

용도지역제도를 고려한 건물부문 온실가스 배출량 관리 정책 연구
Zoning Regulations and Greenhouse Gas Management Policies in Building Sector

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1. Introduction

Is net-zero energy building possible? As we learn from the existing experimental approaches, it is no longer technically unattainable. However, would it still be feasible if we set a target for all buildings to become net-zero in their energy use? Can this regulation be a socioeconomically fair, reasonable, and achievable goal? Considering a recent target set by the government, which aims to achieve net-zero energy of all buildings by 2025, there is a strong need to identify whether such a goal is practical, and if not, explore alternatives that may bring along other possibilities. Against this backdrop, this study aims to analyze the theoretical threshold of greenhouse gases (GHG) reduction rate of newly constructed buildings and revise building energy performance regulation and GHG emission performance standard by Use Area.

2. Policy and Literature Review

Chapter 2 reviews existing policies on green buildings and theoretical backgrounds that are relevant to this topic. Firstly, Section 1 reviews strategies of GHG reduction policies and limitations at the architectural level, and argues for the necessity of approaches at the urban planning-level. Section 2 suggests basic concepts and the current status of ‘building energy performance regulation through land use regulation’ including performance zoning. It also proposes a need for land use

performance regulations based on GHG emissions of individual buildings. Lastly, in order to estimate GHG reduction performance of green buildings in general, Section 3 reviews existing literature and systems in five ways. The result suggests that maximum GHG reduction rate could range between 50% and 80%, including the energy demand substitution effects of new and renewable energy generation.

3. Case Study on GHG Reduction Policies and Systems through Land Use Regulations

Chapter 3 investigates land use systems and supporting systems for GHG reduction of building sector in the developed world. Section 1 examines land use regulations and deregulation that target GHG reduction of the building sector and suggests future strategies for system improvement. Next, Section 2 reviews low-carbon urban planning system and guideline of Japan for area-wide GHG management of the building sector. As the current GHG reduction goals are restricted to approaches at the architectural level in Korea, those at urban planning-level are integral. Section 3 studies various supporting systems that promote green building and green urban planning through administrative or financial supports. Lastly, Section 4 explores the essence of performance zoning that were adopted in the U.S. and Australia. The findings suggest that the introduction of performance zoning may play a significant role in the existing zoning system.

4. Characteristics of GHG Emission and Performance Standards by Use Area

Chapter 4 explores building energy performance regulation and GHG emission performance standard by Use Area by analyzing theoretical thresholds of GHG reduction rates of newly constructed buildings. Firstly, Section 1 runs through major methods and data used in this research. Section 2 examines energy consumption characteristics and their determinants by building use and level of zoning regulation by analyzing Building Energy Data (UNBE).

Based on the findings from Section 2, Section 3 analyzes theoretical

thresholds of GHG reduction rates of newly constructed buildings by building use and level of zoning regulation. The results suggest that it is impossible to achieve the net-zero energy goal in all Use Areas except class 1 exclusive residential area. Accordingly, Section 4 suggests a regulation level that is practically reachable by building use and Use Area. It also provides test results on GHG reduction impacts. Simulation shows that the revised regulations, developed in this study, are applicable enough to achieve national GHG goal for the residential building sector, while less so for the commercial building sector. We conclude that an off-site approach is also essential to achieve the national GHG goals, which include new and renewable energy generation and sharing of unused energy.

Lastly, Section 5 establishes a GHG emission performance standard by Use Area as a longer policy alternative. The performance standards for each Use Area range from 15 to 220kgCO₂eq/m²/year. Simulation shows that 66% of total GHG emission can be reduced by 2020 solely through this performance standard.

5. Conclusion

Chapter 5 summarizes implications for future GHG management policy, as follows. Firstly, the government should revise a building energy performance regulation for newly constructed buildings. Second, the government should adopt the GHG emission performance as a new instrument in zoning regulation. Finally, to efficiently manage the two systems suggested above, various supporting systems need to be established as a long-term goal, including incentive systems for successful reduction of GHG, penalty (such as enforcement fine) for failure to achieve their goals, and GHG emission trading system.

Keywords : Greenhouse Gases (GHG), Building Energy, Green Building, Zoning Regulation