Kilowatt Hours to Heat Water

Amount of Water		Temperature Rise (°F)						
Cubic Feet	Gallons	20	40	60	80	100	120	140
		Kilowatts to heat in one hour						
0.67	5	0.3	0.5	0.8	1.1	1.3	1.6	1.9
1.3	10	0.5	1.1	1.6	2.2	2.7	3.2	3.8
2.0	15	0.8	1.6	2.4	3.2	4.0	4.8	5.6
2.7	20	1.1	2.2	3.2	4.3	5.4	6.5	7.5
3.3	25	1.3	2.7	4	5.4	6.7	8.1	9.4
4.0	30	1.6	3.2	4.8	6.5	8.1	9.7	11.3
5.3	40	2.2	4.3	6.5	8.6	10.8	12.9	15.1
6.7	50	2.7	5.4	8.1	10.8	13.5	16.1	18.8
8.0	60	3.2	6.5	9.7	12.9	16.1	19.4	22.6
9.4	70	3.8	7.5	11.3	15.1	18.8	22.6	26.4
10.7	80	4.3	8.6	12.9	17.2	21.5	25.8	30.1
12.0	90	4.8	9.7	14.5	19.4	24.2	29.1	33.9
13.4	100	5.4	10.8	16.1	21.5	26.9	32.3	37.7
16.7	125	6.7	13.5	20.2	26.9	33.6	40.4	47.1
20.1	150	8.1	16.1	24.2	32.3	40.4	48.4	56.5
23.4	175	9.4	18.8	28.2	37.7	47.1	56.5	65.9
26.7	200	10.8	21.5	32.3	43	53.8	64.6	75.3
33.4	250	13.5	26.9	40.4	53.8	67.3	80.7	94.2
40.1	300	16.1	32.3	48.4	64.6	80.7	96.9	113.0
53.5	400	21.5	43.0	64.6	86.1	107.6	129.1	150.7
66.8	500	26.9	53.8	80.7	107.6	134.5	161.4	188.3

For Water:

Use Equation 1 for heating flowing water.

Use Equation 2 or the table for heating water in tanks.

Equation 1

$$KW = GPM \times \text{Temperature Rise (°F)} \times .16$$

Equation 2

$$KW = \frac{\text{Gallons} \times \text{Temperature Rise (°F)}}{372 \times \text{Heat-up time (hrs.)}}$$

NOTE: ***10% safety factor is included.***

Kilowatt Hours to Heat Oil

Amount of Oil		Temperature Rise (°F)					
Cubic Feet	Gallons	50	100	200	300	400	500
		Kilowatts to Heat in One Hour					
0.67	5	0.3	0.7	1.4	2.09	2.79	3.49
1.3	10	0.7	1.4	2.8	4.19	5.58	6.98
2.0	15	1	2.1	4.2	6.28	8.37	10.5
2.7	20	1.4	2.8	5.6	8.37	11.2	14
3.3	25	1.7	3.5	7	10.5	14	17.4
4.0	30	2.1	4.2	8.4	12.6	16.7	20.9
5.3	40	2.8	5.6	11	16.7	22.3	27.9
6.7	50	3.5	7	14	20.9	27.9	34.9
8.0	60	4.2	8.4	17	25.1	33.5	41.9
9.4	70	4.9	9.8	20	29.3	39.1	48.8
10.7	80	5.6	11	22	33.5	44.7	55.8
12.0	90	6.3	13	25	37.7	50.2	62.8
13.4	100	7	14	28	41.9	55.8	69.8
16.7	125	8.7	17	35	52.3	69.8	87.2
20.1	150	10	21	42	62.8	83.7	105
23.4	175	12	24	49	73.3	97.7	122
26.7	200	14	28	56	83.7	112	140
33.4	250	17	35	70	105	140	174
40.1	300	21	42	84	126	167	209
53.5	400	28	56	112	167	223	279
66.8	500	35	70	140	209	279	349

For Oil:

Use equation or table

$$KW = \frac{\text{Gallons} \times \text{Temperature Rise (°F)}}{860 \times \text{Heat-up time (hrs.)}}$$

NOTE: The above KW values are based on an average specific heat of 0.45 (btu/lb/°F) and a Density of 7.35 lb/gallon plus a 20% safety factor. This table should be used only as a guide; exact wattage requirements can be calculated using the formulas on pages 16-2 and 16-6.

Kilowatts to Heat Air

Amt. of Air SCFM	Temperature Rise (°F)										
	50	100	150	200	250	300	350	400	450	500	600
100	1.7	3.3	5	6.7	8.3	10	11.7	13.3	15	16.7	20
200	3.3	6.7	10	13.3	16.7	20	23.3	26.7	30	33.3	40
300	5	10	15	20	25	30	35	40	45	50	60
400	6.7	13.3	20	26.7	33.3	40	46.7	53.3	60	66.7	80
500	8.3	16.7	25	33.3	41.7	50	58.3	66.7	75	83.3	100
600	10	20	30	40	50	60	70	80	90	100	120
700	11.7	23.3	35	46.7	58.3	70	81.7	93.3	105	116.7	140
800	13.3	26.7	40	53.3	66.7	80	93.3	106.7	120	133.3	160
900	15	30	45	60	75	90	105	120	135	150	180
1000	16.7	33.3	50	66.7	83.3	100	116.7	133.3	150	166.7	200
1100	18.3	36.7	55	73.3	91.7	110	128.3	146.7	165	183.3	220
1200	20	40	60	80	100	120	140	160	180	200	240

For free air:

Use equation or table

$$KW = \frac{SCFM \times \text{Temperature Rise (°F)}}{3000}$$

Use the maximum anticipated airflow. This equation assumes insulated duct (negligible heat loss) and 70°F inlet air at 14.7 PSIA.

For compressed air:

$$KW = \frac{CFM^* \times \text{Density}^*(\text{lbs/cu. ft.}) \times \text{Temperature rise (°F)}}{228}$$

***At heater inlet temperature and pressure**

NOTE: If air flow is given in CFM at operating temperature and pressure it can be converted to SCFM (Standard Cubic Feet per Minute) with the following formula:

$$SCFM = CFM \times \frac{PSIG + 14.7}{T + 460} \times 35.37$$

PSIG = operating pressure (gauge pressure in lbs/sq.in.)

T = operating temperature in °F

SCFM = flow rate in CFM at standard conditions of 60°F and 14.7 PSIA.