

THE ROLE OF OPERATIONAL RATING FOR ACHIEVING THE NZEB TARGET: THE NEED FOR NEW STANDARDS

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SUMMARY

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Abstract

Building energy operational rating is a measure of the actual energy performance of a building, based on its operational data such as energy use, occupant behavior, and weather conditions. It plays a crucial role in reducing the energy consumption of buildings by identifying areas of inefficiency and providing a means to monitor and improve energy performance over time. This study aims to explore the role of energy operational rating in achieving the goal of nearly zero energy buildings (nZEBs). Using evidence from the EU funded DEPC project, we demonstrate how energy savings can be achieved through operational rating. Our findings suggest that operational rating can help to bridge the performance gap between predicted and actual energy consumption, leading to a more efficient use of energy in buildings. Furthermore, we discuss ongoing efforts towards the development and adoption of a new CEN standard on building operational rating. This standard aims to provide a common framework for assessing and comparing the energy performance of buildings across Europe. By promoting transparency and accountability, the standard can help to increase public awareness and understanding of energy use in buildings, and ultimately drive the uptake of nZEBs. Overall, this study highlights the importance of energy operational rating in achieving the goal of nZEBs, and provides insights into ongoing efforts to develop and implement a new standard in Europe.

Efforts for new standards on buildings operational rating

The background of the new standardisation project (Work Item, in CEN terminology) on buildings energy operational rating is rooted in the DEPC project. The proposal for this Work Item was put forth by the DEPC project to CEN/TC 371, the European Committee in charge of horizontal standards dealing with Energy Performance of Buildings (EPB). To achieve this goal, DEPC presented, in March

2022, the results of the research made and proposed a new permanent working group (WG). CEN/TC 371/WG 5 "Operational rating of energy performance of buildings" was formally approved in August, 2022, with two partners of DEPC as Convenor and Secretariat.

Since then, regular meetings have been conducted to advance the development of the standard. These meetings serve as a platform for experts and stakeholders to collaborate, exchange knowledge, and contribute to the formulation of guidelines and requirements for operational energy rating in buildings.

The standardisation project dealing with operational energy performance assessment was approved in February, 2023, and assigned to this WG 5. The objective of the new Work Item is to establish a comprehensive European Standard that provides a unified approach to assess and rate the operational energy performance of buildings. By leveraging the expertise and insights from the DEPC project and the collective efforts of CEN/TC 371 and its WG 5, the development of this standard aims to address the current gaps and diversification in operational rating schemes across Europe.

Through ongoing discussions and iterative refinement, the standard will incorporate best practices, methodologies, and measurement techniques to ensure accurate and reliable assessments of building energy performance. The regular meetings facilitate collaboration among experts from various disciplines, enabling a holistic and well-rounded approach to the development of the standard.

The ultimate goal is to provide stakeholders, including building owners, operators, and policymakers, with a standardized framework that supports informed decision-making, energy efficiency improvements, and effective building certification based on actual energy consumption data.

The proposed EN standard on buildings energy operational rating aims to address the need for a standardized procedure for operational rating of buildings at the European level. Unlike asset

rating, which is based on calculated values, the operational rating is determined by measuring the actual energy consumption of the building. The proposal acknowledged the significant deviation between asset rating and operational rating results due to factors such as usage schedules and assumed values in rating schemes.

The purpose of the proposal was to develop a European Standard that establishes a unified approach for operational rating of buildings. The operational rating schemes are characterized by their reliance on specific data obtained from actual energy consumption, rather than relying on standardized data sets. However, the widespread implementation of operational rating has been hindered by the lack of standardized procedures and the requirement for specialized equipment and smart meters, which are not yet available in most existing buildings.

The European Commission's decision to deploy smart meters in all Union buildings is expected to facilitate the use of operational rating as a method for building certification. Therefore, it is crucial for Member States of the European Union to adopt a joint scheme for operational rating. Currently, there is a lack of standardized procedures and regulations governing this type of classification, resulting in a diversified approach across existing operational rating schemes. The proposed Work Item will seek to address these challenges by developing a European Standard that provides a common framework and methodology for operational rating of buildings. By establishing a unified approach, this standard will enable consistent and comparable assessments of building energy performance across Europe, promoting energy efficiency and supporting building certification efforts.

Tentative structure of the proposed standard on operational rating

A standard providing guidelines and requirements for assessing and rating the operational energy performance should contain the following key elements:

Introduction: The standard should begin with an introduction that clearly outlines the purpose and scope of the document, setting the context for the assessment of operational energy performance in buildings.

General requirements for operational energy assessment: This section should outline the objectives and boundaries of the assessment, emphasizing the importance of data collection and verification. It should also address the calculation methodology for assessing energy use, energy carriers, building spaces, correction factors, energy performance indicators, primary

energy, greenhouse gas emissions, and cost weighting factors. Reporting and documentation requirements should be specified as well.

Operational Energy Assessment Framework:

The standard should introduce a framework that presents key principles and concepts for assessing operational energy performance. This should include defining the system boundary and functional units for the assessment, as well as energy performance indicators such as energy consumption, greenhouse gas emissions, and renewable energy production. Performance metrics and benchmarks, including the Energy Performance Index (EPI) and various benchmark types, should be explained in detail.

Data collection and analysis: This section should outline the data requirements and sources, including building information, occupancy data, energy consumption data, weather data, and other relevant data. It should cover aspects such as occupancy profiles and patterns, measurement and monitoring techniques, data analysis and validation techniques, uncertainty analysis, and sensitivity analysis. The section should emphasize the importance of accurate reporting and documentation for data analysis.

Calculation methodologies: This section should provide guidance on calculation models, algorithms, and estimation techniques for energy consumption. It should also address load profiles and energy demand patterns, along with the use of calculation tools and software.

Performance assessment and benchmarking:

The standard should define reference buildings and their categorization based on data collection and analysis. It should outline procedures for benchmarking and target setting, stressing the importance of comparing energy performance to established benchmarks and setting improvement targets. The section should also introduce performance gap analysis to identify discrepancies between predicted and actual energy performance.

Reporting and documentation: Detailed requirements should be provided for the structure of the assessment report, key findings, recommendations, uncertainty and sensitivity analysis, and the communication and visualization of results.

Verification and validation procedures: The standard should address procedures to ensure the accuracy and reliability of the assessment results. It may also include optional annexes that provide additional information or guidance on specific topics.

Future work for the establishment of a standard on operational rating

The drafting of the standard should focus on several key areas to ensure the development of a comprehensive and effective document, focused on the needs of potential users, such as energy assessors. These areas include:

Stakeholder engagement: It is crucial to involve a wide range of stakeholders in the development process, including building owners, operators, policymakers, energy experts, and industry representatives. Regular meetings, workshops, and consultations should be organized to gather input, share insights, and address any concerns or challenges faced by different stakeholders.

Technical specifications and methodologies:

The standard should provide clear and detailed technical specifications and methodologies for assessing and rating the operational energy performance of buildings. This includes establishing guidelines for data collection and analysis, calculation models and algorithms, load profiles and energy demand patterns, as well as performance assessment and benchmarking procedures. It should incorporate best practices and take into account the diversity of building types, climates, and energy systems across Europe.

Harmonization and alignment: Efforts should be made to align the proposed standard with existing national and international standards, regulations, and certification schemes related to building energy performance. This will ensure consistency and compatibility, allowing for easier adoption and implementation by Member States.

Testing and validation: The standard should undergo rigorous testing and validation to ensure its effectiveness and reliability. This can involve pilot projects, case studies, and simulations to assess the practicality and accuracy of the assessment methodologies and performance metrics. Feedback and lessons learned from these testing activities should be incorporated into the standard's refinement process.

Dissemination and awareness: Once the standard is finalized, efforts should be made to disseminate and promote its adoption across Europe. This can include organizing training sessions, providing guidance documents and educational materials, and raising awareness among relevant stakeholders about the benefits and importance of operational energy rating. Collaboration with national and regional authorities, industry associations, and professional networks can help facilitate the dissemination process.

Continuous improvement and updates: The standard should be regularly reviewed and updated to keep pace with evolving

technologies, practices, and policy frameworks in the field of building energy performance. CEN has a systematic for the review of standards 5 years after the publication, in which the Technical Committee (TC) receives a ballot to confirm, cancel or revise the relevant standard. In addition to this process, a parallel feedback mechanism can be applied, monitoring the implementation of the standard, and soliciting input from stakeholders to identify areas for improvement and address emerging challenges. By addressing these areas of future work, the proposal can become a robust European Standard on buildings energy operational rating. This standard will provide a unified and transparent framework for assessing and comparing the energy performance of buildings, supporting the achievement of nearly zero energy buildings (nZEB) targets and promoting energy efficiency across Europe.

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