

Energy Savings Estimation Worksheet for Night Setback

Building Name: _____ **Location (city):** _____ **ECM No.** _____
ECM Description: _____

Instructions

- Complete this form for each building where the winter Occupied Temperature will be reduced.
 a) Complete the input assumptions and provide:
 - a cost estimate for the proposed option.
 b) The spreadsheet will calculate the savings for you.

Conversion Factors (CF)		
to	Conversion	Units
Electric	293	kWh/mmBtu
Natural Gas	10	Therms/mmBtu
Natural Gas	971	Cubic feet/mmBtu
#2 oil	7.2	Gallons/mmBtu
#6 oil	6.7	Gallons/mmBtu
Propane	10.5	Gallons/mmBtu

Input Assumptions

1) Floor Area..... (FA)	<u>1,000</u> Square Feet	6) Average Winter Outdoor Temperature..... (AWT)	<u>39</u> °F
2) Unoccupied hours per day..... (HPD)	<u>24</u> Hours/Day	7) Average Energy Cost Heating Fuel (e.g. kWh, Gal., therms)..... (AEC)	<u>\$ 0.06</u> / kWh (heating unit)
3) Heating Degree Days for the site..... (HDD)	<u>400</u>	8) Estimated Heating System Efficiency**..... (HSE)	<u>100%</u>
4) Current Unoccupied Heating Setpoint.... (CUHS)	<u>72</u> °F	9) Estimated Project Cost..... (PC)	<u>\$ -</u>
5) Proposed Unoccupied Heating Setpoint... (PUHS)	<u>45</u> °F	10) Conversion Factor..... (CF)	<u>293</u> kWh (Units)

Notes: * The value 0.198 is the estimated U-Factor (which is one over the total R-Value) for the walls and roof, and an adjustment to account for the wall area and assumes a square building and correction factor.
 ** The "estimated heating system efficiency" is the annual heating system efficiency; for gas or oil heat use 0.7, for electric resistance heat use 1.0, for heat pumps use 2.0.

$$\begin{aligned}
 \text{Building Heat Loss} &= 0.198^* \times \frac{1,000}{(FA)} \times \frac{24}{(HPD)} \times \frac{400}{(HDD)} / 1,000,000 = \frac{A}{2} \text{ mmBtu/year} \\
 \text{Total heat used} &= \frac{A}{2} / \frac{100\%}{(HSE)} = \frac{B}{2} \text{ mmBtu/year} \\
 \text{Existing Heating Energy Consumption} &= \frac{B}{2} \times \frac{293}{(CF)} \frac{\text{kWh}}{\text{mmBtu}} = \frac{C}{557} \text{ kWh /year (Heating Units/year)} \\
 &= \frac{72}{(CUHS)} - \frac{39}{(AWT)} - \frac{27}{(CUHS - PUHS)} = \frac{D}{6} \\
 &= \frac{6}{(D)} / \left(\frac{72}{(CUHS)} - \frac{39}{(AWT)} \right) = \frac{E}{0.18} \\
 \text{Future Heating Energy Consumption} &= \frac{0.18}{(E)} \times \frac{557}{(C)} = \frac{F}{101} \text{ kWh /year (Heating Units)} \\
 \text{Estimated Energy Savings} &= \frac{557}{(C)} - \frac{101}{(F)} = \frac{G}{456} \text{ kWh /year (Heating Units)} \\
 \text{Dollar Savings} &= \frac{456}{(G)} \times \frac{\$ 0.06}{(AEC)} = \frac{\$ 29}{\text{year}}
 \end{aligned}$$