Central Energy Management Conversions & Notes

Energy Conversions

	BTU	KWH	Foot-pounds	Joules	calories	Kilo-calories
1 BTU	1	$2.93x10^{-4}$	777.9	1055	252.0	0.252
1 KWH	3413	1	$2.655x10^{6}$	$3.6x10^{6}$	$8.598x10^{5}$	859.8
1 joule	$9.481x10^{-4}$	$2.778x10^{-7}$	0.7376	1	0.2388	$2.388x10^{-4}$
1 calorie	0.003969	$1.163x10^{-6}$	3.088	4.187	1	0.001
1 kilocalorie	3.969	0.001163	3088	4187	1000	1
1 Foot-pound	0.001285	3.766x10-7	1	1.356	0.3238	3.238x10-4

Note- 1 Therm of natural gas is 100,000 BTU, 1CF of natural gas is 1008 to 1034 BTU

Power Conversions

	KW	HP	Foot-Pounds per second	calories per second
1 KW	1	1.341	737.6	238.8
1 HP	0.746	1	550	178.1
1 foot-pound per second	0.001356	0.001818	1	0.3238
1 Calorie per second	0.004187	0.005615	3.088	1

H = m (t2 - t1) where H=BTU, m=mass of h20, t1 & t2 are initial & final temps
Kw = (GPH x Trise(F) x 8.34) / (Thermal Eff x 3413)
1 Gal = 3.785 Liters 1 Gal = 8.34Lb @39deg F
1 Kwh = 3413 Btu
Typical Electric Water Heater: EF = 95% Solar w/Electric Backup: EF = 120%
Older Gas Water Heater: EF = 59% New Commercial Gas Water Heaters: EF = 95%
Residential flow rates: Sink 1-2gpm, Shower 1.5-3gpm, Bathtub 2-4gpm, Toilet 1gpm
Heat Loss Formula: H=A(Thot – Tcold) / R, where H=heat loss in BTU/HR, A=Surface Area, Thot=water tempF, Tcold=Air tempF, R=R-value of insulation in sqFt hr/btu
Area of Tank surface=Ends First $2*3.14*(radius)^2$ + Shell Next 2*3.14*radius*height