Analyzing the Results of Buildings Energy Audit by Using Grey Set Theory

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Abstract : Grey set theory has the advantage of using fewer data to analyze many factors, and it is therefore more appropriate for system study rather than traditional statistical regression which require massive data, normal distribution in the data and few variant factors. So, in this paper grey clustering and entropy of coefficient vector of grey evaluations are used to analyze energy consumption in buildings of the Oil Ministry in Tehran. In fact, this article intends to analyze the results of energy audit reports and defines most favorable characteristics of system, which is energy consumption of buildings, and most favorable factors affecting these characteristics in order to modify and improve them. According to the results of the model, 'the real Building Load Coefficient' has been selected as the most important system characteristic and 'uncontrolled area of the building' has been diagnosed as the most favorable factor which has the greatest effect on energy consumption of building. Grey clustering in this study has been used for two purposes: First, all the variables of building relate to energy audit cluster in two main groups of indicators and the number of variables is reduced. Second, grey clustering with variable weights has been used to classify all buildings in three categories named 'no standard deviation', 'low standard deviation' and 'non- standard'. Entropy of coefficient vector of Grey evaluations is calculated to investigate greyness of results. It shows that among the 38 buildings surveyed in terms of energy consumption, 3 cases are in standard group, 24 cases are in 'low standard deviation' group and 11 buildings are completely non-standard. In addition, clustering greyness of 13 buildings is less than 0.5 and average uncertainly of clustering results is 66%.