How much energy do you save by doubling insulation?

The basic equation governing energy transfer across a surface (through a wall, for example) is

$$Q=U×A×ΔT,$$

Where $Q$ is the heat rate, $U$ is the heat transfer coefficient, $A$ is the area for heat transfer, and $ΔT$ is the temperature difference across the wall.

For buildings, you may have heard of the “R-Value,” which describes the insulation value of a material.

Normally, in buildings, we measure heat rate in BTUs per hour. If temperature difference is measured in degrees Fahrenheit, and area $A$ is measured in square feet, then the heat transfer coefficient is related to the R-value by

$$U=\frac{1}{R}.$$

Suppose the R-value of your house is R=6, the temperature inside is 68 degrees, and the temperature outside is 30 degrees, and your house has a surface area of 3000 square feet. How much heat are you losing?

$$Q=\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_.$$

If we double it to R=12, how much energy did you save. (Compute a new Q value, and subtract from old.)

NEW CALCULATION:

Suppose originally your R-value was R=30, and you raise to R=60. How much energy would you save?