

Standard Resistance Electric Heat @ 100% Efficiency			
Electric (\$/kWh) 100% Efficiency	Propane (\$/Gallon) 90% Efficiency	Fuel Oil (\$/Gallon) 80% Efficiency	Natural Gas (\$/Therm) 90% Efficiency
0.05	1.21	1.64	1.32
0.052	1.26	1.71	1.37
0.054	1.30	1.77	1.42
0.056	1.35	1.84	1.48
0.058	1.40	1.90	1.53
0.06	1.45	1.97	1.58
0.062	1.50	2.03	1.63
0.064	1.55	2.10	1.69
0.066	1.59	2.17	1.74
0.068	1.64	2.23	1.79
0.07	1.69	2.30	1.85
0.072	1.74	2.36	1.90
0.074	1.79	2.43	1.95
0.076	1.84	2.49	2.00
0.078	1.88	2.56	2.06
0.08	1.93	2.63	2.11
0.082	1.98	2.69	2.16
0.084	2.03	2.76	2.22
0.086	2.08	2.82	2.27
0.088	2.13	2.89	2.32
0.09	2.17	2.95	2.37
0.095	2.29	3.12	2.51
0.10	2.42	3.28	2.64
0.105	2.54	3.45	2.77
0.11	2.66	3.61	2.90
0.115	2.78	3.77	3.03
0.12	2.90	3.94	3.16
0.125	3.02	4.10	3.30
0.13	3.14	4.27	3.43
0.135	3.26	4.43	3.56
0.14	3.38	4.59	3.69
0.145	3.50	4.76	3.82

Air-Source Heat Pump (ASHP) combined with Modulating Supplemental Electric Heat @ 200% Efficiency			
ASHP/Supp. (\$/kWh) 200% Efficiency	Propane (\$/Gallon) 90% Efficiency	Fuel Oil (\$/Gallon) 80% Efficiency	Natural Gas (\$/Therm) 90% Efficiency
0.05	0.60	0.82	0.66
0.052	0.63	0.85	0.69
0.054	0.65	0.89	0.71
0.056	0.68	0.92	0.74
0.058	0.70	0.95	0.76
0.06	0.72	0.98	0.79
0.062	0.75	1.02	0.82
0.064	0.77	1.05	0.84
0.066	0.80	1.08	0.87
0.068	0.82	1.12	0.90
0.07	0.85	1.15	0.92
0.072	0.87	1.18	0.95
0.074	0.89	1.21	0.98
0.076	0.92	1.25	1.00
0.078	0.94	1.28	1.03
0.08	0.97	1.31	1.05
0.082	0.99	1.35	1.08
0.084	1.01	1.38	1.11
0.086	1.04	1.41	1.13
0.088	1.06	1.44	1.16
0.09	1.09	1.48	1.19
0.095	1.15	1.56	1.25
0.10	1.21	1.64	1.32
0.105	1.27	1.72	1.38
0.11	1.33	1.80	1.45
0.115	1.39	1.89	1.52
0.12	1.45	1.97	1.58
0.125	1.51	2.05	1.65
0.13	1.57	2.13	1.71
0.135	1.63	2.22	1.78
0.14	1.69	2.30	1.85
0.145	1.75	2.38	1.91

Ground Source Heat Pump (GSHP) @ 330% Efficiency			
GSHP (\$/kWh) 330% Efficiency	Propane (\$/Gallon) 90% Efficiency	Fuel Oil (\$/Gallon) 80% Efficiency	Natural Gas (\$/Therm) 90% Efficiency
0.05	0.37	0.50	0.40
0.052	0.38	0.52	0.42
0.054	0.40	0.54	0.43
0.056	0.41	0.56	0.45
0.058	0.42	0.58	0.46
0.06	0.44	0.60	0.48
0.062	0.45	0.62	0.50
0.064	0.47	0.64	0.51
0.066	0.48	0.66	0.53
0.068	0.50	0.68	0.54
0.07	0.51	0.70	0.56
0.072	0.53	0.72	0.58
0.074	0.54	0.74	0.59
0.076	0.56	0.76	0.61
0.078	0.57	0.78	0.62
0.08	0.59	0.80	0.64
0.082	0.60	0.82	0.66
0.084	0.61	0.84	0.67
0.086	0.63	0.86	0.69
0.088	0.64	0.88	0.70
0.09	0.66	0.89	0.72
0.095	0.70	0.94	0.76
0.10	0.73	0.99	0.80
0.105	0.77	1.04	0.84
0.11	0.81	1.09	0.88
0.115	0.84	1.14	0.92
0.12	0.88	1.19	0.96
0.125	0.91	1.24	1.00
0.13	0.95	1.29	1.04
0.135	0.99	1.34	1.08
0.14	1.02	1.39	1.12
0.145	1.06	1.44	1.16

Assumptions

Fuel Source	Btu Heat Content	Annual Seasonal Operating Efficiency
Electricity - standard resistance	3,413 Btu/kWh	100%
Air-Source Heat Pump (ASHP) combined with Modulating Supplemental Electric Heat @ 200% Efficiency	3,413 Btu/kWh	200%
Ground Source Heat Pump (GSHP)	3,413 Btu/kWh	330%
#2 Fuel Oil	140,000 Btu/Gallon	80%
Propane	91,600 Btu/Gallon	90%
Natural Gas	100,000 Btu/Therm	90%

Electric rate to alternate fuel price conversion formula:

$$(\text{Electric Rate} \div \text{Efficiency}) \times (\text{Alternate Btu Heat Content} \times \text{Efficiency}) \div 3,413 = \text{Alternate Fuel Price}$$

Example of \$0.06/kWh ASHP with Modulating Supplemental Electric Heat @ 200% efficiency to Propane @ 90% efficiency
 $(91,600 \times 90\%) \div 3,413 = \$0.72/\text{gallon propane}$

$$(.06 \div 200\%) \times$$

Alternate fuel price to electric rate conversion formula:

$$(\text{Alternate Fuel Price} \div \text{Efficiency}) \times (3,413 \times \text{efficiency}) \div \text{Alternate Fuel Btu Heat Content} = \text{Electric Rate}$$

Example of \$0.72/Gallon Propane @ 90% efficiency to ASHP with Modulating Supplemental Electric Heat @ 200% efficiency
 $(.72 \div 90\%) \times (3,413 \times 200\%) \div 91,600 = \$0.06/\text{kWh}$

