

A Multicriteria Framework for Assessing Energy Audit Software for Low-Income Households

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Abstract : Buildings in the United States account for a significant proportion of energy consumption and greenhouse gas (GHG) emissions, and this trend is expected to continue as well as rise in the near future. Low-income households, in particular, bear a disproportionate burden of high building energy consumption and spending due to high energy costs. Energy efficiency improvements need to reach an average of 4% per year in this decade in order to meet global net zero emissions target by 2050, but less than 1 % of U.S. buildings are improved each year. The government has recognized the importance of technology in addressing this issue, and energy efficiency programs have been developed to tackle the problem. The Weatherization Assistance Program (WAP), the largest residential whole-house energy efficiency program in the U.S., is specifically designed to reduce energy costs for low-income households. Under the WAP, energy auditors must follow specific audit procedures and use Department of Energy (DOE) approved energy audit tools or software. This article proposes an expanded framework of factors that should be considered in energy audit software that is approved for use in energy efficiency programs, particularly for low-income households. The framework includes more than 50 factors organized under 14 assessment criteria and can be used to qualitatively and quantitatively score different energy audit software to determine their suitability for specific energy efficiency programs. While the tool can be useful for developers to build new tools and improve existing software, as well as for energy efficiency program administrators to approve or certify tools for use, there are limitations to the model, such as the lack of flexibility that allows continuous scoring to accommodate variability and subjectivity. These limitations can be addressed by using aggregate scores of each criterion as weights that could be combined with value function and direct rating scores in a multicriteria decision analysis for a more flexible scoring.

Keywords : buildings, energy efficiency, energy audit, software

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