

Discrepancy between South Korea's ZEB Certification System and its Real Energy Saving Effects: An Empirical Analysis

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Abstract: Since 2017, South Korea has been the first country in the world to implement a national certification system for Zero Energy Buildings (ZEB). This system aims to maximize the energy efficiency of buildings to reduce greenhouse gas emissions and reduce energy consumption in the building sector using renewable energy. To achieve this goal, the ZEB certification system classifies green buildings into five grades based on the energy independence rate. However, the current ZEB certification system based on the energy independence rate is only considered a requirement for building completion, losing its original intent. This study aims to highlight the problems and limitations of the ZEB certification system based on the energy independence rate and to propose an operational plan for the system that can genuinely reduce energy consumption in the building sector. For this, the actual energy consumption and the renewable energy production referenced during the certification of 10 ZEB-certified buildings were quantified and compared with the energy independence rate. The total energy consumption, energy production, life cycle cost, performance coefficient of equipment, and other key indicators were analyzed to evaluate the actual effects of ZEB certification on energy savings. As a result, the simple energy independence rate-based ZEB certification was judged to be inconsistent with the original intent of the system. The ZEB certification system needs to be re-established to reflect the design of systems that can activate and utilize energy savings and renewable energy usage in buildings. Additionally, improvements in the management and inspection systems are necessary to determine how much they contribute to actual reductions in greenhouse gas emissions and energy consumption post-certification.

Key words: zero energy buildings, energy efficiency, greenhouse gas emissions, energy independence rate, renewable energy, post-certification management