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## WILL DOUBLING A WALL'S R-VALUE DOUBLE THE ENERGY EFFICIENCY?

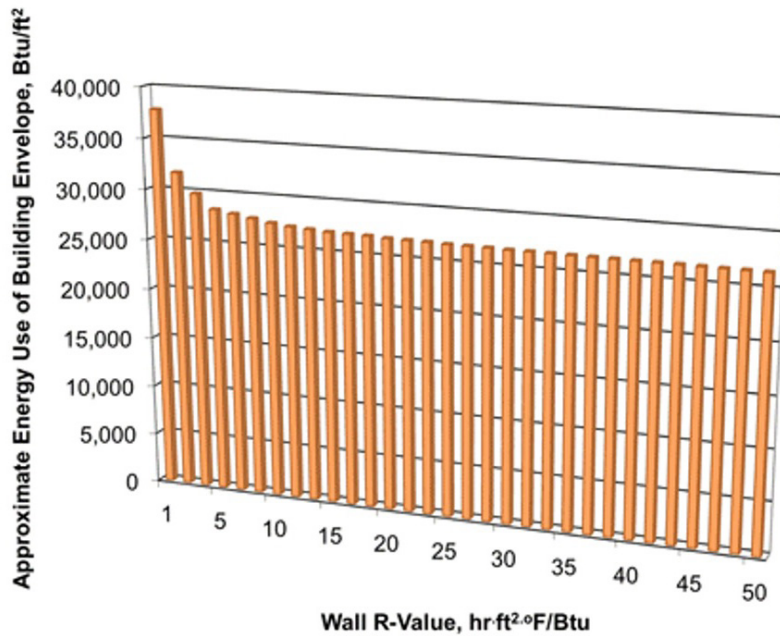
Rarely. Although higher R-Values reduce heat flow through building elements, the R-Values have a diminishing impact on the building envelope energy use as a whole. In other words, it's important not to automatically equate higher R-Value with improved energy efficiency.

As an example, consider a two-story elementary school in Bowling Green, Kentucky. If this school is built using single wythe concrete masonry walls with integral (cell) insulation resulting in a wall assembly R-Value of 7 hr.ft<sup>2</sup>.oF/Btu, a simplistic estimate of the building envelope energy use is roughly 27,800 Btu/ft<sup>2</sup>. If we replace that wall with an R14 wall, the building envelope energy use drops by 2.5%, which is not in proportion to doubling

the wall R-value. Figure 1 illustrates the trend: as wall R-value increases, the wall R-value has less and less impact on the building envelope performance. In this example, a wall R-value larger than about R12 no longer has a significant impact on the envelope energy use. At this point, it may make more sense to invest in energy efficiency measures other than wall insulation.

When required, concrete masonry construction can provide walls with high R-values. For overall project economy, however, the industry recommends a parametric analysis similar to that shown in Figure 1 to determine appropriate insulation levels for the building envelope that provide a meaningful return on the initial investment.

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**Figure 1— Building Energy Use For Varying Wall R-Value**

Figure 1 Notes: Analysis is based on a two-story school in Bowling Green, Kentucky. Other building types and climates will have a similarly-shaped curve, although the individual numbers vary on a case-by-case basis. The y-axis values approximate the total heating and cooling energy associated with an average square foot of surface or square meter of building envelope. This analysis was performed using ENVSTD version 5.0.

## ABOUT CMHA

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