How much energy do you save by doubling insulation?

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

Where is the heat rate, is the heat transfer coefficient, is the area for heat transfer, and 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 is measured in square feet, then the heat transfer coefficient is related to the R-value by

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?

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?