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## An expeditious method for comparing sustainable rating systems for residential buildings

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### Abstract

Rating systems for sustainability (R.S.), started to be largely used in the assessment of built environment since the early '90s. The diffusion of these tools led to several benefits but also underlined some critical issues. One of the main hitches is the difficulty in comparing methods and results of different assessments, which have been developed at different times and places, following specific approaches.

This paper aims at proposing a method to compare different R.S. and their outcomes, by mapping what and how much they have in common, to identify a shared core of elements that could be considered the most representative in assessing the sustainability of the built environment, focusing particularly on residential buildings.

The predictable loss of accuracy due to the reduction of the considered indicators is analyzed, to define an acceptable level of reliability of the resulting concise R.S., whose simplification can, however, help to facilitate its wider application.

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### 1. Rating Systems and their limits

Several tools for assessing the sustainability of buildings -or some of its features- are available today [1]. They span from the evaluation of the environmental behavior of the building during its entire life cycle, to the appraisal of energy efficiency, or merely of energy consumption, assumed as the most important feature of the overall building performances.

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The more comprehensive approach, which include environmental, economic and social issues whose assessment, is based on multidimensional and multi-criterial analysis by which single factors are separately evaluated by specific indicators and then combined in order to give a final overall rating by scores, on the basis of predefined performance levels [2]. Because of this, they are known as sustainable building rating systems (R.S.). Among their many virtues and potentials in allowing an objective measure of sustainability, R.S. also show some issues [3], that can hinder the implementation of the good precepts from which they derive:

- Complexity of operations, due to the large number of variables that must be considered, which require several specialized auditors and long elaboration times in most cases, with subsequent high costs, which are often a key barrier to perform the assessment
- Relevant complexity and costs imply the weak application of the R.S. in small projects, such as in residential sector, which is the most penalized despite its high potential demand
- The almost total inability of comparison of the results issued from different R.S. due to a lack of homogeneity and cross-coherence between them

In order to both encourage the use of sustainable practices in housing sector and limit the unsuitable proliferation of R.S., it would be very beneficial to establish a simplified methodology, which is proven able to preserve the multi-criteria approach, an adequate level of reliability as well as a robust coherence with the R.S. currently in use. Extracting a core set of common criteria and indicators from the most representative R.S. it appears an effective way to reach such result. A simplified R.S. based on this set of criteria could permit the development of a methodology able to compare the results obtained from different systems, providing a basic common standard suitable to make comparable the sustainability assessment issued from different existing R.S.

This paper presents a procedure by which a set of criteria have been drawn up from different existing R.S., highlighting what criteria are in common and to what extent, in order to identify a core set of indicators applicable in particular to residential buildings.

## **2. Methodology for Rating Systems comparison**

Despite almost all R.S. share common target and approach to the issue of sustainability assessment, their structures, indicators and metrics were developed independently and are extremely inhomogeneous. Therefore, it is impossible to map directly the matches between corresponding specifications, if not through the medium of an external "interface" which provides a common structure to which the specifications of individual RS can be referred. For this purpose:

- A common platform has been defined, which retains the basic features of "Active House", an evaluation system developed in northern Europe specifically for housing, since 2007
- A limited set of current R.S. has been selected on the basis of specific criteria, in order to have a representative sample, to be subjected to the next stage of comparison
- Summary boards for each selected R.S. have been draw up, in which its main features were listed (such as the structure by areas of assessment, the criteria assigned to each area and the weight assigned to each criterion included in the areas). So, the correspondences among the evaluation structures of different Systems have been marked and the level of similarity (as a percentage) between them has been calculated
- A common platform of 11 evaluation areas has been identified and the level of importance assigned to each of them by each R.S. has been recorded, determining area by area the compliance of each system to the reference platform
- Final considerations on the obtained results have been deducted, with respect in particular to the Active House system, in order to verify the reliability of its simple evaluation structure in providing a reference for a common platform

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