SD Natural Gas Furnaces - Energy Savings Table

Zone 1 **Choose Weather Zone from Drop-Down Menu to the left**

Retrofit **Choose New or Retrofit from Drop-Down Menu to the left**

Calculator

Furnace Size (BTU)	75,000
Heating Efficiency	97.0%
Savings (MMBTU)	**22.2**
Savings (kWh)	**720**
Measure Life (Years)	**20**

Annual MMBTU Savings = Btuh_in x Load_Factor x EFLH_Heat x Eff_High x (1/Eff_Base - 1/Eff-High) / Conversion_Factor - Heating_Savings x 0.003142 / Eff_High

Where:

Heating_Savings = Blower ECM motor savings during heating season = 418 kWh

Btuh_in = The nominal rating of the input capacity of the new furnace or boiler in Btu/h

Load_Factor = The load factor, assumed to be 0.77 (implies 30% oversizing)

EFLH_Heat = Effective Full Load Hours of Heating

Eff_Base = Efficiency of the baseline equipment (80% for retrofit furnace, 90% for new furnace, 80% for all boilers)

Eff_High = Efficiency of the new furnace or boiler

Conversion_Factor = 1,000,000 BTU/MMBTU

Source: Minnesota Technical Reference Manual Ver. 3.3

Furnace Size (BTU)	Energy Factor 0.95	Energy Factor 0.96	Energy Factor 0.97	Energy Factor 0.98
30,000	7.8	8.3	8.8	9.3
35,000	9.1	9.7	10.3	10.9
40,000	10.4	11.1	11.8	12.5
45,000	11.7	12.5	13.3	14.1
50,000	13.0	13.9	14.8	15.6
55,000	14.3	15.3	16.3	17.2
60,000	15.6	16.7	17.7	18.8
65,000	17.0	18.1	19.2	20.4

Furnace Size (BTU)	Energy Factor 0.95	Energy Factor 0.96	Energy Factor 0.97	Energy Factor 0.98
70,000	18.3	19.5	20.7	22.0
75,000	19.6	20.9	22.2	23.5
80,000	20.9	22.3	23.7	25.1
85,000	22.2	23.7	25.2	26.7
90,000	23.5	25.1	26.7	28.3
95,000	24.8	26.5	28.2	29.8
100,000	26.2	27.9	29.7	31.4
105,000	27.5	29.3	31.2	33.0
110,000	28.8	30.7	32.6	34.6
115,000	30.1	32.1	34.1	36.2
120,000	31.4	33.5	35.6	37.7
125,000	32.7	34.9	37.1	39.3
130,000	34.0	36.3	38.6	40.9
135,000	35.4	37.7	40.1	42.5
140,000	36.7	39.1	41.6	44.0
145,000	38.0	40.5	43.1	45.6
150,000	39.3	41.9	44.6	47.2
155,000	40.6	43.3	46.1	48.8
160,000	41.9	44.7	47.5	50.3
165,000	43.2	46.1	49.0	51.9
170,000	44.6	47.5	50.5	53.5
175,000	45.9	48.9	52.0	55.1
180,000	47.2	50.3	53.5	56.7
185,000	48.5	51.7	55.0	58.2
190,000	49.8	53.2	56.5	59.8
195,000	51.1	54.6	58.0	61.4
200,000	52.4	56.0	59.5	63.0
205,000	53.8	57.4	61.0	64.5
210,000	55.1	58.8	62.4	66.1
215,000	56.4	60.2	63.9	67.7
220,000	57.7	61.6	65.4	69.3
225,000	59.0	63.0	66.9	70.9

South Dakota Natural Gas Programmable Thermostats - Energy Savings Table

Savings in dk per Tier 1 Programmable Thermostat =	2.3
kWh Savings per Tier 1 Thermostat	0.0
Savings in dk per Tier 2 Programmable Thermostat =	3.5
kWh Savings per Tier 2 Thermostat	41.0
Savings in dk per Tier 3 Programmable Thermostat =	7.1
kWh Savings per Tier 3 Thermostat	63.8
Measure Life (Years)	**10**

Unit Dth Savings per Year = HWF x Heating_Dth

Where:

HSF = Heating Savings Factor = assumed fraction of heating energy saved by thermostat, See Table 1

Heating_Dth = Baseline heating energy for natural gas residences. Default = 69 Dth/yr

Table 1:

	Tier 1	Tier 2	Tier 3
Heating HSF	3.6%/0%	5.40%	10.90%
Incremental Cost	$30	$110	$200

Source: MN Technical Reference Manual Ver. 3.3

South Dakota Natural Gas Commercial Furnaces - Energy Savings Table

Replacement **Choose Replacement or New from Drop-Down Menu to the left**

Calculator

Furnace Size (BTU)	95,000	
Heating Efficiency	97%	
Savings (MMBTU)	**27.0**	
Savings (kWh)	**0**	As noted in the MN TRM 3.3, ZERO kWh savings for commercial
Measure Life (Years)	**20.0**	

Unit Dth Savings per Year = Btuh_in x Load_Factor x EFLH_Heat x Eff_High x (1/Eff_Base - 1/Eff_High) / Conversion_Factor x MF - Heating_Savings x .003142 / Eff_High

Where:

Heating Savings =	Blower ECM motor savings during heating season = 418 kWh
Btuh_in =	the nominal rating of the input capacity of the new furnace or boiler in BTU/hr
Load_Factor =	the load factor, assumed to be 0.77 (implies 30% oversizing)
EFLH_Heat =	Effective Full Load Hours of Heating
Eff_Base =	Efficiency of the baseline equipment
Eff_High =	Efficiency of the new furnace or boiler
Conversion Factor =	1,000,000 btu/Dth

Source: MN Technical Reference Manual Ver. 3.3

Furnace Size (kBTU)	Energy Factor 0.95	Energy Factor 0.96	Energy Factor 0.97
30,000	6.6	7.1	7.7
35,000	7.9	8.5	9.2
40,000	9.2	9.9	10.6
45,000	10.5	11.3	12.1
50,000	11.8	12.7	13.6
55,000	13.2	14.1	15.1
60,000	14.5	15.5	16.6
65,000	15.8	16.9	18.1

Furnace Size (kBTU)	Energy Factor 0.95	Energy Factor 0.96	Energy Factor 0.97
70,000	17.1	18.3	19.6
75,000	18.4	19.7	21.1
80,000	19.7	21.1	22.6
85,000	21.0	22.5	24.0
90,000	22.4	23.9	25.5
95,000	23.7	25.4	27.0
100,000	25.0	26.8	28.5
105,000	26.3	28.2	30.0
110,000	27.6	29.6	31.5
115,000	28.9	31.0	33.0
120,000	30.2	32.4	34.5
125,000	31.6	33.8	36.0
130,000	32.9	35.2	37.5
135,000	34.2	36.6	38.9
140,000	35.5	38.0	40.4
145,000	36.8	39.4	41.9
150,000	38.1	40.8	43.4
155,000	39.4	42.2	44.9
160,000	40.8	43.6	46.4
165,000	42.1	45.0	47.9
170,000	43.4	46.4	49.4
175,000	44.7	47.8	50.9
180,000	46.0	49.2	52.4
185,000	47.3	50.6	53.8
190,000	48.6	52.0	55.3
195,000	50.0	53.4	56.8
200,000	51.3	54.8	58.3