APPENDIX 6.4. ENGINEERING ANALYSIS COST AND EFFICIENCY TABLES

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APPENDIX 6.4. ENGINEERING ANALYSIS COST AND EFFICIENCY TABLES

6.4.1 NOTE

This appendix contains the cost and efficiency tables described in Chapter 6, section 6.7.4 of the Furnace and Boiler Technical Support Document (TSD). Non-weatherized gas furnaces was the only product class that DOE analyzed using three installation cost scenarios: Installation Model (by DOE), Natural Resources Canada (NRCan), and the Gas Research Institute (GRI). The Department based the payback periods on the calculation methodology found in the DOE furnace/boiler test procedure; these payback periods may differ from those found under field conditions.

Table 6.4.1.1 Cost Table for Non-Weatherized Gas Furnaces (Installation Model)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Trans-portation	Over-head	Total	Increme-ntal	Retail	Instal-lation	Mainte-nance
		$	$	$	$	$	$	$	$	$
1	78%AFUE - Baseline Non-Weatherized	232.79	57.76	19.62	31.16	341.33		1065.41	726.51	36.61
1.1	80%AFUE (A) - Increased HXArea	234.69	58.55	19.62	31.62	344.48	3.14	1071.92	730.51	36.61
1.1.1	80%AFUE (A1) - ImprovedCircBlowerMotor (PSC)	237.69	58.55	19.62	31.62	347.48	6.14	1078.13	730.51	36.61
1.1.2	80%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	337.69	58.55	19.62	31.62	447.48	106.14	1285.19	730.51	36.61
1.1.3	80%AFUE (A3) - ImprovedCircBlowerMotor(SR)	337.69	58.55	19.62	31.62	447.48	106.14	1285.19	730.51	36.61
1.1.4	80%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	293.25	58.55	39.54	31.62	422.95	81.62	1234.41	730.51	36.61
1.1.5	80%AFUE (A5) - ImprovedCircBlowerImpeller + ECM	359.20	58.55	19.62	31.62	468.99	127.65	1329.73	730.51	36.61
1.2	80%AFUE (B) - Improved Heat Transfer Coef	235.22	61.82	19.62	32.50	349.16	7.82	1081.62	730.51	36.61
1.2.1	80%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	238.22	61.82	19.62	32.50	352.16	10.82	1087.83	730.51	36.61
1.2.2	80%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	338.22	61.82	19.62	32.50	452.16	110.82	1294.89	730.51	36.61
1.2.3	80%AFUE (B3) - ImprovedCircBlowerMotor(SR)	338.22	61.82	19.62	32.50	452.16	110.82	1294.89	730.51	36.61
1.2.4	80%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	293.78	61.82	39.54	32.50	427.63	86.30	1244.11	730.51	36.61
1.2.5	80%AFUE (B5) - ImprovedCircBlowerImpeller + ECM	359.73	61.82	19.62	32.50	473.67	132.34	1339.42	730.51	36.61
1.3	80%AFUE (C) - Modulation (2-stage)	256.74	58.55	19.62	31.62	366.53	25.19	1117.58	730.51	36.61
1.3.1	80%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	259.74	58.55	19.62	31.62	369.53	28.19	1123.79	730.51	36.61
1.3.2	80%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	359.74	58.55	19.62	31.62	469.53	128.19	1330.85	730.51	36.61
1.3.3	80%AFUE (C3) - ImprovedCircBlowerImpeller	335.22	58.55	39.54	31.62	464.92	123.59	1321.31	730.51	36.61
1.3.4	80%AFUE (C4) - ImprovedCircBlowerImpeller + ECM	418.30	58.55	19.62	31.62	528.08	186.75	1452.09	730.51	36.61

Table 6.4.1.1 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Transpor-tation	Over-head	Total	Increme-ntal	Retail	Instal-lation	Mainte-nance
		$	$	$	$	$	$	$	$	$
2.1	81%AFUE (A) - Increased HX Area	237.50	58.55	19.62	31.89	347.56	6.22	1078.30	809.68	36.61
2.1.1	81%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	240.50	58.55	19.62	31.89	350.56	9.22	1084.51	809.68	36.61
2.1.2	81%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	340.50	58.55	19.62	31.89	450.56	109.22	1291.57	809.68	36.61
2.1.3	81%AFUE (A3) - ImprovedCircBlowerMotor(SR)	340.50	58.55	19.62	31.89	450.56	109.22	1291.57	809.68	36.61
2.1.4	81%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	296.06	58.55	39.54	31.89	426.03	84.70	1240.79	809.68	36.61
2.1.5	81%AFUE (A5) - ImprovedCircBlowerImpeller + ECM	362.01	58.55	19.62	31.89	472.07	130.73	1336.11	809.68	36.61
2.2	81%AFUE (B) - Improved Heat TransferCoef	236.36	61.84	19.62	32.61	350.43	9.10	1084.25	809.68	36.61
2.2.1	81%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	239.36	61.84	19.62	32.61	353.43	12.10	1090.46	809.68	36.61
2.2.2	81%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	339.36	61.84	19.62	32.61	453.43	112.10	1297.52	809.68	36.61
2.2.3	81%AFUE (B3) - ImprovedCircBlowerMotor(SR)	339.36	61.84	19.62	32.61	453.43	112.10	1297.52	809.68	36.61
2.2.4	81%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	294.91	61.84	39.54	32.61	428.91	87.57	1246.74	809.68	36.61
2.2.5	81%AFUE (B5) - ImprovedCircBlowerImpeller + ECM	360.87	61.84	19.62	32.61	474.94	133.61	1342.06	809.68	36.61
2.3	81%AFUE (C) - Modulation (2-stage)	257.69	58.55	19.62	31.89	367.75	26.41	1120.10	759.98	36.61
2.3.1	81%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	260.69	58.55	19.62	31.89	370.75	29.41	1126.31	759.98	36.61
2.3.2	81%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	360.69	58.55	19.62	31.89	470.75	129.41	1333.37	759.98	36.61
2.3.3	81%AFUE (C3) - ImprovedCircBlowerImpeller	336.17	58.55	39.54	31.89	466.14	124.81	1323.84	759.98	36.61
2.3.4	81%AFUE (C4) - ImprovedCircBlowerImpeller + ECM	419.25	58.55	19.62	31.89	529.30	187.97	1454.62	759.98	36.61

Table 6.4.1.1 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Transpor-tation	Over-head	Total	Increm-ental	Retail	Instal-lation	Mainte-nance
		$	$	$	$	$	$	$	$	$
3.1	82%AFUE (A) - Increased HX Area	240.32	58.55	19.62	32.25	350.74	9.40	1084.88	1011.61	36.61
3.1.1	82%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	243.32	58.55	19.62	32.25	353.74	12.40	1091.09	1011.61	36.61
3.1.2	82%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	343.32	58.55	19.62	32.25	453.74	112.40	1298.15	1011.61	36.61
3.1.3	82%AFUE (A3) - ImprovedCircBlowerMotor(SR)	343.32	58.55	19.62	32.25	453.74	112.40	1298.15	1011.61	36.61
3.1.4	82%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	298.88	58.55	39.54	32.25	429.21	87.88	1247.37	1011.61	36.61
3.1.5	82%AFUE (A5) - ImprovedCircBlowerImpeller + ECM	364.83	58.55	19.62	32.25	475.25	133.91	1342.69	1011.61	36.61
3.2	82%AFUE (B) - Improved Heat Transfer Coef	237.32	61.84	19.62	32.78	351.56	10.22	1086.58	1011.61	36.61
3.2.1	82%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	240.32	61.84	19.62	32.78	354.56	13.22	1092.80	1011.61	36.61
3.2.2	82%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	340.32	61.84	19.62	32.78	454.56	113.22	1299.86	1011.61	36.61
3.2.3	82%AFUE (B3) - ImprovedCircBlowerMotor(SR)	340.32	61.84	19.62	32.78	454.56	113.22	1299.86	1011.61	36.61
3.2.4	82%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	295.87	61.84	39.54	32.78	430.03	88.70	1249.07	1011.61	36.61
3.2.5	82%AFUE (B5) - ImprovedCircBlowerImpeller + ECM	361.83	61.84	19.62	32.78	476.07	134.74	1344.39	1011.61	36.61
3.3	82%AFUE (C) - Modulation (2-stage)	260.50	58.55	19.62	32.25	370.92	29.58	1126.67	1011.61	36.61
3.3.1	82%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	263.50	58.55	19.62	32.25	373.92	32.58	1132.88	1011.61	36.61
3.3.2	82%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	363.50	58.55	19.62	32.25	473.92	132.58	1339.94	1011.61	36.61
3.3.3	82%AFUE (C3) - ImprovedCircBlowerImpeller	338.98	58.55	39.54	32.25	469.31	127.98	1330.40	1011.61	36.61
3.3.4	82%AFUE (C4) - ImprovedCircBlowerImpeller + ECM	422.06	58.55	19.62	32.25	532.47	191.14	1461.18	1011.61	36.61
4.1	83%AFUE (A) - Increased HX Area	245.05	58.55	19.62	32.65	355.87	14.53	1095.50	1355.57	61.01

Table 6.4.1.1 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Transpor-tation	Over-head	Total	Increm-ental	Retail	Instal-lation	Mainte-nance
		$	$	$	$	$	$	$	$	$
5.1	90%AFUE - Baseline Condensing	354.39	62.94	23.88	46.48	487.69	146.36	1368.46	979.51	64.38
5.1.1	90%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	357.39	62.94	23.88	46.48	490.69	149.36	1374.67	979.51	64.38
5.1.2	90%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	457.39	62.94	23.88	46.48	590.69	249.36	1581.73	979.51	64.38
5.1.3	90%AFUE (A3) - ImprovedCircBlowerMotor(SR)	457.39	62.94	23.88	46.48	590.69	249.36	1581.73	979.51	64.38
5.1.4	90%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	412.94	62.94	43.80	46.48	566.17	224.83	1530.95	979.51	64.38
5.1.5	90%AFUE (A5) - ImprovedCircBlowerImpeller + ECM	478.90	62.94	23.88	46.48	612.20	270.87	1626.27	979.51	64.38
5.2	90%AFUE (C) - Modulation (2-stage) + ECM	480.39	62.94	23.88	46.48	613.69	272.36	1629.35	979.51	64.38
5.2.1	90%AFUE (C1) - ImprovedCircBlowerImpeller	501.90	62.94	23.88	46.48	635.20	293.87	1673.89	979.51	64.38
6.1	92%AFUE (A) - Increased HXArea	409.47	72.08	26.27	46.48	554.30	212.96	1506.38	979.51	64.38
6.1.1	92%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	412.47	72.08	26.27	46.48	557.30	215.96	1512.59	979.51	64.38
6.1.2	92%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	512.47	72.08	26.27	46.48	657.30	315.96	1719.65	979.51	64.38
6.1.3	92%AFUE (A3) - ImprovedCircBlowerMotor(SR)	512.47	72.08	26.27	46.48	657.30	315.96	1719.65	979.51	64.38
6.1.4	92%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	468.02	72.08	46.19	46.48	632.77	291.44	1668.87	979.51	64.38
6.1.5	92%AFUE (A5) - ImprovedCircBlowerImpeller + ECM	533.98	72.08	26.27	46.48	678.81	337.47	1764.18	979.51	64.38
6.2	92%AFUE (C) - Modulation (2-stage) + ECM	535.47	72.08	26.27	46.48	680.30	338.96	1767.27	979.51	64.38
6.2.1	92%AFUE (C1) - ImprovedCircBlowerImpeller	556.98	72.08	26.27	46.48	701.81	360.47	1811.81	979.51	64.38
6.3	92%AFUE (D) - Modulation (Continuous) + ECM	687.70	72.08	26.27	46.48	832.53	491.20	2082.48	979.51	64.38
6.3.1	92%AFUE (D1) - ImprovedCircBlowerImpeller	709.21	72.08	26.27	46.48	854.04	512.71	2127.02	979.51	64.38
7.1	96%AFUE (D) - Modulation (Continuous) + ECM	729.53	86.40	35.37	59.87	911.17	569.84	2245.31	979.51	107.30
7.1.2	96%AFUE (D1) - ImprovedCircBlowerImpeller + ECM	751.04	86.40	35.37	59.87	932.68	591.35	2289.85	979.51	107.30

Table 6.4.1.2 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		
		BOH	Fuel	Electric	Total Installed	Total Operating	Simple Payback
		hr	MBtu/yr	kWh/year	$	$/yr	years
1	78%AFUE - Baseline Non-Weatherized	792	59	558	1791.93	494.53	
1.1	80%AFUE (A) - Increased HXArea	773	58	545	1802.43	483.48	1.0
1.1.1	80%AFUE (A1) - ImprovedCircBlowerMotor (PSC)	774	58	532	1808.65	482.84	1.4
1.1.2	80%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	778	58	459	2015.70	479.30	14.7
1.1.3	80%AFUE (A3) - ImprovedCircBlowerMotor(SR)	776	58	487	2015.70	480.67	16.1
1.1.4	80%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	777	58	480	1964.92	480.35	12.2
1.1.5	80%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	781	59	407	2060.24	476.78	15.1
1.2	80%AFUE (B) - Improved Heat Transfer Coef	773	58	545	1812.13	483.48	1.8
1.2.1	80%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	774	58	532	1818.34	482.84	2.3
1.2.2	80%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	778	58	459	2025.40	479.30	15.3
1.2.3	80%AFUE (B3) - ImprovedCircBlowerMotor(SR)	776	58	487	2025.40	480.67	16.8
1.2.4	80%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	777	58	480	1974.62	480.35	12.9
1.2.5	80%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	781	59	407	2069.94	476.78	15.7
1.3	80%AFUE (C) - Modulation (2-stage)	747	56	572	1848.09	471.98	2.5
1.3.1	80%AFUE(C1) - Improved CircBlowerMotor(PSC)	749	57	559	1854.30	471.73	2.7
1.3.2	80%AFUE(C2) - ImprovedCircBlowerMotor(ECM)	757	57	484	2061.36	470.28	11.1
1.3.3	80%AFUE(C3) - ImprovedeCircBlowerImpeller	754	57	507	2051.83	470.71	10.9
1.3.4	80%AFUE(C4) - ImprovedCompactCircBlowerImpeller + ECM	763	57	431	2182.61	469.23	15.4

Table 6.4.1.2 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		
		BOH	Fuel	Electric	Total Installed	Total Operating	Simple Payback
		hr	MBtu/yr	kWh/year	$	$/yr	years
2.1	81%AFUE (A) - Increased HX Area	764	57	538	1887.98	478.15	5.86
2.1.1	81%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	765	57	525	1894.19	477.52	6.01
2.1.2	81%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	769	58	453	2101.25	473.99	15.06
2.1.3	81%AFUE (A3) - ImprovedCircBlowerMotor(SR)	767	58	481	2101.25	475.35	16.13
2.1.4	81%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	768	58	475	2050.47	475.03	13.26
2.1.5	81%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	772	58	402	2145.79	471.48	15.35
2.2	81%AFUE (B) - Improved Heat TransferCoef	764	57	538	1893.93	478.15	6.23
2.2.1	81%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	765	57	525	1900.14	477.52	6.36
2.2.2	81%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	769	58	453	2107.20	473.99	15.35
2.2.3	81%AFUE (B3) - ImprovedCircBlowerMotor(SR)	767	58	481	2107.20	475.35	16.44
2.2.4	81%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	768	58	475	2056.42	475.03	13.57
2.2.5	81%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	772	58	402	2151.74	471.48	15.61
2.3	81%AFUE (C) - Modulation (2-stage)	985	74	754	1880.09	610.42	-
2.3.1	81%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	987	74	737	1886.30	610.07	-
2.3.2	81%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	997	75	638	2093.36	608.08	-
2.3.3	81%AFUE (C3) - ImprovedCircBlowerImpeller	994	75	668	2083.82	608.67	-
2.3.4	81%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	1005	75	568	2214.60	606.65	-

Note: Some cells are left blank because the payback periods for some efficiency levels can not be accurately established due to discrepancies in the algorithm for calculating the energy use in the current furnace/boiler test procedure. More details about this discrepancy are provided in section 6.7.4 of Chapter 6 and in section 6.3.2.3 of Appendix 6.3. This note is applicable to other tables in this appendix.

Table 6.4.1.2 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		
		BOH	Fuel	Electric	Total Installed	Total Operating	Simple Payback
		hr	MBtu/yr	kWh/year	$	$/yr	years
3.1	82%AFUE (A) - Increased HX Area	1007	75	709	2096.49	618.39	-
3.1.1	82%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	1008	76	692	2102.70	617.55	-
3.1.2	82%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	1013	76	597	2309.76	612.87	-
3.1.3	82%AFUE (A3) - ImprovedCircBlowerMotor(SR)	1011	76	634	2309.76	614.68	-
3.1.4	82%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	1011	76	625	2258.98	614.26	-
3.1.5	82%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	1017	76	529	2354.30	609.54	-
3.2	82%AFUE (B) - Improved Heat Transfer Coef	1007	75	709	2098.19	618.39	-
3.2.1	82%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	1008	76	692	2104.40	617.55	-
3.2.2	82%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	1013	76	597	2311.46	612.87	-
3.2.3	82%AFUE (B3) - ImprovedCircBlowerMotor(SR)	1011	76	634	2311.46	614.68	-
3.2.4	82%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	1011	76	625	2260.68	614.26	-
3.2.5	82%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	1017	76	529	2356.00	609.54	-
3.3	82%AFUE (C) - Modulation (2-stage)	973	73	745	2138.27	603.88	-
3.3.1	82%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	975	73	728	2144.48	603.52	-
3.3.2	82%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	986	74	631	2351.54	601.48	-
3.3.3	82%AFUE (C3) - ImprovedCircBlowerImpeller	983	74	660	2342.01	602.09	-
3.3.4	82%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	994	75	561	2472.79	600.02	-
4.1	83%AFUE (A) - Increased HX Area	995	75	701	2451.07	636.02	-

Table 6.4.1.2 Energy and Economics Table for Non-Weatherized Gas Furnaces (Installation Model) (Continued)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		
		BOH	Fuel	Electric	Total Installed	Total Operating	Simple Payback
		hr	MBtu/yr	kWh/year	$	$/yr	years
5.1	90%AFUE - Baseline Condensing	920	69	648	2347.97	596.04	-
5.1.1	90%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	921	69	633	2354.18	595.23	-
5.1.2	90%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	925	69	545	2561.24	590.71	-
5.1.3	90%AFUE (A3) - ImprovedCircBlowerMotor(SR)	923	69	579	2561.24	592.45	-
5.1.4	90%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	924	69	571	2510.46	592.05	-
5.1.5	90%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	928	70	483	2605.78	587.50	-
5.2	90%AFUE (C) - Modulation (2-stage) + ECM	903	68	578	2608.87	581.50	-
5.2.1	90%AFUE (C1) - ImprovedCircBlowerImpeller	909	68	513	2653.40	579.83	-
6.1	92%AFUE (A) - Increased HXArea	900	68	635	2485.89	584.83	-
6.1.1	92%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	901	68	619	2492.10	584.03	-
6.1.2	92%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	905	68	534	2699.16	579.55	-
6.1.3	92%AFUE (A3) - ImprovedCircBlowerMotor(SR)	904	68	567	2699.16	581.28	-
6.1.4	92%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	904	68	559	2648.38	580.88	-
6.1.5	92%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	908	68	473	2743.70	576.37	-
6.2	92%AFUE (C) - Modulation (2-stage) + ECM	884	66	566	2746.78	570.80	-
6.2.1	92%AFUE (C1) - ImprovedCircBlowerImpeller	890	67	503	2791.32	569.08	-
6.3	92%AFUE (D) - Modulation (Continuous) + ECM	884	66	566	3061.99	570.80	-
6.3.1	92%AFUE (D1) - ImprovedCircBlowerImpeller	890	67	503	3106.53	569.08	-
7.1	96%AFUE (D)	849	64	543	3224.82	593.59	-
7.1.2	96%AFUE (D1) - ImprovedCompactCircBlowerImpeller + ECM	854	64	483	3269.36	591.81	-

Table 6.4.1.3 Summary Results for Non-Weatherized Gas Furnaces (NRCan)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
1	78%AFUE - Baseline Non-Weatherized	382.00	1447.41	494.53	
1.1	80%AFUE (A) - Increased HXArea	382.00	1453.92	483.48	0.6
1.1.1	80%AFUE (A1) - ImprovedCircBlowerMotor (PSC)	382.00	1460.13	482.84	1.1
1.1.2	80%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	382.00	1667.19	479.30	14.4
1.1.3	80%AFUE (A3) - ImprovedCircBlowerMotor(SR)	382.00	1667.19	480.67	15.9
1.1.4	80%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	382.00	1616.41	480.35	11.9
1.1.5	80%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	382.00	1711.73	476.78	14.9
1.2	80%AFUE (B) - Improved Heat Transfer Coef	382.00	1463.62	483.48	1.5
1.2.1	80%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	382.00	1469.83	482.84	1.9
1.2.2	80%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	382.00	1676.89	479.30	15.1
1.2.3	80%AFUE (B3) - ImprovedCircBlowerMotor(SR)	382.00	1676.89	480.67	16.6
1.2.4	80%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	382.00	1626.11	480.35	12.6
1.2.5	80%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	382.00	1721.42	476.78	15.4
1.3	80%AFUE (C) - Modulation (2-stage)	382.00	1499.58	471.98	2.3
1.3.1	80%AFUE(C1) - Improved CircBlowerMotor(PSC)	382.00	1505.79	471.73	2.6
1.3.2	80%AFUE(C2) - ImprovedCircBlowerMotor(ECM)	382.00	1712.85	470.28	10.9
1.3.3	80%AFUE(C3) - ImprovedeCircBlowerImpeller	382.00	1703.31	470.71	10.7
1.3.4	80%AFUE(C4) - ImprovedCompactCircBlowerImpeller + ECM	382.00	1834.09	469.23	15.3

Table 6.4.1.3 Summary Results for Non-Weatherized Gas Furnaces (NRCan) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
2.1	81%AFUE (A) - Increased HX Area	431.70	1509.99	478.15	3.8
2.1.1	81%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	431.70	1516.20	477.52	4.0
2.1.2	81%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	431.70	1723.26	473.99	13.4
2.1.3	81%AFUE (A3) - ImprovedCircBlowerMotor(SR)	431.70	1723.26	475.35	14.4
2.1.4	81%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	431.70	1672.48	475.03	11.5
2.1.5	81%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	431.70	1767.80	471.48	13.9
2.2	81%AFUE (B) - Improved Heat TransferCoef	431.70	1515.95	478.15	4.2
2.2.1	81%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	431.70	1522.16	477.52	4.4
2.2.2	81%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	431.70	1729.22	473.99	13.7
2.2.3	81%AFUE (B3) - ImprovedCircBlowerMotor(SR)	431.70	1729.22	475.35	14.7
2.2.4	81%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	431.70	1678.44	475.03	11.8
2.2.5	81%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	431.70	1773.76	471.48	14.2
2.3	81%AFUE (C) - Modulation (2-stage)	382.00	1502.10	610.42	-
2.3.1	81%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	382.00	1508.31	610.07	-
2.3.2	81%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	382.00	1715.37	608.08	-
2.3.3	81%AFUE (C3) - ImprovedCircBlowerImpeller	382.00	1705.84	608.67	-
2.3.4	81%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	382.00	1836.62	606.65	-

Table 6.4.1.3 Summary Results for Non-Weatherized Gas Furnaces (NRCan) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
3.1	82%AFUE (A) - Increased HX Area	633.62	1718.50	618.39	-
3.1.1	82%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	633.62	1724.72	617.55	-
3.1.2	82%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	633.62	1931.77	612.87	-
3.1.3	82%AFUE (A3) - ImprovedCircBlowerMotor(SR)	633.62	1931.77	614.68	-
3.1.4	82%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	633.62	1880.99	614.26	-
3.1.5	82%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	633.62	1976.31	609.54	-
3.2	82%AFUE (B) - Improved Heat Transfer Coef	633.62	1720.21	618.39	-
3.2.1	82%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	633.62	1726.42	617.55	-
3.2.2	82%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	633.62	1933.48	612.87	-
3.2.3	82%AFUE (B3) - ImprovedCircBlowerMotor(SR)	633.62	1933.48	614.68	-
3.2.4	82%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	633.62	1882.70	614.26	-
3.2.5	82%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	633.62	1978.02	609.54	-
3.3	82%AFUE (C) - Modulation (2-stage)	633.62	1760.29	603.88	-
3.3.1	82%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	633.62	1766.50	603.52	-
3.3.2	82%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	633.62	1973.56	601.48	-
3.3.3	82%AFUE (C3) - ImprovedCircBlowerImpeller	633.62	1964.02	602.09	-
3.3.4	82%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	633.62	2094.80	600.02	-
4.1	83%AFUE (A) - Increased HX Area	1011.05	2106.56	636.02	-

Table 6.4.1.3 Summary Results for Non-Weatherized Gas Furnaces (NRCan) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
5.1	90%AFUE - Baseline Condensing	411.00	1779.46	596.04	-
5.1.1	90%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	411.00	1785.67	595.23	-
5.1.2	90%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	411.00	1992.73	590.71	-
5.1.3	90%AFUE (A3) - ImprovedCircBlowerMotor(SR)	411.00	1992.73	592.45	-
5.1.4	90%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	411.00	1941.95	592.05	-
5.1.5	90%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	411.00	2037.27	587.50	-
5.2	90%AFUE (C) - Modulation (2-stage) + ECM	411.00	2040.35	581.50	-
5.2.1	90%AFUE (C1) - ImprovedCircBlowerImpeller	411.00	2084.89	579.83	-
6.1	92%AFUE (A) - Increased HXArea	411.00	1917.38	584.83	-
6.1.1	92%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	411.00	1923.59	584.03	-
6.1.2	92%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	411.00	2130.65	579.55	-
6.1.3	92%AFUE (A3) - ImprovedCircBlowerMotor(SR)	411.00	2130.65	581.28	-
6.1.4	92%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	411.00	2079.87	580.88	-
6.1.5	92%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	411.00	2175.18	576.37	-
6.2	92%AFUE (C) - Modulation (2-stage) + ECM	411.00	2178.27	570.80	-
6.2.1	92%AFUE (C1) - ImprovedCircBlowerImpeller	411.00	2222.81	569.08	-
6.3	92%AFUE (D) - Modulation (Continuous) + ECM	411.00	2493.48	570.80	-
6.3.1	92%AFUE (D1) - ImprovedCircBlowerImpeller	411.00	2538.02	569.08	-
7.1	96%AFUE (D)	411.00	2656.31	593.59	-
7.1.2	96%AFUE (D1) - ImprovedCompactCircBlowerImpeller + ECM	411.00	2700.85	591.81	-

Table 6.4.1.4 Summary Results for Non-Weatherized Gas Furnaces (GRI)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
1	78%AFUE - Baseline Non-Weatherized	773.28	1838.69	494.53	
1.1	80%AFUE (A) - Increased HXArea	964.58	2036.50	483.48	17.9
1.1.1	80%AFUE (A1) - ImprovedCircBlowerMotor (PSC)	964.58	2042.71	482.84	17.5
1.1.2	80%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	964.58	2249.77	479.30	27.0
1.1.3	80%AFUE (A3) - ImprovedCircBlowerMotor(SR)	964.58	2249.77	480.67	29.6
1.1.4	80%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	964.58	2198.99	480.35	25.4
1.1.5	80%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	964.58	2294.31	476.78	25.7
1.2	80%AFUE (B) - Improved Heat Transfer Coef	964.58	2046.20	483.48	18.8
1.2.1	80%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	964.58	2052.41	482.84	18.3
1.2.2	80%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	964.58	2259.47	479.30	27.6
1.2.3	80%AFUE (B3) - ImprovedCircBlowerMotor(SR)	964.58	2259.47	480.67	30.3
1.2.4	80%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	964.58	2208.69	480.35	26.1
1.2.5	80%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	964.58	2304.01	476.78	26.2
1.3	80%AFUE (C) - Modulation (2-stage)	964.58	2082.16	471.98	10.8
1.3.1	80%AFUE(C1) - Improved CircBlowerMotor(PSC)	964.58	2088.37	471.73	10.9
1.3.2	80%AFUE(C2) - ImprovedCircBlowerMotor(ECM)	964.58	2295.43	470.28	18.8
1.3.3	80%AFUE(C3) - ImprovedeCircBlowerImpeller	964.58	2285.90	470.71	18.8
1.3.4	80%AFUE(C4) - ImprovedCompactCircBlowerImpeller + ECM	964.58	2416.68	469.23	22.8

Table 6.4.1.4 Summary Results for Non-Weatherized Gas Furnaces (GRI) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
2.1	81%AFUE (A) - Increased HX Area	1104.19	2182.49	478.15	21.0
2.1.1	81%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	1104.19	2188.70	477.52	20.6
2.1.2	81%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	1104.19	2395.76	473.99	27.1
2.1.3	81%AFUE (A3) - ImprovedCircBlowerMotor(SR)	1104.19	2395.76	475.35	29.0
2.1.4	81%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	1104.19	2344.98	475.03	26.0
2.1.5	81%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	1104.19	2440.30	471.48	26.1
2.2	81%AFUE (B) - Improved Heat TransferCoef	1104.19	2188.44	478.15	21.4
2.2.1	81%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	1104.19	2194.65	477.52	20.9
2.2.2	81%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	1104.19	2401.71	473.99	27.4
2.2.3	81%AFUE (B3) - ImprovedCircBlowerMotor(SR)	1104.19	2401.71	475.35	29.4
2.2.4	81%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	1104.19	2350.93	475.03	26.3
2.2.5	81%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	1104.19	2446.25	471.48	26.4
2.3	81%AFUE (C) - Modulation (2-stage)	964.58	2084.69	610.42	-
2.3.1	81%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	964.58	2090.90	610.07	-
2.3.2	81%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	964.58	2297.96	608.08	-
2.3.3	81%AFUE (C3) - ImprovedCircBlowerImpeller	964.58	2288.42	608.67	-
2.3.4	81%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	964.58	2419.20	606.65	-

Table 6.4.1.4 Summary Results for Non-Weatherized Gas Furnaces (GRI) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
3.1	82%AFUE (A) - Increased HX Area	1671.47	2756.35	618.39	-
3.1.1	82%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	1671.47	2762.56	617.55	-
3.1.2	82%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	1671.47	2969.62	612.87	-
3.1.3	82%AFUE (A3) - ImprovedCircBlowerMotor(SR)	1671.47	2969.62	614.68	-
3.1.4	82%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	1671.47	2918.84	614.26	-
3.1.5	82%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	1671.47	3014.16	609.54	-
3.2	82%AFUE (B) - Improved Heat Transfer Coef	1671.47	2758.05	618.39	-
3.2.1	82%AFUE (B1) - ImprovedCircBlowerMotor(PSC)	1671.47	2764.26	617.55	-
3.2.2	82%AFUE (B2) - ImprovedCircBlowerMotor(ECM)	1671.47	2971.32	612.87	-
3.2.3	82%AFUE (B3) - ImprovedCircBlowerMotor(SR)	1671.47	2971.32	614.68	-
3.2.4	82%AFUE (B4) - ImprovedCircBlowerImpeller w/ PSC	1671.47	2920.54	614.26	-
3.2.5	82%AFUE (B5) - ImprovedCompactCircBlowerImpeller + ECM	1671.47	3015.86	609.54	-
3.3	82%AFUE (C) - Modulation (2-stage)	1671.47	2798.13	603.88	-
3.3.1	82%AFUE (C1) - ImprovedCircBlowerMotor(PSC)	1671.47	2804.35	603.52	-
3.3.2	82%AFUE (C2) - ImprovedCircBlowerMotor(ECM)	1671.47	3011.41	601.48	-
3.3.3	82%AFUE (C3) - ImprovedCircBlowerImpeller	1671.47	3001.87	602.09	-
3.3.4	82%AFUE (C4) - ImprovedCompactCircBlowerImpeller + ECM	1671.47	3132.65	600.02	-
4.1	83%AFUE (A) - Increased HX Area	2731.80	3827.30	636.02	-

Table 6.4.1.4 Summary Results for Non-Weatherized Gas Furnaces (GRI) (Continued)

ID	Efficiency Levels & Design Options	Cost Data	Summary Economics		
		Consumer Costs	Total Costs		
		Installation	Total Installed	Total Operating	Simple Payback
		$	$	$/yr	years
5.1	90%AFUE - Baseline Condensing	1239.20	2607.65	596.04	-
5.1.1	90%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	1239.20	2613.86	595.23	-
5.1.2	90%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	1239.20	2820.92	590.71	-
5.1.3	90%AFUE (A3) - ImprovedCircBlowerMotor(SR)	1239.20	2820.92	592.45	-
5.1.4	90%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	1239.20	2770.14	592.05	-
5.1.5	90%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	1239.20	2865.46	587.50	-
5.2	90%AFUE (C) - Modulation (2-stage) + ECM	1239.20	2868.55	581.50	-
5.2.1	90%AFUE (C1) - ImprovedCircBlowerImpeller	1239.20	2913.09	579.83	-
6.1	92%AFUE (A) - Increased HXArea	1239.20	2745.57	584.83	-
6.1.1	92%AFUE (A1) - ImprovedCircBlowerMotor(PSC)	1239.20	2751.78	584.03	-
6.1.2	92%AFUE (A2) - ImprovedCircBlowerMotor(ECM)	1239.20	2958.84	579.55	-
6.1.3	92%AFUE (A3) - ImprovedCircBlowerMotor(SR)	1239.20	2958.84	581.28	-
6.1.4	92%AFUE (A4) - ImprovedCircBlowerImpeller w/ PSC	1239.20	2908.06	580.88	-
6.1.5	92%AFUE (A5) - ImprovedCompactCircBlowerImpeller + ECM	1239.20	3003.38	576.37	-
6.2	92%AFUE (C) - Modulation (2-stage) + ECM	1239.20	3006.46	570.80	-
6.2.1	92%AFUE (C1) - ImprovedCircBlowerImpeller	1239.20	3051.00	569.08	-
6.3	92%AFUE (D) - Modulation (Continuous) + ECM	1239.20	3321.67	570.80	-
6.3.1	92%AFUE (D1) - ImprovedCircBlowerImpeller	1239.20	3366.21	569.08	-
7.1	96%AFUE (D)	1267.72	3513.03	593.59	-
7.1.2	96%AFUE (D1) - ImprovedCompactCircBlowerImpeller + ECM	1267.72	3557.57	591.81	-

Table 6.4.1.5 Cost Table for Weatherized Gas Furnaces

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Transportation	Overhead	Total	Incremental	Retail	Installation	Maintenance
		$	$	$	$	$	$	$	$	$
1	78% - Baseline	533.69	80.57	23.94	110.96	749.15		2338.35	1123.00	36.61
1.1	80% - Increased HXArea	535.59	81.35	23.94	111.42	752.30	3.14	2344.85	1123.00	36.61
1.1.1	80% - Improved Insulation	540.25	81.57	23.94	111.42	757.18	8.02	2354.96	1123.00	36.61
1.1.2	80% - ImprovedCircBlowerMotor (PSC)	538.59	81.35	23.94	111.42	755.30	6.14	2351.07	1123.00	36.61
1.1.3	80% - ImprovedSupplyFanMotor (ECM)	638.59	81.35	23.94	111.42	855.30	106.14	2558.13	1123.00	36.61
1.2	80% - Improved Heat Transfer Coef	536.11	84.63	23.94	112.30	756.98	7.82	2354.55	1123.00	36.61
2.1	81% - Increased HXArea	538.39	81.36	23.94	111.69	755.38	6.23	2351.24	1123.00	36.61
2.1.1	81% - Improved Insulation	543.05	81.58	23.94	111.69	760.26	11.11	2361.35	1123.00	36.61
2.1.2	81% - ImprovedCircBlowerMotor (PSC)	541.39	81.36	23.94	111.69	758.38	9.23	2357.46	1123.00	36.61
2.1.3	81% - ImprovedSupplyFanMotor (ECM)	641.39	81.36	23.94	111.69	858.38	109.23	2564.52	1123.00	36.61
2.2	81% - Improved Heat Transfer Coef	537.25	84.65	23.94	112.41	758.25	9.09	2357.17	1123.00	36.61
3.1	82% - Increased HXArea	541.22	81.36	23.94	112.05	758.56	9.40	2357.82	1123.00	36.61
3.1.1	82% - Improved Insulation	545.88	81.58	23.94	112.05	763.44	14.28	2367.92	1123.00	36.61
3.1.2	82% - ImprovedCircBlowerMotor (PSC)	544.22	81.36	23.94	112.05	761.56	12.40	2364.03	1123.00	36.61
3.1.3	82% - ImprovedSupplyFanMotor (ECM)	644.22	81.36	23.94	112.05	861.56	112.40	2571.09	1123.00	36.61
3.2	82% - Improved Heat Transfer Coef	538.21	84.65	23.94	112.58	759.37	10.21	2359.49	1123.00	36.61
4.1	83% - Increased HXArea	545.94	81.36	23.94	112.45	763.69	14.53	2368.44	1123.00	61.01
4.1.1	83% - Improved Insulation	550.60	81.58	23.94	112.45	768.57	19.41	2378.54	1123.00	61.01
4.1.2	83% - ImprovedCircBlowerMotor (PSC)	548.94	81.36	23.94	112.45	766.69	17.53	2374.65	1123.00	36.61
4.1.3	83% - ImprovedSupplyFanMotor (ECM)	648.94	81.36	23.94	112.45	866.69	117.53	2581.71	1123.00	61.01
4.2	83% - Improved Heat Transfer Coef	542.61	83.26	23.94	112.57	762.38	13.22	2365.73	1123.00	61.01

Table 6.4.1.6 Energy and Economics Table for Weatherized Gas Furnaces

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
1	78% - Baseline	792.3	59.42	558.30	3461.35	494.53	
1.1	80% - Increased HXArea	773.2	57.99	544.83	3467.85	483.48	0.6
1.1.1	80% - Improved Insulation	771.8	57.88	543.84	3477.96	482.67	1.4
1.1.2	80% - ImprovedCircBlowerMotor (PSC)	773.9	58.04	531.72	3474.07	482.84	1.1
1.1.3	80% - ImprovedSupplyFanMotor (ECM)	778.1	58.36	458.74	3681.13	479.30	14.4
1.2	80% - Improved Heat Transfer Coef	773.2	57.99	544.83	3477.55	483.48	1.5
2.1	81% - Increased HXArea	763.9	57.29	538.33	3474.24	478.15	0.8
2.1.1	81% - Improved Insulation	762.6	57.19	537.37	3484.35	477.36	1.3
2.1.2	81% - ImprovedCircBlowerMotor (PSC)	764.7	57.35	525.37	3480.46	477.52	1.1
2.1.3	81% - ImprovedSupplyFanMotor (ECM)	768.7	57.65	453.24	3687.52	473.99	11.0
2.2	81% - Improved Heat Transfer Coef	763.9	57.29	538.33	3480.17	478.15	1.1
3.1	82% - Increased HXArea	754.9	56.62	531.99	3480.82	472.95	0.9
3.1.1	82% - Improved Insulation	753.6	56.52	531.05	3490.92	472.18	1.3
3.1.2	82% - ImprovedCircBlowerMotor (PSC)	755.6	56.67	519.18	3487.03	472.32	1.2
3.1.3	82% - ImprovedSupplyFanMotor (ECM)	759.6	56.97	447.86	3694.09	468.80	9.0
3.2	82% - Improved Heat Transfer Coef	754.9	56.62	531.99	3482.49	472.95	1.0
4.1	83% - Increased HXArea	750.5	56.29	528.87	3491.44	494.80	-
4.1.1	83% - Improved Insulation	744.8	55.86	524.87	3501.54	491.52	13.3
4.1.2	83% - ImprovedCircBlowerMotor (PSC)	751.2	56.34	516.13	3497.65	469.76	1.5
4.1.3	83% - ImprovedSupplyFanMotor (ECM)	755.1	56.64	445.22	3704.71	490.66	62.9
4.2	83% - Improved Heat Transfer Coef	750.5	56.29	528.87	3488.73	494.80	-

Table 6.4.1.7 Cost Table for Mobile Home Gas Furnaces

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Costs (per unit)						Consumer Costs		
		Material	Labor	Transportation	Overhead	Total	Incremental	Retail	Installation	Maintenance
		$	$	$	$	$	$	$	$	$
1	75% - Baseline	174.04	39.35	39.94	20.99	274.31		767.30	0.00	3.99
1	80% - Increased HX Area	197.21	43.55	39.94	22.51	303.20	28.89	848.12	0.00	18.78
1.1	80% ImprovedSupplyFanMotor (ECM)	300.21	43.55	39.94	22.51	406.20	131.89	1136.23	0.00	18.78
1.1.1	80% Modulation 2 stage	323.21	43.55	39.94	22.51	429.20	154.89	1200.57	0.00	23.12
2	81% - Increased HX Area	202.21	44.85	41.13	22.51	310.71	36.40	869.11	0.00	18.78
2.1	81% ImprovedSupplyFanMotor (ECM)	305.21	44.85	41.13	22.51	413.71	139.40	1157.22	0.00	18.78
2.1.1	81% Modulation 2 stage	328.21	44.85	41.13	22.51	436.71	162.40	1221.56	0.00	23.12
3	82% - Increased HX Area	210.21	45.75	42.37	22.51	320.84	46.53	897.45	0.00	18.78
3.1	82% ImprovedSupplyFanMotor (ECM)	313.21	45.75	42.37	22.51	423.84	149.53	1185.56	0.00	18.78
3.1.1	82% Modulation 2 stage	336.21	45.75	42.37	22.51	446.84	172.53	1249.90	0.00	23.12
4	90% Condensing	284.97	54.90	47.92	27.01	414.80	140.49	1160.28	180.51	22.47

Table 6.4.1.8 Energy and Economics Table for Mobile Home Gas Furnaces

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
1	75% - Baseline	781.0	62.57	500.32	767.30	687.95	
1	80% - Increased HX Area	773.2	57.99	544.83	848.12	659.04	2.8
1.1	80% ImprovedSupplyFanMotor (ECM)	778.1	58.36	458.74	1136.23	656.09	11.6
1.1.1	80% Modulation 2 stage	757.0	56.77	484.43	1200.57	646.12	10.4
2	81% - Increased HX Area	1018.6	76.39	717.77	869.11	862.28	-
2.1	81% ImprovedSupplyFanMotor (ECM)	1025.0	76.87	604.32	1157.22	858.33	-
2.1.1	81% Modulation 2 stage	997.5	74.81	638.37	1221.56	844.09	-
3	82% - Increased HX Area	1006.6	75.49	709.31	897.45	852.34	-
3.1	82% ImprovedSupplyFanMotor (ECM)	1012.8	75.96	597.15	1185.56	848.38	-
3.1.1	82% Modulation 2 stage	986.0	73.95	631.00	1249.90	834.61	-
4	90% Condensing	919.9	68.99	648.21	1340.79	784.22	-

Table 6.4.1.9 Cost Table for Oil-fired Furnaces

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturing Costs (per unit)						Consumer Costs		
		Material	Labor	Trans-portation	Overhead	Total	Incre-mental	Retail	Installation	Maintanence
		$	$	$	$	$	$	$	$	$
1	78% - Baseline	368.23	131.87	37.03	71.03	608.16		1806.45	751.12	103.54
1	80%- IncreasedHXArea	370.23	131.87	37.03	71.03	610.16	2.00	1810.43	751.12	103.54
2	81% - IncreasedHXArea	372.34	132.25	37.03	71.30	612.92	4.76	1815.92	751.12	103.54
2.1	81% Fan Atomized Burner w/ Two-stage Modulation	505.34	138.25	37.77	76.30	757.66	149.50	2104.01	751.12	103.54
2.2	81% Interrupted Ignition	388.84	132.25	37.03	71.30	629.42	21.26	1848.76	751.12	103.54
2.3	81% ImprovedSupplyFanMotor (ECM)	475.34	132.25	37.03	71.30	715.92	107.76	2020.93	751.12	103.54
3	82% - IncreasedHXArea	373.81	132.25	37.03	71.30	614.38	6.22	1818.84	751.12	103.54
3.1	82% Fan Atomized Burner w/ Two-stage Modulation	506.81	138.25	37.77	76.30	759.12	150.96	2106.92	751.12	103.54
3.2	82% Interrupted Ignition	390.31	132.25	37.03	71.30	630.88	22.72	1851.68	751.12	103.54
3.3	82% ImprovedSupplyFanMotor (ECM)	476.81	132.25	37.03	71.30	717.38	109.22	2023.84	751.12	103.54
4	83% - IncreasedHXArea	375.27	132.46	37.03	71.70	616.45	8.29	1822.95	751.12	103.54
4.1	83% Fan Atomized Burner w/ Two-stage Modulation	508.27	138.46	37.77	76.70	761.19	153.03	2111.04	751.12	103.54
4.2	83% Interrupted Ignition	391.77	132.46	37.03	71.70	632.95	24.79	1855.79	751.12	103.54
4.3	83% ImprovedSupplyFanMotor (ECM)	478.27	132.46	37.03	71.70	719.45	111.29	2027.96	751.12	103.54
5	84% - IncreasedHXArea	376.74	132.46	37.03	71.70	617.92	9.76	1825.87	1641.05	103.54
5.1	84% Fan Atomized Burner w/ Two-stage Modulation	509.74	138.46	37.77	76.70	762.66	154.50	2113.95	1641.05	103.54
5.2	84% Interrupted Ignition	393.24	132.46	37.03	71.70	634.42	26.26	1858.71	1641.05	103.54
5.3	84% ImprovedSupplyFanMotor (ECM)	479.74	132.46	37.03	71.70	720.92	112.76	2030.87	1641.05	103.54
6	85% - IncreasedHXArea	381.13	132.46	37.03	71.70	622.31	14.15	1834.61	1641.05	103.54
6.1	85% Fan Atomized Burner w/ Two-stage Modulation	514.13	138.46	37.77	76.70	767.05	158.89	2122.70	1641.05	103.54
6.2	85% Interrupted Ignition	397.63	132.46	37.03	71.70	638.81	30.65	1867.46	1641.05	103.54
6.3	85% ImprovedSupplyFanMotor (ECM)	484.13	132.46	37.03	71.70	725.31	117.15	2039.62	1641.05	103.54

Table 6.4.1.10 Energy and Economics Table for Oil-fired Furnaces

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
1	78% - Baseline	943.7	99.09	969.09	2557.57	1200.60	
1	80%- IncreasedHXArea	920.9	96.69	945.69	2561.56	1174.10	0.2
2	81% - IncreasedHXArea	909.9	95.54	934.41	2567.05	1161.33	0.2
2.1	81% Fan Atomized Burner w/ Two-stage Modulation	897.3	94.21	759.22	2855.13	1133.91	4.5
2.2	81% Interrupted Ignition	920.5	96.66	920.53	2599.89	1171.73	1.5
2.3	81% ImprovedSupplyFanMotor (ECM)	914.0	95.97	833.41	2772.05	1157.83	5.0
3	82% - IncreasedHXArea	899.2	94.41	923.39	2569.96	1148.86	0.2
3.1	82% Fan Atomized Burner w/ Two-stage Modulation	886.8	93.12	750.39	2858.05	1121.93	3.8
3.2	82% Interrupted Ignition	909.6	95.50	663.47	2602.80	1139.70	0.7
3.3	82% ImprovedSupplyFanMotor (ECM)	903.2	94.83	823.54	2774.97	1145.34	3.9
4	83% - IncreasedHXArea	888.7	93.31	912.63	2574.08	1136.68	0.3
4.1	83% Fan Atomized Burner w/ Two-stage Modulation	876.6	92.05	741.77	2862.16	1110.22	3.4
4.2	83% Interrupted Ignition	898.8	94.38	655.65	2606.92	1127.49	0.7
4.3	83% ImprovedSupplyFanMotor (ECM)	892.6	93.72	813.90	2779.08	1133.15	3.3
5	84% - IncreasedHXArea	878.5	92.24	902.12	3466.92	1124.78	12.0
5.1	84% Fan Atomized Burner w/ Two-stage Modulation	866.7	91.00	733.34	3755.01	1098.78	11.8
5.2	84% Interrupted Ignition	888.4	93.28	648.01	3499.76	1115.56	11.1
5.3	84% ImprovedSupplyFanMotor (ECM)	882.3	92.64	804.48	3671.93	1121.24	14.0
6	85% - IncreasedHXArea	868.5	91.19	891.85	3475.67	1113.15	10.5
6.1	85% Fan Atomized Burner w/ Two-stage Modulation	856.9	89.98	725.10	3763.75	1087.60	10.7
6.2	85% Interrupted Ignition	878.1	92.20	640.55	3508.51	1103.91	9.8
6.3	85% ImprovedSupplyFanMotor (ECM)	872.2	91.58	795.28	3680.67	1109.60	12.3

Table 6.4.1.11 Cost Table for Gas Boilers (Installation Model Data)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Cost (per unit)						Consumer Costs		
		Material	Labor	Trans-portation	Overhead	Total	Incre-mental	Retail	Install-ation	Main-tanence
		$	$	$	$	$	$	$	$	$
0	80% - Baseline	378.95	63.53	32.10	39.81	514.40		1527.94	1678.86	36.61
1	81% - Improved Heat Transfer Coef & Electronic Ignition	408.27	63.53	32.10	39.81	543.72	29.32	1586.30	1678.86	36.61
1.1	81% Two stage Modulation + Induced Draft	461.27	66.93	33.06	45.31	606.58	92.19	1711.42	1678.86	36.61
1.2	81% Improved Circulating Pump	511.27	63.53	32.10	39.81	646.72	132.32	1791.31	1678.86	36.61
2	82% - Improved Heat Transfer Coef & Electronic Ignition	414.84	63.53	32.10	43.06	553.53	39.14	1605.83	1678.86	36.61
2.1	82% Two stage Modulation + Induced Draft	467.84	66.93	33.06	48.56	616.39	102.00	1730.95	1678.86	36.61
2.2	82% Improved Circulating Pump	517.84	63.53	32.10	43.06	656.53	142.14	1810.84	1678.86	36.61
3	83% - Improved Heat Transfer Coef & Electronic Ignition	422.81	63.53	32.10	43.06	561.50	47.10	1621.68	1678.86	36.61
3.1	83% Two stage Modulation + Induced Draft	475.81	66.93	33.06	48.56	624.36	109.96	1746.80	1678.86	36.61
3.2	83% Improved Circulating Pump	525.81	63.53	32.10	43.06	664.50	150.10	1826.69	1678.86	36.61
4	84% - Improved Heat Transfer Coef & Electronic Ignition	430.43	63.53	32.10	43.36	569.42	55.03	1637.46	1678.86	36.61
4.1	84% Two stage Modulation + Induced Draft	483.43	66.93	33.06	48.86	632.29	117.89	1762.58	1678.86	36.61
4.2	84% Improved Circulating Pump	533.43	63.53	32.10	43.36	672.42	158.03	1842.47	1678.86	36.61
5	88%	489.73	73.06	32.92	46.39	642.10	127.70	1782.11	2832.62	61.01
6	91%	757.90	63.53	32.10	39.81	893.35	378.95	2282.18	2091.93	64.38
7	99%	1068.42	94.98	76.81	90.60	1330.81	816.41	3152.89	2091.93	64.38

Table 6.4.1.12 Energy and Economics Table for Gas Boilers (Installation Model Data)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
0	80% - Baseline	913.7	99.86	182.73	3206.80	746.94	
1	81% - Improved Heat Transfer Coef & Electronic Ignition	935.5	98.23	211.07	3265.16	737.82	6.4
1.1	81% Two stage Modulation + Induced Draft	928.6	97.50	241.07	3390.28	735.08	15.5
1.2	81% Improved Circulating Pump	936.4	98.32	189.42	3470.16	736.76	25.9
2	82% - Improved Heat Transfer Coef & Electronic Ignition	924.2	97.04	208.52	3284.69	729.33	4.4
2.1	82% Two stage Modulation + Induced Draft	917.4	96.33	238.17	3409.81	726.68	10.0
2.2	82% Improved Circulating Pump	925.1	97.13	187.12	3489.69	728.27	15.2
3	83% - Improved Heat Transfer Coef & Electronic Ignition	913.1	95.88	206.02	3300.54	721.03	3.6
3.1	83% Two stage Modulation + Induced Draft	906.5	95.18	235.34	3425.66	718.48	7.7
3.2	83% Improved Circulating Pump	914.0	95.97	184.88	3505.55	719.98	11.1
4	84% - Improved Heat Transfer Coef & Electronic Ignition	902.3	94.74	203.58	3316.32	712.93	3.2
4.1	84% Two stage Modulation + Induced Draft	895.8	94.06	232.57	3441.44	710.47	6.4
4.2	84% Improved Circulating Pump	903.1	94.83	182.69	3521.32	711.89	9.0
5	88%	861.6	90.46	194.38	4614.73	706.78	35.1
6	91%	1000.0	105.00	225.61	4374.11	813.90	-
7	99%	919.6	96.56	207.48	5244.81	753.65	-

Table 6.4.1.13 Cost Table for Gas Boilers (GRI Data)

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Cost (per unit)						Consumer Costs		
		Material	Labor	Trans-portation	Overhead	Total	Incre-mental	Retail	Install-ation	Main-tanence
		$	$	$	$	$	$	$	$	$
0	80% - Baseline	378.95	63.53	32.10	39.81	514.40		1527.94	1544.72	36.61
1	81% - Improved Heat Transfer Coef & Electronic Ignition	408.27	63.53	32.10	39.81	543.72	29.32	1586.30	1544.72	36.61
1.1	81% Two stage Modulation + Induced Draft	461.27	66.93	33.06	45.31	606.58	92.19	1711.42	1544.72	36.61
1.2	81% Improved Circulating Pump	511.27	63.53	32.10	39.81	646.72	132.32	1791.31	1544.72	36.61
2	82% - Improved Heat Transfer Coef & Electronic Ignition	414.84	63.53	32.10	43.06	553.53	39.14	1605.83	1544.72	36.61
2.1	82% Two stage Modulation + Induced Draft	467.84	66.93	33.06	48.56	616.39	102.00	1730.95	1544.72	36.61
2.2	82% Improved Circulating Pump	517.84	63.53	32.10	43.06	656.53	142.14	1810.84	1544.72	36.61
3	83% - Improved Heat Transfer Coef & Electronic Ignition	422.81	63.53	32.10	43.06	561.50	47.10	1621.68	1544.72	36.61
3.1	83% Two stage Modulation + Induced Draft	475.81	66.93	33.06	48.56	624.36	109.96	1746.80	1544.72	36.61
3.2	83% Improved Circulating Pump	525.81	63.53	32.10	43.06	664.50	150.10	1826.69	1544.72	36.61
4	84% - Improved Heat Transfer Coef & Electronic Ignition	430.43	63.53	32.10	43.36	569.42	55.03	1637.46	1544.72	36.61
4.1	84% Two stage Modulation + Induced Draft	483.43	66.93	33.06	48.86	632.29	117.89	1762.58	1544.72	36.61
4.2	84% Improved Circulating Pump	533.43	63.53	32.10	43.36	672.42	158.03	1842.47	1544.72	36.61
5	88%	489.73	73.06	32.92	46.39	642.10	127.70	1782.11	2831.88	61.01
6	91%	757.90	63.53	32.10	39.81	893.35	378.95	2282.18	2091.93	64.38
7	99%	1068.42	94.98	76.81	90.60	1330.81	816.41	3152.89	2091.93	64.38

Table 6.4.1.14 Energy and Economics Table for Gas Boilers (GRI Data)

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
0	80% - Baseline	913.7	99.86	182.73	3072.66	746.94	
1	81% - Improved Heat Transfer Coef & Electronic Ignition	935.5	98.23	211.07	3131.02	737.82	6.4
1.1	81% Two stage Modulation + Induced Draft	928.6	97.50	241.07	3256.14	235.08	15.5
1.2	81% Improved Circulating Pump	936.4	98.32	189.42	3336.03	736.76	25.9
2	82% - Improved Heat Transfer Coef & Electronic Ignition	924.2	97.04	208.52	3150.55	729.33	4.4
2.1	82% Two stage Modulation + Induced Draft	917.4	96.33	238.17	3275.67	726.68	10.0
2.2	82% Improved Circulating Pump	925.1	97.13	187.12	3355.56	728.27	15.2
3	83% - Improved Heat Transfer Coef & Electronic Ignition	913.1	95.88	206.02	3166.40	721.03	3.6
3.1	83% Two stage Modulation + Induced Draft	906.5	95.18	235.34	3291.52	718.48	7.7
3.2	83% Improved Circulating Pump	914.0	95.97	184.88	3371.41	719.98	11.1
4	84% - Improved Heat Transfer Coef & Electronic Ignition	902.3	94.74	203.58	3182.18	712.93	3.2
4.1	84% Two stage Modulation + Induced Draft	895.9	94.06	232.57	3307.30	710.47	6.4
4.2	84% Improved Circulating Pump	903.1	94.83	182.69	3387.19	711.89	9.0
5	88%	861.6	90.46	194.38	4614.00	706.78	38.4
6	91%	1000.0	105.00	225.61	4374.11	813.90	-
7	99%	919.6	96.56	207.48	5244.81	753.65	-

Table 6.4.1.15 Cost Table for Oil-fired Boilers

ID	Efficiency Levels & Design Options	Cost Data								
		Manufacturer Cost (per unit)						Consumer Costs		
		Material	Labor	Transport-ation	Overhead	Total	Incremen-tal	Retail	Instal-lation	Main-tanence
		$	$	$	$	$	$	$	$	$
0	80%	507.31	50.20	39.80	43.05	640.37		1902.12	1631.21	103.54
1	81%- IncreasedHXArea	508.11	52.36	39.80	43.80	644.08	3.71	1909.52	1631.21	103.54
1.1	81% Interrupted Ignition	524.61	52.36	39.80	43.80	660.58	20.21	1942.36	1631.21	103.54
1.2	81% Improved Circulating Pump	611.11	52.36	39.80	43.80	747.08	106.71	2114.52	1631.21	103.54
2	82%- IncreasedHXArea	508.92	54.52	39.80	44.55	647.80	7.43	1916.91	1631.21	103.54
2.1	82% Fan Atomized Burner w/ Two-stage Modulation	641.92	60.52	40.60	49.55	792.59	152.22	2205.10	1631.21	103.54
2.2	82% Interrupted Ignition	525.42	54.52	39.80	44.55	664.30	23.93	1949.75	1631.21	103.54
2.3	82% Improved Circulating Pump	611.92	54.52	39.80	44.55	750.80	110.43	2121.91	1631.21	103.54
3	83%- IncreasedHXArea	509.72	56.68	39.80	45.30	651.51	11.14	1924.30	1631.21	103.54
3.1	83% Fan Atomized Burner w/ Two-stage Modulation	642.72	62.68	40.60	50.30	796.31	155.94	2212.49	1631.21	103.54
3.2	83% Interrupted Ignition	526.22	56.68	39.80	45.30	668.01	27.64	1957.14	1631.21	103.54
3.3	83% Improved Circulating Pump	612.72	56.68	39.80	45.30	754.51	114.14	2129.31	1631.21	103.54
4	84%- IncreasedHXArea	510.53	58.84	39.80	46.05	655.22	14.86	1931.69	1631.21	103.54
4.1	84% Fan Atomized Burner w/ Two-stage Modulation	643.53	64.84	40.60	51.05	800.02	159.65	2219.89	1631.21	103.54
4.2	84% Interrupted Ignition	527.03	58.84	39.80	46.05	671.72	31.36	1964.53	1631.21	103.54
4.3	84% Improved Circulating Pump	613.53	58.84	39.80	46.05	758.22	117.86	2136.70	1631.21	103.54
5	86%- IncreasedHXArea	512.13	63.16	39.80	47.56	662.65	22.28	1946.48	2556.58	103.54
5.1	86% Fan Atomized Burner w/ Two-stage Modulation	645.13	69.16	40.60	52.56	807.45	167.08	2234.67	2556.58	103.54
5.2	86% Interrupted Ignition	528.63	63.16	39.80	47.56	679.15	38.78	1979.32	2556.58	103.54
5.3	86% Improved Circulating Pump	615.13	63.16	39.80	47.56	765.65	125.28	2151.48	2556.58	103.54
6	90%	801.89	82.11	105.10	85.60	1074.70	434.33	2766.59	2091.93	103.54
7	95%	1268.28	82.11	40.17	85.60	1476.16	835.79	3565.64	2091.93	103.54

Table 6.4.1.16 Energy and Economics Table for Oil-fired Boilers

ID	Efficiency Levels & Design Options	Energy Use Data			Summary Economics		
					Total Costs		Simple Payback
		BOH	Fuel	Electric	Total Installed	Total Operating	
		hr	MBtu/yr	kWh/year	$	$/yr	years
0	80%	992.8	138.99	348.34	3533.33	1563.16	
1	81%- IncreasedHXArea	980.7	137.29	344.08	3540.73	1545.29	0.4
1.1	81% Interrupted Ignition	984.1	137.78	228.26	3573.57	1541.25	1.8
1.2	81% Improved Circulating Pump	981.3	137.39	321.42	3745.73	1544.50	11.4
2	82%- IncreasedHXArea	968.8	135.63	339.92	3548.12	1527.85	0.4
2.1	82% Fan Atomized Burner w/ Two-stage Modulation	965.0	135.10	229.24	3836.31	1521.58	7.3
2.2	82% Interrupted Ignition	972.2	136.11	225.49	3580.96	1523.80	1.2
2.3	82% Improved Circulating Pump	969.5	135.72	317.53	3753.12	1527.06	6.1
3	83%- IncreasedHXArea	957.2	134.01	335.85	3555.51	1510.82	0.4
3.1	83% Fan Atomized Burner w/ Two-stage Modulation	953.5	133.49	325.32	3843.70	1504.70	5.3
3.2	83% Interrupted Ignition	960.5	134.47	222.78	3588.35	1506.76	1.0
3.3	83% Improved Circulating Pump	957.9	134.10	313.73	3760.52	1510.03	4.3
4	84%- IncreasedHXArea	945.9	132.43	331.88	3562.90	1494.20	0.4
4.1	84% Fan Atomized Burner w/ Two-stage Modulation	942.3	131.92	321.49	3851.10	1488.21	4.2
4.2	84% Interrupted Ignition	949.2	132.88	220.14	3595.74	1490.13	0.9
4.3	84% Improved Circulating Pump	946.5	132.51	310.02	3767.91	1493.40	3.4
5	86%- IncreasedHXArea	924.1	129.37	324.23	4503.05	1462.11	9.6
5.1	86% Fan Atomized Burner w/ Two-stage Modulation	931.4	130.39	317.75	4791.25	1472.10	13.8
5.2	86% Interrupted Ignition	927.2	129.80	215.04	4535.90	1458.02	9.5
5.3	86% Improved Circulating Pump	924.7	129.45	302.86	4708.06	1461.31	11.5
6	90%	883.3	123.66	309.92	4858.52	1402.17	8.2
7	95%	956.7	133.94	335.68	5657.56	1510.11	40.0