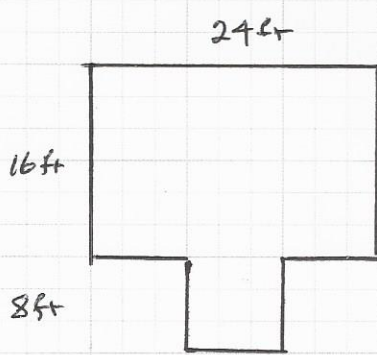


### Brian Waddington Hut Heating



Area: 450 sqft  
Perimeter: 96  
Avg total H: 12  
~ Volume: 5400

Windows:  $4 \times 4' \times 4 + 4' \times 3' \times 2 = 88$   
Doors:  $7' \times 8' = 21'$   
Walls:  $96' \times 12' = 1152$   
Roof:  $450 \times \sqrt{2} = 636$

#### R Values (BTU/hr/°F)

Windows: 0.88  
Doors: 3  
Walls: 1  
Roof: 0.85  
(Baseboard) Floor: 1.25

#### Losses

$$\frac{88}{0.88} + \frac{21}{3} + \frac{1152}{1} + \frac{636}{0.5} + \frac{96}{1.25} = 2600 \text{ BTU/hr/°F}$$

For a 20,000 BTU/hr heater

$$20,000 - 2,600 = 17,400 \text{ BTU/hr/°F}$$

#### Whistler Alpine Temperatures (Typ)

	Dec → Feb	Mar → May
High	23°F (-5°C)	41°F (5°C)
Low	10°F (-12°C)	18°F (-8°C)
Avg	16°F (-7°C)	30°F (-2°C)

#### Goal Temperature of Hut

50°F (10°C) (Low)  
59°F (15°C) (High)

Delta	40°F	30°F
Losses	104,000 BTU/hr	78,000 BTU/hr

2017 propane cost (Van)  
\$80/L → \$280/cylinder

Hrs @ 20,000	5 hr	4 hr
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$$120 \text{ gal} \rightarrow 455 \text{ L} \times 80\% = 363 \text{ L}$$

Days of use	20 days	25 days
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Total Hours	100 hr	100 hr	= 200 hr per winter season
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$$\begin{aligned} & @ 0.926 \text{ lbs/hr} \\ & = 215 \text{ lbs} \end{aligned}$$

Therefore with ~~two~~ 420 lbs tanks we will require @ helicopter drop once over 4 years.

Capital = \$500 × 4 propane tanks  
= \$500 heater  
\$200 equip & access  
\$2700

Operations = \$290/cylinder × 2 cylinders ≈ \$600/4 years

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$$\begin{aligned} & \text{So} = \$150 / \text{year} \\ & = \$40 / \text{hel. min} \times 1/2 \text{ hr} = \$1200 \rightarrow \$600 / \text{year} \end{aligned}$$

{ \$750/year