0	0	0
2042	0	0	13.346	0	0.217	0	0	0	0
2043	0	0	13.747	0	0.223	0	0	0	0
2044	0	0	14.159	0	0.230	0	0	0	0
2045	0	0	14.584	0	0.237	0	0	0	0
2046	0	0	15.021	0	0.244	0	0	0	0
2047	0	0	15.472	0	0.251	0	0	0	0
2048	0	0	15.936	0	0.259	0	0	0	0
2049	0	0	16.414	0	0.266	0	0	0	0
Total =		28,350					$344,114	$69,750	$274,364
						NPV =	$202,805	$62,803	140,002

Total NPV = $140,002
Benefit/Cost Ratio = 3.23

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

Table 5
Total Resource Cost Test

Compai **Montana-Dakota Utilities Co.**
Project: **Programmable Thermostats - Tier 2**

	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)
2027	$3,325	$1,729	$185	$5,239	$10,441	$14,250	$24,691	($19,452)
2028	6,849	3,478	381	10,708	10,458	14,250	24,708	(14,000)
2029	10,583	5,254	590	16,427	10,474	14,250	24,724	(8,297)
2030	10,901	5,311	609	16,821	0	0	0	16,821
2031	11,227	5,368	627	17,222	0	0	0	17,222
2032	11,564	5,424	646	17,634	0	0	0	17,634
2033	11,910	5,481	664	18,055	0	0	0	18,055
2034	12,267	5,538	683	18,488	0	0	0	18,488
2035	12,636	5,595	720	18,951	0	0	0	18,951
2036	13,015	5,652	738	19,405	0	0	0	19,405
2037	8,938	3,799	504	13,241	0	0	0	13,241
2038	4,602	1,929	258	6,789	0	0	0	6,789
2039	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0
			Total =	$178,980			$74,123	$104,857
			NPV =	$124,063			$69,371	54,692

Total NPV =	$54,692
Benefit/Cost Ratio =	1.79

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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: **Total Commercial Furnaces - South Dakota**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$1,601	$1,619	$1,637
16b) Incentive Costs =	10,000	10,000	10,000
16c) Total Utility Project Costs =	$11,601	$11,619	$11,637
17) Direct Participant Costs ($/Part.) =	$702	$702	$702
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	19.467	19.467	19.467
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	30	30	30
24) Total Annual Dk Saved =	584	584	584
25) Incentive/Participant =	$333	$333	$333
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$66,140	2.20
Utility Cost Test	$88,580	3.72
Societal Test	$283,713	5.27
Participant Test	$90,826	2.60
Total Resource Cost Test	$57,554	1.90

Table 1
Ratepayer Impact Measure Test

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

		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	2027	584	$3.518	$2,055	$0.000	$0	$2,055	5.9	$182	$1,074	$3,129	$1.182	$545	$1,601	$10,000	$12,146	($9,017)
2	2028	1,166	3.624	4,226	0.000	0	4,226	11.6	184	2,135	6,361	1.218	1,123	1,619	10,000	12,742	(6,381)
3	2029	1,750	3.733	6,532	0.000	0	6,532	17.5	185	3,239	9,771	1.254	1,733	1,637	10,000	13,370	(3,599)
4	2030	1,750	3.845	6,729	0.000	0	6,729	17.5	187	3,273	10,002	1.292	1,787	0	0	1,787	8,215
5	2031	1,750	3.960	6,931	0.000	0	6,931	17.5	189	3,308	10,239	1.331	1,841	0	0	1,841	8,398
6	2032	1,750	4.079	7,138	0.000	0	7,138	17.5	191	3,342	10,480	1.371	1,895	0	0	1,895	8,585
7	2033	1,750	4.201	7,352	0.000	0	7,352	17.5	193	3,377	10,729	1.412	1,953	0	0	1,953	8,776
8	2034	1,750	4.327	7,572	0.000	0	7,572	17.5	195	3,414	10,986	1.454	2,010	0	0	2,010	8,976
9	2035	1,750	4.457	7,800	0.000	0	7,800	17.5	197	3,448	11,248	1.498	2,071	0	0	2,071	9,177
10	2036	1,750	4.591	8,034	0.000	0	8,034	17.5	199	3,483	11,517	1.543	2,133	0	0	2,133	9,384
11	2037	1,750	4.729	8,275	0.000	0	8,275	17.5	201	3,517	11,792	1.589	2,197	0	0	2,197	9,595
12	2038	1,750	4.870	8,523	0.000	0	8,523	17.5	203	3,552	12,075	1.637	2,263	0	0	2,263	9,812
13	2039	1,750	5.017	8,780	0.000	0	8,780	17.5	205	3,589	12,369	1.686	2,331	0	0	2,331	10,038
14	2040	1,750	5.167	9,042	0.000	0	9,042	17.5	207	3,623	12,665	1.736	2,400	0	0	2,400	10,265
15	2041	1,750	5.322	9,314	0.000	0	9,314	17.5	209	3,658	12,972	1.789	2,474	0	0	2,474	10,498
16	2042	1,750	5.482	9,593	0.000	0	9,593	17.5	211	3,692	13,285	1.842	2,547	0	0	2,547	10,738
17	2043	1,750	5.646	9,880	0.000	0	9,880	17.5	213	3,727	13,607	1.897	2,623	0	0	2,623	10,984
18	2044	1,750	5.816	10,178	0.000	0	10,178	17.5	215	3,764	13,942	1.954	2,701	0	0	2,701	11,241
19	2045	1,750	5.990	10,483	0.000	0	10,483	17.5	217	3,798	14,281	2.013	2,783	0	0	2,783	11,498
20	2046	1,750	6.170	10,798	0.000	0	10,798	17.5	220	3,850	14,648	2.073	2,866	0	0	2,866	11,782
21	2047	1,166	6.355	7,410	0.000	0	7,410	11.6	222	2,575	9,985	2.136	1,968	0	0	1,968	8,017
22	2048	584	6.545	3,822	0.000	0	3,822	5.9	224	1,322	5,144	2.200	1,015	0	0	1,015	4,129
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	35,000									$241,227					$80,116	$161,111
									NPV =		$121,201					$55,062	$66,140

Total NPV = $66,140
Benefit/Cost Ratio = 2.20

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: **Total Commercial Furnaces - South Dakota**

	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)
2027	$2,055	$1,074	$3,129	$1,601	$10,000	$11,601	($8,472)
2028	4,226	2,135	6,361	1,619	10,000	11,619	(5,258)
2029	6,532	3,239	9,771	1,637	10,000	11,637	(1,866)
2030	6,729	3,273	10,002	0	0	0	10,002
2031	6,931	3,308	10,239	0	0	0	10,239
2032	7,138	3,342	10,480	0	0	0	10,480
2033	7,352	3,377	10,729	0	0	0	10,729
2034	7,572	3,414	10,986	0	0	0	10,986
2035	7,800	3,448	11,248	0	0	0	11,248
2036	8,034	3,483	11,517	0	0	0	11,517
2037	8,275	3,517	11,792	0	0	0	11,792
2038	8,523	3,552	12,075	0	0	0	12,075
2039	8,780	3,589	12,369	0	0	0	12,369
2040	9,042	3,623	12,665	0	0	0	12,665
2041	9,314	3,658	12,972	0	0	0	12,972
2042	9,593	3,692	13,285	0	0	0	13,285
2043	9,880	3,727	13,607	0	0	0	13,607
2044	10,178	3,764	13,942	0	0	0	13,942
2045	10,483	3,798	14,281	0	0	0	14,281
2046	10,798	3,850	14,648	0	0	0	14,648
2047	7,410	2,575	9,985	0	0	0	9,985
2048	3,822	1,322	5,144	0	0	0	5,144
2049	0	0	0	0	0	0	0
Total =			$241,227			$34,857	$206,370
		NPV =	$121,201			$32,621	$88,580

Total NPV = $88,580
Benefit/Cost Ratio = 3.72

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 Commercial Furnaces - South Dakota**

	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)
2027	$2,055	$1,074	$0.030	$0	$4.614	$2,695	$5,824	$11,601	$11,050	$22,651	($16,827)
2028	4,226	2,135	0.031	0	4.721	5,505	11,866	11,619	11,050	22,669	(10,803)
2029	6,532	3,239	0.032	0	4.830	8,452	18,223	11,637	11,050	22,687	(4,464)
2030	6,729	3,273	0.033	0	4.941	8,647	18,649	0	0	0	18,649
2031	6,931	3,308	0.034	0	5.056	8,848	19,087	0	0	0	19,087
2032	7,138	3,342	0.035	0	5.172	9,051	19,531	0	0	0	19,531
2033	7,352	3,377	0.036	0	5.292	9,262	19,991	0	0	0	19,991
2034	7,572	3,414	0.037	0	5.414	9,474	20,460	0	0	0	20,460
2035	7,800	3,448	0.039	0	5.539	9,694	20,942	0	0	0	20,942
2036	8,034	3,483	0.040	0	5.667	9,916	21,433	0	0	0	21,433
2037	8,275	3,517	0.041	0	5.798	10,145	21,937	0	0	0	21,937
2038	8,523	3,552	0.042	0	5.932	10,382	22,457	0	0	0	22,457
2039	8,780	3,589	0.043	0	6.069	10,620	22,989	0	0	0	22,989
2040	9,042	3,623	0.045	0	6.209	10,866	23,531	0	0	0	23,531
2041	9,314	3,658	0.046	0	6.353	11,117	24,089	0	0	0	24,089
2042	9,593	3,692	0.047	0	6.499	11,373	24,658	0	0	0	24,658
2043	9,880	3,727	0.049	0	6.649	11,636	25,243	0	0	0	25,243
2044	10,178	3,764	0.050	0	6.803	11,905	25,847	0	0	0	25,847
2045	10,483	3,798	0.052	0	6.960	12,181	26,462	0	0	0	26,462
2046	10,798	3,850	0.053	0	7.121	12,462	27,110	0	0	0	27,110
2047	7,410	2,575	0.055	0	7.285	8,494	18,479	0	0	0	18,479
2048	3,822	1,322	0.057	0	7.454	4,354	9,498	0	0	0	9,498
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$448,306			$68,007	$380,299
						NPV =	$350,208			$66,495	$283,713

Total NPV = $283,713
Benefit/Cost Ratio = 5.27

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: **Total Commercial Furnaces - South Dakota**

	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)
2027	$10,000	584	$7.141	$4,169	$0.134	$0	$14,169	$21,050	($6,881)
2028	10,000	1,166	7.355	8,576	0.138	0	18,576	21,050	(2,474)
2029	10,000	1,750	7.576	13,259	0.143	0	23,259	21,050	2,209
2030	0	1,750	7.803	13,655	0.147	0	13,655	0	13,655
2031	0	1,750	8.037	14,064	0.151	0	14,064	0	14,064
2032	0	1,750	8.278	14,487	0.156	0	14,487	0	14,487
2033	0	1,750	8.527	14,922	0.161	0	14,922	0	14,922
2034	0	1,750	8.783	15,370	0.165	0	15,370	0	15,370
2035	0	1,750	9.046	15,830	0.170	0	15,830	0	15,830
2036	0	1,750	9.317	16,304	0.175	0	16,304	0	16,304
2037	0	1,750	9.597	16,795	0.181	0	16,795	0	16,795
2038	0	1,750	9.885	17,298	0.186	0	17,298	0	17,298
2039	0	1,750	10.181	17,818	0.192	0	17,818	0	17,818
2040	0	1,750	10.487	18,352	0.197	0	18,352	0	18,352
2041	0	1,750	10.801	18,903	0.203	0	18,903	0	18,903
2042	0	1,750	11.125	19,469	0.209	0	19,469	0	19,469
2043	0	1,750	11.459	20,053	0.216	0	20,053	0	20,053
2044	0	1,750	11.803	20,655	0.222	0	20,655	0	20,655
2045	0	1,750	12.157	21,275	0.229	0	21,275	0	21,275
2046	0	1,750	12.522	21,914	0.236	0	21,914	0	21,914
2047	0	1,166	12.897	15,038	0.243	0	15,038	0	15,038
2048	0	584	13.284	7,758	0.250	0	7,758	0	7,758
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		35,000					$375,964	$63,150	$312,814
						NPV =	$147,687	$56,861	90,826

Total NPV =	$90,826
Benefit/Cost Ratio =	2.60

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

Table 5
Total Resource Cost Test

Compai **Montana-Dakota Utilities Co.**
Project: **Total Commercial Furnaces - South Dakota**

	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)
2027	$2,055	$1,074	$0	$3,129	$11,601	$11,050	$22,651	($19,522)
2028	4,226	2,135	0	6,361	11,619	11,050	22,669	(16,308)
2029	6,532	3,239	0	9,771	11,637	11,050	22,687	(12,916)
2030	6,729	3,273	0	10,002	0	0	0	10,002
2031	6,931	3,308	0	10,239	0	0	0	10,239
2032	7,138	3,342	0	10,480	0	0	0	10,480
2033	7,352	3,377	0	10,729	0	0	0	10,729
2034	7,572	3,414	0	10,986	0	0	0	10,986
2035	7,800	3,448	0	11,248	0	0	0	11,248
2036	8,034	3,483	0	11,517	0	0	0	11,517
2037	8,275	3,517	0	11,792	0	0	0	11,792
2038	8,523	3,552	0	12,075	0	0	0	12,075
2039	8,780	3,589	0	12,369	0	0	0	12,369
2040	9,042	3,623	0	12,665	0	0	0	12,665
2041	9,314	3,658	0	12,972	0	0	0	12,972
2042	9,593	3,692	0	13,285	0	0	0	13,285
2043	9,880	3,727	0	13,607	0	0	0	13,607
2044	10,178	3,764	0	13,942	0	0	0	13,942
2045	10,483	3,798	0	14,281	0	0	0	14,281
2046	10,798	3,850	0	14,648	0	0	0	14,648
2047	7,410	2,575	0	9,985	0	0	0	9,985
2048	3,822	1,322	0	5,144	0	0	0	5,144
2049	0	0	0	0	0	0	0	0
			Total =	$241,227			$68,007	$173,220
			NPV =	$121,201			$63,647	57,554

Total NPV = $57,554
Benefit/Cost Ratio = 1.90

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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%-96.9% AFUE Furnace - New**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$120	$120	$123
16b) Incentive Costs =	750	750	750
16c) Total Utility Project Costs =	$870	$870	$873
17) Direct Participant Costs ($/Part.) =	$165	$165	$165
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	6.100	6.100	6.100
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	5	5	5
24) Total Annual Dk Saved =	31	31	31
25) Incentive/Participant =	$150	$150	$150
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$2,703	1.75
Utility Cost Test	$3,884	2.59
Societal Test	$15,570	6.61
Participant Test	$6,141	3.76
Total Resource Cost Test	$3,673	2.38

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95%-96.9% 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	2027	31	$3.518	$109	$0.000	$0	$109	0.3	$182	$55	$164	$1.182	$29	$120	$750	$899	($735)
2	2028	61	3.624	221	0.000	0	221	0.6	184	110	331	1.218	59	120	750	929	(598)
3	2029	92	3.733	343	0.000	0	343	0.9	185	167	510	1.254	91	123	750	964	(454)
4	2030	92	3.845	354	0.000	0	354	0.9	187	168	522	1.292	94	0	0	94	428
5	2031	92	3.960	364	0.000	0	364	0.9	189	170	534	1.331	97	0	0	97	437
6	2032	92	4.079	375	0.000	0	375	0.9	191	172	547	1.371	100	0	0	100	447
7	2033	92	4.201	386	0.000	0	386	0.9	193	174	560	1.412	103	0	0	103	457
8	2034	92	4.327	398	0.000	0	398	0.9	195	176	574	1.454	106	0	0	106	468
9	2035	92	4.457	410	0.000	0	410	0.9	197	177	587	1.498	109	0	0	109	478
10	2036	92	4.591	422	0.000	0	422	0.9	199	179	601	1.543	112	0	0	112	489
11	2037	92	4.729	435	0.000	0	435	0.9	201	181	616	1.589	115	0	0	115	501
12	2038	92	4.870	448	0.000	0	448	0.9	203	183	631	1.637	119	0	0	119	512
13	2039	92	5.017	462	0.000	0	462	0.9	205	185	647	1.686	123	0	0	123	524
14	2040	92	5.167	475	0.000	0	475	0.9	207	186	661	1.736	126	0	0	126	535
15	2041	92	5.322	490	0.000	0	490	0.9	209	188	678	1.789	130	0	0	130	548
16	2042	92	5.482	504	0.000	0	504	0.9	211	190	694	1.842	134	0	0	134	560
17	2043	92	5.646	519	0.000	0	519	0.9	213	192	711	1.897	138	0	0	138	573
18	2044	92	5.816	535	0.000	0	535	0.9	215	194	729	1.954	142	0	0	142	587
19	2045	92	5.990	551	0.000	0	551	0.9	217	195	746	2.013	146	0	0	146	600
20	2046	92	6.170	568	0.000	0	568	0.9	220	198	766	2.073	151	0	0	151	615
21	2047	61	6.355	388	0.000	0	388	0.6	222	133	521	2.136	103	0	0	103	418
22	2048	31	6.545	203	0.000	0	203	0.3	224	67	270	2.200	54	0	0	54	216
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	1,840									$12,600					$4,994	$7,606
									NPV =		$6,329					$3,626	$2,703

Total NPV = $2,703
Benefit/Cost Ratio = 1.75

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 95%-96.9% 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)
2027	$109	$55	$164	$120	$750	$870	($706)
2028	221	110	331	120	750	870	(539)
2029	343	167	510	123	750	873	(363)
2030	354	168	522	0	0	0	522
2031	364	170	534	0	0	0	534
2032	375	172	547	0	0	0	547
2033	386	174	560	0	0	0	560
2034	398	176	574	0	0	0	574
2035	410	177	587	0	0	0	587
2036	422	179	601	0	0	0	601
2037	435	181	616	0	0	0	616
2038	448	183	631	0	0	0	631
2039	462	185	647	0	0	0	647
2040	475	186	661	0	0	0	661
2041	490	188	678	0	0	0	678
2042	504	190	694	0	0	0	694
2043	519	192	711	0	0	0	711
2044	535	194	729	0	0	0	729
2045	551	195	746	0	0	0	746
2046	568	198	766	0	0	0	766
2047	388	133	521	0	0	0	521
2048	203	67	270	0	0	0	270
2049	0	0	0	0	0	0	0
Total =			$12,600			$2,613	$9,987
		NPV =	$6,329			$2,445	$3,884

Total NPV = $3,884
Benefit/Cost Ratio = 2.59

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%-96.9% 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)
2027	$109	$55	$0.030	$0	$4.614	$143	$307	$870	$75	$945	($638)
2028	221	110	0.031	0	4.721	288	619	870	75	945	(326)
2029	343	167	0.032	0	4.830	444	954	873	75	948	6
2030	354	168	0.033	0	4.941	455	977	0	0	0	977
2031	364	170	0.034	0	5.056	465	999	0	0	0	999
2032	375	172	0.035	0	5.172	476	1,023	0	0	0	1,023
2033	386	174	0.036	0	5.292	487	1,047	0	0	0	1,047
2034	398	176	0.037	0	5.414	498	1,072	0	0	0	1,072
2035	410	177	0.039	0	5.539	510	1,097	0	0	0	1,097
2036	422	179	0.040	0	5.667	521	1,122	0	0	0	1,122
2037	435	181	0.041	0	5.798	533	1,149	0	0	0	1,149
2038	448	183	0.042	0	5.932	546	1,177	0	0	0	1,177
2039	462	185	0.043	0	6.069	558	1,205	0	0	0	1,205
2040	475	186	0.045	0	6.209	571	1,232	0	0	0	1,232
2041	490	188	0.046	0	6.353	584	1,262	0	0	0	1,262
2042	504	190	0.047	0	6.499	598	1,292	0	0	0	1,292
2043	519	192	0.049	0	6.649	612	1,323	0	0	0	1,323
2044	535	194	0.050	0	6.803	626	1,355	0	0	0	1,355
2045	551	195	0.052	0	6.960	640	1,386	0	0	0	1,386
2046	568	198	0.053	0	7.121	655	1,421	0	0	0	1,421
2047	388	133	0.055	0	7.285	444	965	0	0	0	965
2048	203	67	0.057	0	7.454	231	501	0	0	0	501
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$23,485			$2,838	$20,647
						NPV =	$18,345			$2,775	$15,570

Total NPV = $15,570
Benefit/Cost Ratio = 6.61

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%-96.9% 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)
2027	$750	31	$7.141	$221	$0.134	$0	$971	$825	$146
2028	750	61	7.355	449	0.138	0	1,199	825	374
2029	750	92	7.576	697	0.143	0	1,447	825	622
2030	0	92	7.803	718	0.147	0	718	0	718
2031	0	92	8.037	739	0.151	0	739	0	739
2032	0	92	8.278	762	0.156	0	762	0	762
2033	0	92	8.527	784	0.161	0	784	0	784
2034	0	92	8.783	808	0.165	0	808	0	808
2035	0	92	9.046	832	0.170	0	832	0	832
2036	0	92	9.317	857	0.175	0	857	0	857
2037	0	92	9.597	883	0.181	0	883	0	883
2038	0	92	9.885	909	0.186	0	909	0	909
2039	0	92	10.181	937	0.192	0	937	0	937
2040	0	92	10.487	965	0.197	0	965	0	965
2041	0	92	10.801	994	0.203	0	994	0	994
2042	0	92	11.125	1,024	0.209	0	1,024	0	1,024
2043	0	92	11.459	1,054	0.216	0	1,054	0	1,054
2044	0	92	11.803	1,086	0.222	0	1,086	0	1,086
2045	0	92	12.157	1,118	0.229	0	1,118	0	1,118
2046	0	92	12.522	1,152	0.236	0	1,152	0	1,152
2047	0	61	12.897	787	0.243	0	787	0	787
2048	0	31	13.284	412	0.250	0	412	0	412
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		1,840					$20,438	$2,475	$17,963
						NPV =	$8,370	$2,229	6,141

Total NPV = $6,141
Benefit/Cost Ratio = 3.76

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Commercial 95%-96.9% 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)
2027	$109	$55	$0	$164	$870	$75	$945	($781)
2028	221	110	0	331	870	75	945	(614)
2029	343	167	0	510	873	75	948	(438)
2030	354	168	0	522	0	0	0	522
2031	364	170	0	534	0	0	0	534
2032	375	172	0	547	0	0	0	547
2033	386	174	0	560	0	0	0	560
2034	398	176	0	574	0	0	0	574
2035	410	177	0	587	0	0	0	587
2036	422	179	0	601	0	0	0	601
2037	435	181	0	616	0	0	0	616
2038	448	183	0	631	0	0	0	631
2039	462	185	0	647	0	0	0	647
2040	475	186	0	661	0	0	0	661
2041	490	188	0	678	0	0	0	678
2042	504	190	0	694	0	0	0	694
2043	519	192	0	711	0	0	0	711
2044	535	194	0	729	0	0	0	729
2045	551	195	0	746	0	0	0	746
2046	568	198	0	766	0	0	0	766
2047	388	133	0	521	0	0	0	521
2048	203	67	0	270	0	0	0	270
2049	0	0	0	0	0	0	0	0
			Total =	$12,600			$2,838	$9,762
			NPV =	$6,329			$2,656	3,673

Total NPV = $3,673
Benefit/Cost Ratio = 2.38

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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%-96.9% AFUE Furnace - Replacement**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$481	$486	$491
16b) Incentive Costs =	3,000	3,000	3,000
16c) Total Utility Project Costs =	$3,481	$3,486	$3,491
17) Direct Participant Costs ($/Part.) =	$736	$736	$736
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	23.700	23.700	23.700
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	10	10	10
24) Total Annual Dk Saved =	237	237	237
25) Incentive/Participant =	$300	$300	$300
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$30,317	2.60
Utility Cost Test	$39,434	5.03
Societal Test	$119,238	6.18
Participant Test	$37,251	2.87
Total Resource Cost Test	$27,192	2.23

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 95%-96.9% 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	2027	237	$3.518	$834	$0.000	$0	$834	2.4	$182	$437	$1,271	$1.182	$221	$481	$3,000	$3,702	($2,431)
2	2028	474	3.624	1,718	0.000	0	1,718	4.7	184	865	2,583	1.218	456	486	3,000	3,942	(1,359)
3	2029	711	3.733	2,654	0.000	0	2,654	7.1	185	1,314	3,968	1.254	704	491	3,000	4,195	(227)
4	2030	711	3.845	2,734	0.000	0	2,734	7.1	187	1,328	4,062	1.292	726	0	0	726	3,336
5	2031	711	3.960	2,816	0.000	0	2,816	7.1	189	1,342	4,158	1.331	748	0	0	748	3,410
6	2032	711	4.079	2,900	0.000	0	2,900	7.1	191	1,356	4,256	1.371	770	0	0	770	3,486
7	2033	711	4.201	2,987	0.000	0	2,987	7.1	193	1,370	4,357	1.412	793	0	0	793	3,564
8	2034	711	4.327	3,076	0.000	0	3,076	7.1	195	1,385	4,461	1.454	817	0	0	817	3,644
9	2035	711	4.457	3,169	0.000	0	3,169	7.1	197	1,399	4,568	1.498	841	0	0	841	3,727
10	2036	711	4.591	3,264	0.000	0	3,264	7.1	199	1,413	4,677	1.543	867	0	0	867	3,810
11	2037	711	4.729	3,362	0.000	0	3,362	7.1	201	1,427	4,789	1.589	893	0	0	893	3,896
12	2038	711	4.870	3,463	0.000	0	3,463	7.1	203	1,441	4,904	1.637	919	0	0	919	3,985
13	2039	711	5.017	3,567	0.000	0	3,567	7.1	205	1,456	5,023	1.686	947	0	0	947	4,076
14	2040	711	5.167	3,674	0.000	0	3,674	7.1	207	1,470	5,144	1.736	975	0	0	975	4,169
15	2041	711	5.322	3,784	0.000	0	3,784	7.1	209	1,484	5,268	1.789	1,005	0	0	1,005	4,263
16	2042	711	5.482	3,898	0.000	0	3,898	7.1	211	1,498	5,396	1.842	1,035	0	0	1,035	4,361
17	2043	711	5.646	4,014	0.000	0	4,014	7.1	213	1,512	5,526	1.897	1,066	0	0	1,066	4,460
18	2044	711	5.816	4,135	0.000	0	4,135	7.1	215	1,527	5,662	1.954	1,098	0	0	1,098	4,564
19	2045	711	5.990	4,259	0.000	0	4,259	7.1	217	1,541	5,800	2.013	1,131	0	0	1,131	4,669
20	2046	711	6.170	4,387	0.000	0	4,387	7.1	220	1,562	5,949	2.073	1,164	0	0	1,164	4,785
21	2047	474	6.355	3,012	0.000	0	3,012	4.7	222	1,043	4,055	2.136	800	0	0	800	3,255
22	2048	237	6.545	1,551	0.000	0	1,551	2.4	224	538	2,089	2.200	412	0	0	412	1,677
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	14,220									$97,966					$28,846	$69,120
									NPV =		$49,221					$18,904	$30,317

Total NPV = $30,317
Benefit/Cost Ratio = 2.60

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 95%-96.9% 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)
2027	$834	$437	$1,271	$481	$3,000	$3,481	($2,210)
2028	1,718	865	2,583	486	3,000	3,486	(903)
2029	2,654	1,314	3,968	491	3,000	3,491	477
2030	2,734	1,328	4,062	0	0	0	4,062
2031	2,816	1,342	4,158	0	0	0	4,158
2032	2,900	1,356	4,256	0	0	0	4,256
2033	2,987	1,370	4,357	0	0	0	4,357
2034	3,076	1,385	4,461	0	0	0	4,461
2035	3,169	1,399	4,568	0	0	0	4,568
2036	3,264	1,413	4,677	0	0	0	4,677
2037	3,362	1,427	4,789	0	0	0	4,789
2038	3,463	1,441	4,904	0	0	0	4,904
2039	3,567	1,456	5,023	0	0	0	5,023
2040	3,674	1,470	5,144	0	0	0	5,144
2041	3,784	1,484	5,268	0	0	0	5,268
2042	3,898	1,498	5,396	0	0	0	5,396
2043	4,014	1,512	5,526	0	0	0	5,526
2044	4,135	1,527	5,662	0	0	0	5,662
2045	4,259	1,541	5,800	0	0	0	5,800
2046	4,387	1,562	5,949	0	0	0	5,949
2047	3,012	1,043	4,055	0	0	0	4,055
2048	1,551	538	2,089	0	0	0	2,089
2049	0	0	0	0	0	0	0
Total =			$97,966			$10,458	$87,508
		NPV =	$49,221			$9,787	$39,434

Total NPV =	$39,434
Benefit/Cost Ratio =	5.03

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%-96.9% 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)
2027	$834	$437	$0.030	$0	$4.614	$1,094	$2,365	$3,481	$4,360	$7,841	($5,476)
2028	1,718	865	0.031	0	4.721	2,238	4,821	3,486	4,360	7,846	(3,025)
2029	2,654	1,314	0.032	0	4.830	3,434	7,402	3,491	4,360	7,851	(449)
2030	2,734	1,328	0.033	0	4.941	3,513	7,575	0	0	0	7,575
2031	2,816	1,342	0.034	0	5.056	3,595	7,753	0	0	0	7,753
2032	2,900	1,356	0.035	0	5.172	3,677	7,933	0	0	0	7,933
2033	2,987	1,370	0.036	0	5.292	3,763	8,120	0	0	0	8,120
2034	3,076	1,385	0.037	0	5.414	3,849	8,310	0	0	0	8,310
2035	3,169	1,399	0.039	0	5.539	3,938	8,506	0	0	0	8,506
2036	3,264	1,413	0.040	0	5.667	4,029	8,706	0	0	0	8,706
2037	3,362	1,427	0.041	0	5.798	4,122	8,911	0	0	0	8,911
2038	3,463	1,441	0.042	0	5.932	4,218	9,122	0	0	0	9,122
2039	3,567	1,456	0.043	0	6.069	4,315	9,338	0	0	0	9,338
2040	3,674	1,470	0.045	0	6.209	4,415	9,559	0	0	0	9,559
2041	3,784	1,484	0.046	0	6.353	4,517	9,785	0	0	0	9,785
2042	3,898	1,498	0.047	0	6.499	4,621	10,017	0	0	0	10,017
2043	4,014	1,512	0.049	0	6.649	4,727	10,253	0	0	0	10,253
2044	4,135	1,527	0.050	0	6.803	4,837	10,499	0	0	0	10,499
2045	4,259	1,541	0.052	0	6.960	4,949	10,749	0	0	0	10,749
2046	4,387	1,562	0.053	0	7.121	5,063	11,012	0	0	0	11,012
2047	3,012	1,043	0.055	0	7.285	3,453	7,508	0	0	0	7,508
2048	1,551	538	0.057	0	7.454	1,767	3,856	0	0	0	3,856
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$182,100			$23,538	$158,562
						NPV =	$142,253			$23,015	$119,238

Total NPV = $119,238
Benefit/Cost Ratio = 6.18

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%-96.9% 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)
2027	$3,000	237	$7.141	$1,692	$0.134	$0	$4,692	$7,360	($2,668)
2028	3,000	474	7.355	3,486	0.138	0	6,486	7,360	(874)
2029	3,000	711	7.576	5,387	0.143	0	8,387	7,360	1,027
2030	0	711	7.803	5,548	0.147	0	5,548	0	5,548
2031	0	711	8.037	5,714	0.151	0	5,714	0	5,714
2032	0	711	8.278	5,886	0.156	0	5,886	0	5,886
2033	0	711	8.527	6,063	0.161	0	6,063	0	6,063
2034	0	711	8.783	6,245	0.165	0	6,245	0	6,245
2035	0	711	9.046	6,432	0.170	0	6,432	0	6,432
2036	0	711	9.317	6,624	0.175	0	6,624	0	6,624
2037	0	711	9.597	6,823	0.181	0	6,823	0	6,823
2038	0	711	9.885	7,028	0.186	0	7,028	0	7,028
2039	0	711	10.181	7,239	0.192	0	7,239	0	7,239
2040	0	711	10.487	7,456	0.197	0	7,456	0	7,456
2041	0	711	10.801	7,680	0.203	0	7,680	0	7,680
2042	0	711	11.125	7,910	0.209	0	7,910	0	7,910
2043	0	711	11.459	8,147	0.216	0	8,147	0	8,147
2044	0	711	11.803	8,392	0.222	0	8,392	0	8,392
2045	0	711	12.157	8,644	0.229	0	8,644	0	8,644
2046	0	711	12.522	8,903	0.236	0	8,903	0	8,903
2047	0	474	12.897	6,113	0.243	0	6,113	0	6,113
2048	0	237	13.284	3,148	0.250	0	3,148	0	3,148
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		14,220					$149,560	$22,080	$127,480
						NPV =	$57,132	$19,881	37,251

Total NPV = $37,251
Benefit/Cost Ratio = 2.87

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Commercial 95%-96.9% 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)
2027	$834	$437	$0	$1,271	$3,481	$4,360	$7,841	($6,570)
2028	1,718	865	0	2,583	3,486	4,360	7,846	(5,263)
2029	2,654	1,314	0	3,968	3,491	4,360	7,851	(3,883)
2030	2,734	1,328	0	4,062	0	0	0	4,062
2031	2,816	1,342	0	4,158	0	0	0	4,158
2032	2,900	1,356	0	4,256	0	0	0	4,256
2033	2,987	1,370	0	4,357	0	0	0	4,357
2034	3,076	1,385	0	4,461	0	0	0	4,461
2035	3,169	1,399	0	4,568	0	0	0	4,568
2036	3,264	1,413	0	4,677	0	0	0	4,677
2037	3,362	1,427	0	4,789	0	0	0	4,789
2038	3,463	1,441	0	4,904	0	0	0	4,904
2039	3,567	1,456	0	5,023	0	0	0	5,023
2040	3,674	1,470	0	5,144	0	0	0	5,144
2041	3,784	1,484	0	5,268	0	0	0	5,268
2042	3,898	1,498	0	5,396	0	0	0	5,396
2043	4,014	1,512	0	5,526	0	0	0	5,526
2044	4,135	1,527	0	5,662	0	0	0	5,662
2045	4,259	1,541	0	5,800	0	0	0	5,800
2046	4,387	1,562	0	5,949	0	0	0	5,949
2047	3,012	1,043	0	4,055	0	0	0	4,055
2048	1,551	538	0	2,089	0	0	0	2,089
2049	0	0	0	0	0	0	0	0
			Total =	$97,966			$23,538	$74,428
			NPV =	$49,221			$22,029	27,192

Total NPV =	$27,192
Benefit/Cost Ratio =	2.23

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 97+% AFUE Furnace - New**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$200	$202	$205
16b) Incentive Costs =	1,250	1,250	1,250
16c) Total Utility Project Costs =	$1,450	$1,452	$1,455
17) Direct Participant Costs ($/Part.) =	$477	$477	$477
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	9.100	9.100	9.100
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	5	5	5
24) Total Annual Dk Saved =	46	46	46
25) Incentive/Participant =	$250	$250	$250
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$3,719	1.64
Utility Cost Test	$5,476	2.34
Societal Test	$19,926	3.63
Participant Test	$6,380	1.99
Total Resource Cost Test	$2,289	1.32

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 97+% 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	2027	46	$3.518	$162	$0.000	$0	$162	0.5	$182	$91	$253	$1.182	$43	$200	$1,250	$1,493	($1,240)
2	2028	91	3.624	330	0.000	0	330	0.9	184	166	496	1.218	88	202	1,250	1,540	(1,044)
3	2029	137	3.733	511	0.000	0	511	1.4	185	259	770	1.254	136	205	1,250	1,591	(821)
4	2030	137	3.845	527	0.000	0	527	1.4	187	262	789	1.292	140	0	0	140	649
5	2031	137	3.960	543	0.000	0	543	1.4	189	265	808	1.331	144	0	0	144	664
6	2032	137	4.079	559	0.000	0	559	1.4	191	267	826	1.371	148	0	0	148	678
7	2033	137	4.201	576	0.000	0	576	1.4	193	270	846	1.412	153	0	0	153	693
8	2034	137	4.327	593	0.000	0	593	1.4	195	273	866	1.454	157	0	0	157	709
9	2035	137	4.457	611	0.000	0	611	1.4	197	276	887	1.498	162	0	0	162	725
10	2036	137	4.591	629	0.000	0	629	1.4	199	279	908	1.543	167	0	0	167	741
11	2037	137	4.729	648	0.000	0	648	1.4	201	281	929	1.589	172	0	0	172	757
12	2038	137	4.870	667	0.000	0	667	1.4	203	284	951	1.637	177	0	0	177	774
13	2039	137	5.017	687	0.000	0	687	1.4	205	287	974	1.686	182	0	0	182	792
14	2040	137	5.167	708	0.000	0	708	1.4	207	290	998	1.736	188	0	0	188	810
15	2041	137	5.322	729	0.000	0	729	1.4	209	293	1,022	1.789	194	0	0	194	828
16	2042	137	5.482	751	0.000	0	751	1.4	211	295	1,046	1.842	199	0	0	199	847
17	2043	137	5.646	774	0.000	0	774	1.4	213	298	1,072	1.897	205	0	0	205	867
18	2044	137	5.816	797	0.000	0	797	1.4	215	301	1,098	1.954	211	0	0	211	887
19	2045	137	5.990	821	0.000	0	821	1.4	217	304	1,125	2.013	218	0	0	218	907
20	2046	137	6.170	845	0.000	0	845	1.4	220	308	1,153	2.073	224	0	0	224	929
21	2047	91	6.355	578	0.000	0	578	0.9	222	200	778	2.136	154	0	0	154	624
22	2048	46	6.545	301	0.000	0	301	0.5	224	112	413	2.200	80	0	0	80	333
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	2,740									$19,008					$7,899	$11,109
									NPV =		$9,553					$5,834	$3,719

Total NPV = $3,719
Benefit/Cost Ratio = 1.64

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 97+% 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)
2027	$162	$91	$253	$200	$1,250	$1,450	($1,197)
2028	330	166	496	202	1,250	1,452	(956)
2029	511	259	770	205	1,250	1,455	(685)
2030	527	262	789	0	0	0	789
2031	543	265	808	0	0	0	808
2032	559	267	826	0	0	0	826
2033	576	270	846	0	0	0	846
2034	593	273	866	0	0	0	866
2035	611	276	887	0	0	0	887
2036	629	279	908	0	0	0	908
2037	648	281	929	0	0	0	929
2038	667	284	951	0	0	0	951
2039	687	287	974	0	0	0	974
2040	708	290	998	0	0	0	998
2041	729	293	1,022	0	0	0	1,022
2042	751	295	1,046	0	0	0	1,046
2043	774	298	1,072	0	0	0	1,072
2044	797	301	1,098	0	0	0	1,098
2045	821	304	1,125	0	0	0	1,125
2046	845	308	1,153	0	0	0	1,153
2047	578	200	778	0	0	0	778
2048	301	112	413	0	0	0	413
2049	0	0	0	0	0	0	0
Total =			$19,008			$4,357	$14,651
		NPV =	$9,553			$4,077	$5,476

Total NPV = $5,476
Benefit/Cost Ratio = 2.34

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 97+% 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)
2027	$162	$91	$0.030	$0	$4.614	$212	$465	$1,450	$1,135	$2,585	($2,120)
2028	330	166	0.031	0	4.721	430	926	1,452	1,135	2,587	(1,661)
2029	511	259	0.032	0	4.830	662	1,432	1,455	1,135	2,590	(1,158)
2030	527	262	0.033	0	4.941	677	1,466	0	0	0	1,466
2031	543	265	0.034	0	5.056	693	1,501	0	0	0	1,501
2032	559	267	0.035	0	5.172	709	1,535	0	0	0	1,535
2033	576	270	0.036	0	5.292	725	1,571	0	0	0	1,571
2034	593	273	0.037	0	5.414	742	1,608	0	0	0	1,608
2035	611	276	0.039	0	5.539	759	1,646	0	0	0	1,646
2036	629	279	0.040	0	5.667	776	1,684	0	0	0	1,684
2037	648	281	0.041	0	5.798	794	1,723	0	0	0	1,723
2038	667	284	0.042	0	5.932	813	1,764	0	0	0	1,764
2039	687	287	0.043	0	6.069	831	1,805	0	0	0	1,805
2040	708	290	0.045	0	6.209	851	1,849	0	0	0	1,849
2041	729	293	0.046	0	6.353	870	1,892	0	0	0	1,892
2042	751	295	0.047	0	6.499	890	1,936	0	0	0	1,936
2043	774	298	0.049	0	6.649	911	1,983	0	0	0	1,983
2044	797	301	0.050	0	6.803	932	2,030	0	0	0	2,030
2045	821	304	0.052	0	6.960	954	2,079	0	0	0	2,079
2046	845	308	0.053	0	7.121	976	2,129	0	0	0	2,129
2047	578	200	0.055	0	7.285	663	1,441	0	0	0	1,441
2048	301	112	0.057	0	7.454	343	756	0	0	0	756
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$35,221			$7,762	$27,459
						NPV =	$27,515			$7,589	$19,926

Total NPV = $19,926
Benefit/Cost Ratio = 3.63

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 97+% 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)
2027	$1,250	46	$7.141	$328	$0.134	$0	$1,578	$2,385	($807)
2028	1,250	91	7.355	669	0.138	0	1,919	2,385	(466)
2029	1,250	137	7.576	1,038	0.143	0	2,288	2,385	(97)
2030	0	137	7.803	1,069	0.147	0	1,069	0	1,069
2031	0	137	8.037	1,101	0.151	0	1,101	0	1,101
2032	0	137	8.278	1,134	0.156	0	1,134	0	1,134
2033	0	137	8.527	1,168	0.161	0	1,168	0	1,168
2034	0	137	8.783	1,203	0.165	0	1,203	0	1,203
2035	0	137	9.046	1,239	0.170	0	1,239	0	1,239
2036	0	137	9.317	1,276	0.175	0	1,276	0	1,276
2037	0	137	9.597	1,315	0.181	0	1,315	0	1,315
2038	0	137	9.885	1,354	0.186	0	1,354	0	1,354
2039	0	137	10.181	1,395	0.192	0	1,395	0	1,395
2040	0	137	10.487	1,437	0.197	0	1,437	0	1,437
2041	0	137	10.801	1,480	0.203	0	1,480	0	1,480
2042	0	137	11.125	1,524	0.209	0	1,524	0	1,524
2043	0	137	11.459	1,570	0.216	0	1,570	0	1,570
2044	0	137	11.803	1,617	0.222	0	1,617	0	1,617
2045	0	137	12.157	1,666	0.229	0	1,666	0	1,666
2046	0	137	12.522	1,716	0.236	0	1,716	0	1,716
2047	0	91	12.897	1,174	0.243	0	1,174	0	1,174
2048	0	46	13.284	611	0.250	0	611	0	611
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		2,740					$30,834	$7,155	$23,679
						NPV =	$12,823	$6,442	6,380

Total NPV = $6,380
Benefit/Cost Ratio = 1.99

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Commercial 97+% 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)
2027	$162	$91	$0	$253	$1,450	$1,135	$2,585	($2,332)
2028	330	166	0	496	1,452	1,135	2,587	(2,091)
2029	511	259	0	770	1,455	1,135	2,590	(1,820)
2030	527	262	0	789	0	0	0	789
2031	543	265	0	808	0	0	0	808
2032	559	267	0	826	0	0	0	826
2033	576	270	0	846	0	0	0	846
2034	593	273	0	866	0	0	0	866
2035	611	276	0	887	0	0	0	887
2036	629	279	0	908	0	0	0	908
2037	648	281	0	929	0	0	0	929
2038	667	284	0	951	0	0	0	951
2039	687	287	0	974	0	0	0	974
2040	708	290	0	998	0	0	0	998
2041	729	293	0	1,022	0	0	0	1,022
2042	751	295	0	1,046	0	0	0	1,046
2043	774	298	0	1,072	0	0	0	1,072
2044	797	301	0	1,098	0	0	0	1,098
2045	821	304	0	1,125	0	0	0	1,125
2046	845	308	0	1,153	0	0	0	1,153
2047	578	200	0	778	0	0	0	778
2048	301	112	0	413	0	0	0	413
2049	0	0	0	0	0	0	0	0
			Total =	$19,008			$7,762	$11,246
			NPV =	$9,553			$7,264	2,289

Total NPV =	$2,289
Benefit/Cost Ratio =	1.32

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 97+% AFUE Furnace - Replacement**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$800	$811	$818
16b) Incentive Costs =	5,000	5,000	5,000
16c) Total Utility Project Costs =	$5,800	$5,811	$5,818
17) Direct Participant Costs ($/Part.) =	$1,048	$1,048	$1,048
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	20	20	20
21) Avg. Dk/Part. Saved =	27.000	27.000	27.000
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	10	10	10
24) Total Annual Dk Saved =	270	270	270
25) Incentive/Participant =	$500	$500	$500
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$29,400	2.10
Utility Cost Test	$39,787	3.44
Societal Test	$128,979	4.89
Participant Test	$41,053	2.45
Total Resource Cost Test	$24,400	1.77

Table 1
Ratepayer Impact Measure Test

Company: **Montana-Dakota Utilities Co.**
Project: **Commercial 97+% 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	2027	270	$3.518	$950	$0.000	$0	$950	2.7	$182	$491	$1,441	$1.182	$252	$800	$5,000	$6,052	($4,611)
2	2028	540	3.624	1,957	0.000	0	1,957	5.4	184	994	2,951	1.218	520	811	5,000	6,331	(3,380)
3	2029	810	3.733	3,024	0.000	0	3,024	8.1	185	1,499	4,523	1.254	802	818	5,000	6,620	(2,097)
4	2030	810	3.845	3,114	0.000	0	3,114	8.1	187	1,515	4,629	1.292	827	0	0	827	3,802
5	2031	810	3.960	3,208	0.000	0	3,208	8.1	189	1,531	4,739	1.331	852	0	0	852	3,887
6	2032	810	4.079	3,304	0.000	0	3,304	8.1	191	1,547	4,851	1.371	877	0	0	877	3,974
7	2033	810	4.201	3,403	0.000	0	3,403	8.1	193	1,563	4,966	1.412	904	0	0	904	4,062
8	2034	810	4.327	3,505	0.000	0	3,505	8.1	195	1,580	5,085	1.454	930	0	0	930	4,155
9	2035	810	4.457	3,610	0.000	0	3,610	8.1	197	1,596	5,206	1.498	959	0	0	959	4,247
10	2036	810	4.591	3,719	0.000	0	3,719	8.1	199	1,612	5,331	1.543	987	0	0	987	4,344
11	2037	810	4.729	3,830	0.000	0	3,830	8.1	201	1,628	5,458	1.589	1,017	0	0	1,017	4,441
12	2038	810	4.870	3,945	0.000	0	3,945	8.1	203	1,644	5,589	1.637	1,048	0	0	1,048	4,541
13	2039	810	5.017	4,064	0.000	0	4,064	8.1	205	1,661	5,725	1.686	1,079	0	0	1,079	4,646
14	2040	810	5.167	4,185	0.000	0	4,185	8.1	207	1,677	5,862	1.736	1,111	0	0	1,111	4,751
15	2041	810	5.322	4,311	0.000	0	4,311	8.1	209	1,693	6,004	1.789	1,145	0	0	1,145	4,859
16	2042	810	5.482	4,440	0.000	0	4,440	8.1	211	1,709	6,149	1.842	1,179	0	0	1,179	4,970
17	2043	810	5.646	4,573	0.000	0	4,573	8.1	213	1,725	6,298	1.897	1,214	0	0	1,214	5,084
18	2044	810	5.816	4,711	0.000	0	4,711	8.1	215	1,742	6,453	1.954	1,250	0	0	1,250	5,203
19	2045	810	5.990	4,852	0.000	0	4,852	8.1	217	1,758	6,610	2.013	1,288	0	0	1,288	5,322
20	2046	810	6.170	4,998	0.000	0	4,998	8.1	220	1,782	6,780	2.073	1,327	0	0	1,327	5,453
21	2047	540	6.355	3,432	0.000	0	3,432	5.4	222	1,199	4,631	2.136	911	0	0	911	3,720
22	2048	270	6.545	1,767	0.000	0	1,767	2.7	224	605	2,372	2.200	469	0	0	469	1,903
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	16,200									$111,653					$38,377	$73,276
									NPV =		$56,098					$26,697	$29,400

Total NPV = $29,400
Benefit/Cost Ratio = 2.10

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 97+% 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)
2027	$950	$491	$1,441	$800	$5,000	$5,800	($4,359)
2028	1,957	994	2,951	811	5,000	5,811	(2,860)
2029	3,024	1,499	4,523	818	5,000	5,818	(1,295)
2030	3,114	1,515	4,629	0	0	0	4,629
2031	3,208	1,531	4,739	0	0	0	4,739
2032	3,304	1,547	4,851	0	0	0	4,851
2033	3,403	1,563	4,966	0	0	0	4,966
2034	3,505	1,580	5,085	0	0	0	5,085
2035	3,610	1,596	5,206	0	0	0	5,206
2036	3,719	1,612	5,331	0	0	0	5,331
2037	3,830	1,628	5,458	0	0	0	5,458
2038	3,945	1,644	5,589	0	0	0	5,589
2039	4,064	1,661	5,725	0	0	0	5,725
2040	4,185	1,677	5,862	0	0	0	5,862
2041	4,311	1,693	6,004	0	0	0	6,004
2042	4,440	1,709	6,149	0	0	0	6,149
2043	4,573	1,725	6,298	0	0	0	6,298
2044	4,711	1,742	6,453	0	0	0	6,453
2045	4,852	1,758	6,610	0	0	0	6,610
2046	4,998	1,782	6,780	0	0	0	6,780
2047	3,432	1,199	4,631	0	0	0	4,631
2048	1,767	605	2,372	0	0	0	2,372
2049	0	0	0	0	0	0	0
Total =			$111,653			$17,429	$94,224
		NPV =	$56,098			$16,311	$39,787

Total NPV = $39,787
Benefit/Cost Ratio = 3.44

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 97+% 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)
2027	$950	$491	$0.030	$0	$4.614	$1,246	$2,687	$5,800	$5,480	$11,280	($8,593)
2028	1,957	994	0.031	0	4.721	2,549	5,500	5,811	5,480	11,291	(5,791)
2029	3,024	1,499	0.032	0	4.830	3,912	8,435	5,818	5,480	11,298	(2,863)
2030	3,114	1,515	0.033	0	4.941	4,002	8,631	0	0	0	8,631
2031	3,208	1,531	0.034	0	5.056	4,095	8,834	0	0	0	8,834
2032	3,304	1,547	0.035	0	5.172	4,189	9,040	0	0	0	9,040
2033	3,403	1,563	0.036	0	5.292	4,287	9,253	0	0	0	9,253
2034	3,505	1,580	0.037	0	5.414	4,385	9,470	0	0	0	9,470
2035	3,610	1,596	0.039	0	5.539	4,487	9,693	0	0	0	9,693
2036	3,719	1,612	0.040	0	5.667	4,590	9,921	0	0	0	9,921
2037	3,830	1,628	0.041	0	5.798	4,696	10,154	0	0	0	10,154
2038	3,945	1,644	0.042	0	5.932	4,805	10,394	0	0	0	10,394
2039	4,064	1,661	0.043	0	6.069	4,916	10,641	0	0	0	10,641
2040	4,185	1,677	0.045	0	6.209	5,029	10,891	0	0	0	10,891
2041	4,311	1,693	0.046	0	6.353	5,146	11,150	0	0	0	11,150
2042	4,440	1,709	0.047	0	6.499	5,264	11,413	0	0	0	11,413
2043	4,573	1,725	0.049	0	6.649	5,386	11,684	0	0	0	11,684
2044	4,711	1,742	0.050	0	6.803	5,510	11,963	0	0	0	11,963
2045	4,852	1,758	0.052	0	6.960	5,638	12,248	0	0	0	12,248
2046	4,998	1,782	0.053	0	7.121	5,768	12,548	0	0	0	12,548
2047	3,432	1,199	0.055	0	7.285	3,934	8,565	0	0	0	8,565
2048	1,767	605	0.057	0	7.454	2,013	4,385	0	0	0	4,385
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$207,500			$33,869	$173,631
						NPV =	$162,095			$33,116	$128,979

Total NPV = $128,979
Benefit/Cost Ratio = 4.89

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 97+% 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)
2027	$5,000	270	$7.141	$1,928	$0.134	$0	$6,928	$10,480	($3,552)
2028	5,000	540	7.355	3,972	0.138	0	8,972	10,480	(1,508)
2029	5,000	810	7.576	6,137	0.143	0	11,137	10,480	657
2030	0	810	7.803	6,320	0.147	0	6,320	0	6,320
2031	0	810	8.037	6,510	0.151	0	6,510	0	6,510
2032	0	810	8.278	6,705	0.156	0	6,705	0	6,705
2033	0	810	8.527	6,907	0.161	0	6,907	0	6,907
2034	0	810	8.783	7,114	0.165	0	7,114	0	7,114
2035	0	810	9.046	7,327	0.170	0	7,327	0	7,327
2036	0	810	9.317	7,547	0.175	0	7,547	0	7,547
2037	0	810	9.597	7,774	0.181	0	7,774	0	7,774
2038	0	810	9.885	8,007	0.186	0	8,007	0	8,007
2039	0	810	10.181	8,247	0.192	0	8,247	0	8,247
2040	0	810	10.487	8,494	0.197	0	8,494	0	8,494
2041	0	810	10.801	8,749	0.203	0	8,749	0	8,749
2042	0	810	11.125	9,011	0.209	0	9,011	0	9,011
2043	0	810	11.459	9,282	0.216	0	9,282	0	9,282
2044	0	810	11.803	9,560	0.222	0	9,560	0	9,560
2045	0	810	12.157	9,847	0.229	0	9,847	0	9,847
2046	0	810	12.522	10,143	0.236	0	10,143	0	10,143
2047	0	540	12.897	6,964	0.243	0	6,964	0	6,964
2048	0	270	13.284	3,587	0.250	0	3,587	0	3,587
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		16,200					$175,132	$31,440	$143,692
						NPV =	$69,362	$28,309	41,053

Total NPV = $41,053
Benefit/Cost Ratio = 2.45

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

Table 5
Total Resource Cost Test

Compar **Montana-Dakota Utilities Co.**
Project: **Commercial 97+% 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)
2027	$950	$491	$0	$1,441	$5,800	$5,480	$11,280	($9,839)
2028	1,957	994	0	2,951	5,811	5,480	11,291	(8,340)
2029	3,024	1,499	0	4,523	5,818	5,480	11,298	(6,775)
2030	3,114	1,515	0	4,629	0	0	0	4,629
2031	3,208	1,531	0	4,739	0	0	0	4,739
2032	3,304	1,547	0	4,851	0	0	0	4,851
2033	3,403	1,563	0	4,966	0	0	0	4,966
2034	3,505	1,580	0	5,085	0	0	0	5,085
2035	3,610	1,596	0	5,206	0	0	0	5,206
2036	3,719	1,612	0	5,331	0	0	0	5,331
2037	3,830	1,628	0	5,458	0	0	0	5,458
2038	3,945	1,644	0	5,589	0	0	0	5,589
2039	4,064	1,661	0	5,725	0	0	0	5,725
2040	4,185	1,677	0	5,862	0	0	0	5,862
2041	4,311	1,693	0	6,004	0	0	0	6,004
2042	4,440	1,709	0	6,149	0	0	0	6,149
2043	4,573	1,725	0	6,298	0	0	0	6,298
2044	4,711	1,742	0	6,453	0	0	0	6,453
2045	4,852	1,758	0	6,610	0	0	0	6,610
2046	4,998	1,782	0	6,780	0	0	0	6,780
2047	3,432	1,199	0	4,631	0	0	0	4,631
2048	1,767	605	0	2,372	0	0	0	2,372
2049	0	0	0	0	0	0	0	0
			Total =	$111,653			$33,869	$77,784
			NPV =	$56,098			$31,698	24,400

Total NPV =	$24,400
Benefit/Cost Ratio =	1.77

Worksheet Calculations
(A) = Table 1 (F)
(B) = Table 1 (I)
(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 Efficiency**
Program Years: **2027 - 2029**

Input Data	
1) Retail Rate ($/Dk) =	$6.933
Escalation Rate =	3.00%
2) Non-Gas Fuel Retail Rate ($/Fuel Unit) =	$0.13053
Escalation Rate =	3.00%
Non-Gas Fuel Units (ie. kWh,Gallons, etc) =	Kwh
3) Commodity Cost ($/Dk) =	$3.416
Escalation Rate =	3.00%
4) Demand Cost ($/Unit/Yr) =	$180.00
Escalation Rate =	1.00%
5) Peak Reduction Factor =	1.000%
6) Variable O&M ($/Dk) =	$0.000
Escalation Rate =	0.00%
7) Non-Gas Fuel Cost ($/Fuel Unit) =	$0.02730
Escalation Rate =	3.00%
8) Non-Gas Fuel Loss Factor	7.72%
9) Gas Environmental Damage Factor =	$4.510
Escalation Rate =	2.31%
10) Non Gas Fuel Environmental Damage Factor =	$0.000
Escalation Rate =	0.00%
11) Participant Discount Rate =	11.50%
12) Utility Discount Rate =	7.01%
13) Societal Discount Rate =	2.29%
14) General Input Data Year =	2026
15) Project Analysis Year 1 =	2027
Project Analysis Year 2 =	2028
Project Analysis Year 3 =	2029

	First Year	Second Year	Third Year
16) Utility Project Costs			
16a) Administrative & Operating Costs =	$959	$974	$987
16b) Incentive Costs =	6,000	6,000	6,000
16c) Total Utility Project Costs =	$6,959	$6,974	$6,987
17) Direct Participant Costs ($/Part.) =	$15,000	$15,000	$15,000
18) Participant Non-Energy Costs (Annual $/Part.) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
19) Participant Non-Energy Savings (Annual $/Part) =	$0	$0	$0
Escalation Rate =	0.00%	0.00%	0.00%
20) Project Life (Years) =	15	15	15
21) Avg. Dk/Part. Saved =	500.000	500.000	500.000
22) Avg Non-Gas Fuel Units/Part. Saved =	0	0	0
22a) Avg Additional Non-Gas Fuel Units/ Part. Used =	0	0	0
23) Number of Participants =	3	3	3
24) Total Annual Dk Saved =	1,500	1,500	1,500
25) Incentive/Participant =	$2,000	$2,000	$2,000
26) Distribution Delivery Charge			$1.148
27) Effective Income Tax Rate = (Federal & State Taxes)			21.000%

Test Results	NPV	B/C
Ratepayer Impact Measure Test	$190,563	3.86
Utility Cost Test	$237,674	13.14
Societal Test	$539,271	5.00
Participant Test	$166,086	2.37
Total Resource Cost Test	$128,171	1.99

Table 1
Ratepayer Impact Measure Test

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

		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	2027	1,500	$3.518	$5,277	$0.000	$0	$5,277	15.0	$182	$2,730	$8,007	$1.182	$1,401	$959	$6,000	$8,360	($353)
2	2028	3,000	3.624	10,872	0.000	0	10,872	30.0	184	5,520	16,392	1.218	2,887	974	6,000	9,861	6,531
3	2029	4,500	3.733	16,799	0.000	0	16,799	45.0	185	8,325	25,124	1.254	4,458	987	6,000	11,445	13,679
4	2030	4,500	3.845	17,303	0.000	0	17,303	45.0	187	8,415	25,718	1.292	4,593	0	0	4,593	21,125
5	2031	4,500	3.960	17,820	0.000	0	17,820	45.0	189	8,505	26,325	1.331	4,732	0	0	4,732	21,593
6	2032	4,500	4.079	18,356	0.000	0	18,356	45.0	191	8,595	26,951	1.371	4,874	0	0	4,874	22,077
7	2033	4,500	4.201	18,905	0.000	0	18,905	45.0	193	8,685	27,590	1.412	5,020	0	0	5,020	22,570
8	2034	4,500	4.327	19,472	0.000	0	19,472	45.0	195	8,775	28,247	1.454	5,169	0	0	5,169	23,078
9	2035	4,500	4.457	20,057	0.000	0	20,057	45.0	197	8,865	28,922	1.498	5,325	0	0	5,325	23,597
10	2036	4,500	4.591	20,660	0.000	0	20,660	45.0	199	8,955	29,615	1.543	5,485	0	0	5,485	24,130
11	2037	4,500	4.729	21,281	0.000	0	21,281	45.0	201	9,045	30,326	1.589	5,649	0	0	5,649	24,677
12	2038	4,500	4.870	21,915	0.000	0	21,915	45.0	203	9,135	31,050	1.637	5,820	0	0	5,820	25,230
13	2039	4,500	5.017	22,577	0.000	0	22,577	45.0	205	9,225	31,802	1.686	5,994	0	0	5,994	25,808
14	2040	4,500	5.167	23,252	0.000	0	23,252	45.0	207	9,315	32,567	1.736	6,171	0	0	6,171	26,396
15	2041	4,500	5.322	23,949	0.000	0	23,949	45.0	209	9,405	33,354	1.789	6,360	0	0	6,360	26,994
16	2042	3,000	5.482	16,446	0.000	0	16,446	30.0	211	6,330	22,776	1.842	4,366	0	0	4,366	18,410
17	2043	1,500	5.646	8,469	0.000	0	8,469	15.0	213	3,195	11,664	1.897	2,248	0	0	2,248	9,416
18	2044	0	5.816	0	0.000	0	0	0.0	215	0	0	1.954	0	0	0	0	0
19	2045	0	5.990	0	0.000	0	0	0.0	217	0	0	2.013	0	0	0	0	0
20	2046	0	6.170	0	0.000	0	0	0.0	220	0	0	2.073	0	0	0	0	0
21	2047	0	6.355	0	0.000	0	0	0.0	222	0	0	2.136	0	0	0	0	0
22	2048	0	6.545	0	0.000	0	0	0.0	224	0	0	2.200	0	0	0	0	0
23	2049	0	6.742	0	0.000	0	0	0.0	226	0	0	2.266	0	0	0	0	0
	Total =	67,500									$436,430					$101,472	$334,958
									NPV =		$257,252					$66,689	$190,563

Total NPV = $190,563
Benefit/Cost Ratio = 3.86

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 Efficiency**

	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)
2027	$5,277	$2,730	$8,007	$959	$6,000	$6,959	$1,048
2028	10,872	5,520	16,392	974	6,000	6,974	9,418
2029	16,799	8,325	25,124	987	6,000	6,987	18,137
2030	17,303	8,415	25,718	0	0	0	25,718
2031	17,820	8,505	26,325	0	0	0	26,325
2032	18,356	8,595	26,951	0	0	0	26,951
2033	18,905	8,685	27,590	0	0	0	27,590
2034	19,472	8,775	28,247	0	0	0	28,247
2035	20,057	8,865	28,922	0	0	0	28,922
2036	20,660	8,955	29,615	0	0	0	29,615
2037	21,281	9,045	30,326	0	0	0	30,326
2038	21,915	9,135	31,050	0	0	0	31,050
2039	22,577	9,225	31,802	0	0	0	31,802
2040	23,252	9,315	32,567	0	0	0	32,567
2041	23,949	9,405	33,354	0	0	0	33,354
2042	16,446	6,330	22,776	0	0	0	22,776
2043	8,469	3,195	11,664	0	0	0	11,664
2044	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0
Total =			$436,430			$20,920	$415,510
		NPV =	$257,252			$19,578	$237,674

Total NPV = $237,674
Benefit/Cost Ratio = 13.14

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 Efficiency**

	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)
2027	$5,277	$2,730	$0.030	$0	$4.614	$6,921	$14,928	$6,959	$39,000	$45,959	($31,031)
2028	10,872	5,520	0.031	0	4.721	14,163	30,555	6,974	39,000	45,974	(15,419)
2029	16,799	8,325	0.032	0	4.830	21,735	46,859	6,987	39,000	45,987	872
2030	17,303	8,415	0.033	0	4.941	22,235	47,953	0	0	0	47,953
2031	17,820	8,505	0.034	0	5.056	22,752	49,077	0	0	0	49,077
2032	18,356	8,595	0.035	0	5.172	23,274	50,225	0	0	0	50,225
2033	18,905	8,685	0.036	0	5.292	23,814	51,404	0	0	0	51,404
2034	19,472	8,775	0.037	0	5.414	24,363	52,610	0	0	0	52,610
2035	20,057	8,865	0.039	0	5.539	24,926	53,848	0	0	0	53,848
2036	20,660	8,955	0.040	0	5.667	25,502	55,117	0	0	0	55,117
2037	21,281	9,045	0.041	0	5.798	26,091	56,417	0	0	0	56,417
2038	21,915	9,135	0.042	0	5.932	26,694	57,744	0	0	0	57,744
2039	22,577	9,225	0.043	0	6.069	27,311	59,113	0	0	0	59,113
2040	23,252	9,315	0.045	0	6.209	27,941	60,508	0	0	0	60,508
2041	23,949	9,405	0.046	0	6.353	28,589	61,943	0	0	0	61,943
2042	16,446	6,330	0.047	0	6.499	19,497	42,273	0	0	0	42,273
2043	8,469	3,195	0.049	0	6.649	9,974	21,638	0	0	0	21,638
2044	0	0	0.050	0	6.803	0	0	0	0	0	0
2045	0	0	0.052	0	6.960	0	0	0	0	0	0
2046	0	0	0.053	0	7.121	0	0	0	0	0	0
2047	0	0	0.055	0	7.285	0	0	0	0	0	0
2048	0	0	0.057	0	7.454	0	0	0	0	0	0
2049	0	0	0.058	0	7.626	0	0	0	0	0	0
Total =							$812,212			$137,920	$674,292
						NPV =	$674,126			$134,855	$539,271

Total NPV = $539,271
Benefit/Cost Ratio = 5.00

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 Efficiency**

	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)
2027	$6,000	1,500	$7.141	$10,712	$0.134	$0	$16,712	$45,000	($28,288)
2028	6,000	3,000	7.355	22,065	0.138	0	28,065	45,000	(16,935)
2029	6,000	4,500	7.576	34,092	0.143	0	40,092	45,000	(4,908)
2030	0	4,500	7.803	35,114	0.147	0	35,114	0	35,114
2031	0	4,500	8.037	36,167	0.151	0	36,167	0	36,167
2032	0	4,500	8.278	37,251	0.156	0	37,251	0	37,251
2033	0	4,500	8.527	38,372	0.161	0	38,372	0	38,372
2034	0	4,500	8.783	39,524	0.165	0	39,524	0	39,524
2035	0	4,500	9.046	40,707	0.170	0	40,707	0	40,707
2036	0	4,500	9.317	41,927	0.175	0	41,927	0	41,927
2037	0	4,500	9.597	43,187	0.181	0	43,187	0	43,187
2038	0	4,500	9.885	44,483	0.186	0	44,483	0	44,483
2039	0	4,500	10.181	45,815	0.192	0	45,815	0	45,815
2040	0	4,500	10.487	47,192	0.197	0	47,192	0	47,192
2041	0	4,500	10.801	48,605	0.203	0	48,605	0	48,605
2042	0	3,000	11.125	33,375	0.209	0	33,375	0	33,375
2043	0	1,500	11.459	17,189	0.216	0	17,189	0	17,189
2044	0	0	11.803	0	0.222	0	0	0	0
2045	0	0	12.157	0	0.229	0	0	0	0
2046	0	0	12.522	0	0.236	0	0	0	0
2047	0	0	12.897	0	0.243	0	0	0	0
2048	0	0	13.284	0	0.250	0	0	0	0
2049	0	0	13.683	0	0.258	0	0	0	0
Total =		67,500					$633,777	$135,000	$498,777
						NPV =	$287,641	$121,555	166,086

Total NPV = $166,086
Benefit/Cost Ratio = 2.37

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

Table 5
Total Resource Cost Test

Compa **Montana-Dakota Utilities Co.**
Project: **Commercial Custom Efficiency**

	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)
2027	$5,277	$2,730	$0	$8,007	$6,959	$39,000	$45,959	(37,952)
2028	10,872	5,520	0	16,392	6,974	39,000	45,974	(29,582)
2029	16,799	8,325	0	25,124	6,987	39,000	45,987	(20,863)
2030	17,303	8,415	0	25,718	0	0	0	25,718
2031	17,820	8,505	0	26,325	0	0	0	26,325
2032	18,356	8,595	0	26,951	0	0	0	26,951
2033	18,905	8,685	0	27,590	0	0	0	27,590
2034	19,472	8,775	0	28,247	0	0	0	28,247
2035	20,057	8,865	0	28,922	0	0	0	28,922
2036	20,660	8,955	0	29,615	0	0	0	29,615
2037	21,281	9,045	0	30,326	0	0	0	30,326
2038	21,915	9,135	0	31,050	0	0	0	31,050
2039	22,577	9,225	0	31,802	0	0	0	31,802
2040	23,252	9,315	0	32,567	0	0	0	32,567
2041	23,949	9,405	0	33,354	0	0	0	33,354
2042	16,446	6,330	0	22,776	0	0	0	22,776
2043	8,469	3,195	0	11,664	0	0	0	11,664
2044	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0
			Total =	$436,430			$137,920	$298,510
			NPV =	$257,252			$129,081	128,171

Total NPV =	$128,171
Benefit/Cost Ratio =	1.99

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

Montana-Dakota Utilities Co.
2026 Input Data Summary
South Dakota Natural Gas Conservation Model

Input No.	Input Data Description	Information Source	SD Res.	SD Comm.
1	Retail Rate ($/dk)	Weighted Average of SD retail rate using projected 2026-27 winter gas costs & October 2026 pipeline and distribution rates	8.317	6.933
	Escalation Rate		3.00%	3.00%
2	Non-Gas Fuel Retail ($/fuel/unit)	Average retail cost of non gas fuel if measures also saves kWh, gallons of water, etc. (for analysis purposes, used electric as Non-Gas Fuel Retail Rate)	0.13497	0.13053
	Escalation Rate		3.00%	3.00%
	Non-Gas Fuel Units (ie. kWh, Gallons, etc)		Kwh	Kwh
3	Commodity Cost ($/dk)	Estimated gas costs using the 3 year average gas price forecast 2027-2029; October 2026 pipeline commodity	3.416	3.416
	Escalation Rate		3.00%	3.00%
4	Demand Cost ($/dk/Yr)	Annual cost of firm capacity on pipeline	$180.00	$180.00
	Escalation Rate		1.00%	1.00%
5	Peak Reduction Factor	Estimated average peak day reduction factor caused by implementing the measure (s)	1.000%	1.000%
6	Variable O&M ($/dk)	Estimated variable O&M that will be avoided due the implementing the measure	$0	$0
	Escalation Rate		0.00%	0.00%
7	Non-Gas Fuel Cost ($/Fuel Unit)	Average commodity cost of non gas fuel if measures also saves kWh, gallons of water, etc. (for analysis purposes, used electric as Non-Gas Fuel Cost)	$0.02730	$0.02730
	Escalation Rate		3.00%	3.00%
8	Non-Gas Fuel Loss Factor	Non-Gas fuel loss factor (for analysis purposes, used total energy loss factor from Class Cost of Service in Docket No. EL23-020)	7.719%	7.719%
9	Gas Environmental Damage Factor	Per Minnesota CIP triennial 2027-2029	4.51	4.51
	Escalation Rate		2.31%	2.31%
10	Non Gas Fuel Environmental Damage Factor	Not Applicable	$0	$0
	Escalation Rate		0.00%	0.00%
11	Participant Discount Rate	Federal Reserve Consumer Credit (G.19) 24-month personal loan rate for the four quarters ending June 30, 2026.	11.50%	11.50%
12	Utility Discount Rate	Montana-Dakota's authorized average cost of capital	7.010%	7.010%
13	Societal Discount Rate	Equal to the 30 year T-Bill rate average for Twelve Months Ending December 31, 2025	2.29%	2.29%
14	General Input Data Year =	Year data was input	2026	2026

Montana-Dakota Utilities Co.
2026 Input Data Summary
South Dakota Natural Gas Conservation Model

Input No.	Input Data Description	Information Source	SD Res.	SD Comm.
15	Project Analysis Year	Year(s) program will be implemented	2027	2027
			2028	2028
			2029	2029
16	Utility Project Costs	Total direct cost to the utility caused by implementing the program(s)		
17	Direct Participant Costs ($/Part.)	Direct costs that the participant would have to participate in the program		
18	Participant Non-Energy Costs (Annual $/Part.) Yr. 1	Annual participant non-energy costs if applicable caused by implementing the measure (Not Applicable)	$0	$0
	Yr. 2		$0	$0
	Yr. 3		$0	$0
	Escalation Rate Yr. 1		0.00%	0.00%
	Escalation Rate Yr. 2		0.00%	0.00%
	Escalation Rate Yr. 3		0.00%	0.00%
19	Participant Non-Energy Savings (Annual $/Part) Yr. 1	Participant non energy savings if applicable caused by implementing the measure (Not Applicable)	$0	$0
	Yr. 2		$0	$0
	Yr. 3		$0	$0
	Escalation Rate Yr. 1		0.00%	0.00%
	Escalation Rate Yr. 2		0.00%	0.00%
	Escalation Rate Yr. 3		0.00%	0.00%
20	Project Life (Years)	Based on the estimated useful life of the energy saving equipment (20 years maximum)		
21	Avg. Dk/Part. Saved	Avg energy reduction (Dk) caused by the program(s)		
22	Avg Non-Gas Fuel Units/Part. Saved Yr. 1	Average non-gas fuel units saved or added due to implementing the measure (for analysis purposes, used kWh)		
	Yr. 2		0	0
	Yr. 3		0	0
22a	Avg Additional Non-Gas Fuel Units/ Part. Used Yr. 1		0	0
	Yr. 2		0	0
	Yr. 3		0	0
23	Number of Participants	Total number of expected participants is the program(s)		
24	Total Annual Dk Saved	Total Dk saved from the program in the year implemented		
25	Incentive/Participant	Incentive provided to the participant		
26	Distribution Delivery Charge	Weighted Average of Montana-Dakota's Distribution Delivery Charge	2.532	1.148
27	Effective Fed & State Income Tax Rate	Montana-Dakota's effective tax rate	21%	21%

South Dakota Natural Gas DSM Programs
Technical Assumptions

2027 - 2029 Program Years	Customer Class	# of Particip Year 1	# of Particip Year 2	# of Particip Year 3	Project Life	Baseline Efficiency	Average High Efficiency	Average dk Saved / Particip	Average Non-Energy Benefits / Particip	Increm Cost	Average Incentive / Particip
Residential											
Furnace Tier 1 - 95%+ AFUE - New	Res	80	75	70	20	90	95	5.7	0.0	165	150
Furnace Tier 1 - 95%+ AFUE - Replacement	Res	145	140	135	20	80	95	19.6	720.0	736	300
Furnace Tier 2 - 97%+ AFUE - New	Res	40	45	50	20	90	97	8.1	0.0	477	250
Furnace Tier 2 - 97%+ AFUE - Replacement	Res	80	85	90	20	80	97	22.2	720.0	1,048	500
Programmable Thermostats - Tier 1	Res	50	50	50	10	NA	NA	2.3	0.0	30	15
Programmable Thermostats - Tier 2	Res	150	150	150	10	NA	NA	6.3	41.0	155	60
Commercial											
Furnace Tier 1 - 95%+ AFUE - New	Comm	5	5	5	20	90	95	6.1	0.0	165	150
Furnace Tier 1 - 95%+ AFUE - Replacement	Comm	10	10	10	20	80	95	23.7	0.0	736	300
Furnace Tier 2 - 97%+ AFUE - New	Comm	5	5	5	20	90	97	9.1	0.0	477	250
Furnace Tier 2 - 97%+ AFUE - Replacement	Comm	10	10	10	20	80	97	27.0	0.0	1,048	500
Custom Efficiency	Comm	3	3	3	15	NA	NA	500.0	0.0	15,000	2,000
Totals	**1,734**	**578**	**578**	**578**							