

BENEFITS OF REPLACING RESIDENTIAL CENTRAL AIR CONDITIONING SYSTEMS*

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ABSTRACT

The energy efficiency ratios (EERs) of marketed residential air conditioning equipment have increased during recent years. This investigation examined the benefits of replacing a unit having an EER of 6 with a unit having an EER of 10 in a prototypical two story house located in 32 U.S. cities. The DOE-2.1A building simulation model was used to predict the energy savings associated with this action. The reasonableness of the model for this study was confirmed by comparing the DOE-2.1A predicted energy use data with measured energy use data for the ACES control house in Knoxville, Tennessee, and four specially metered houses in Little Rock, Arkansas.

It is predicted that the seasonal efficiencies (SEERs) of correctly sized units will vary from 0.6 of the rated EERs in the northern part of the country, to 0.8 of the rated EERs in the middle part of the country, and to about the rated EERs in the lower southern part of the country. Oversized units were predicted to have lower SEERs.

Using 1982 capital and electrical energy costs, simple payback periods were calculated to be as low as 5 years in the lower south regions to about 10 to 15 years in the upper south regions. If the air conditioning unit needs replacement, the simple payback period for the incremental cost of installing a high-efficiency unit was calculated to be about 2 to 5 years in these regions. Further savings would be realized if existing oversized units were replaced with properly sized high-efficiency units.

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