Editorial   **Open Access**

Uncertainties in Life Cycle Cost Analysis of Buildings Energy Efficiency Measures

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Editorial

Life Cycle Cost (LCC) analysis in the field of building renovation is considered an important decision support of the design process in order to compare the effectiveness of different energy efficiency measures (EEMs). The importance of using LCC analysis in the field of buildings and building renovation has been introduced at regulatory level in different countries. LCC methodologies related to energy efficiency measures have been introduced in Europe by Directive 2010/31/EU on the energy performance of buildings [1]. The Directive established that Member States shall calculate "cost-optimal levels" of minimum energy performance requirements using a comparative methodology framework according to the consequent Commission Delegated Regulation and its Guidelines [2,3] based on EN 15459:2007 [4].

Unfortunately, accurate Cost Analysis relies on quality of data and data uncertainty is a well-recognised issue associated with LCC deterministic calculation methods [5-8]. In particular results are heavily dependent on future trends for economic data and the corresponding uncertainty (i.e. inflation rate and energy prices). In the methodology framework established by Directive 2010/31/EU, the practice of using constant market interest rate for calculating the discount rate ignores the possibility of variations over the life cycle of the building resulting from changes in national and international monetary and fiscal policies. Also the prediction of inflation rates over a long-term period increases the uncertainty. Another uncertain area in LCC forecasting is determining the service life of building components [9].

If LCC methodologies in the field of buildings are considered as important decision supports, it is then necessary to assess and communicate the problem of uncertainties properly. Otherwise decisions might be made, which are based on faulty assumptions [6].

Several studies exist that deal with probabilistic analysis in building simulation, particularly focusing on Building Energy Simulation (BES) [10-14], in order to overcome the limit of deterministic models and to credit the solutions with "robustness" that is the probability to obtain a certain performance level [15]. Nevertheless, specific literature on probabilistic methodologies in LCC of buildings is still very fragmented. While a deterministic LCC analysis approach requires input variables that are fixed and distinct in both time and cost, in a probabilistic approach variables are modeled using a probabilistic distribution function (PDF) and the quantification of the uncertainty of the outputs is a result of possible variance of the input parameters.

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2. Commission Delegated Regulation (EU) No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements (Text with EEA relevance).

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