Korea’s Visionary National Policies for Enhancing Building Energy Efficiency

4th June 2024

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Regional Context In Korea
Regional Context in Korea

**National NDC increase**

GHG reduction by 2030 based on 2018 emissions 26.3% → 40%

**Building sector Greenhouse Gas Reduction Target**

- '30 compared to 18's emissions
  - 19.5% → 32.8%
- Reinforcement of reduction targets
- 17.1 million tons needed to be reduced by 2030

"Increase in GHG reduction target due to NDC increase"

![Graph showing GHG reduction targets](image)

**Building sector Energy Consumption**

- On an increasing trend until '18 transition to a decreasing trend from '19
- After a significant decline due to the spread of COVID-19, it is increasing again

"Trend of final energy consumption in the building sector"

(home, commercial, public)

![Graph showing energy consumption trends](image)

(Achieving national NDC and energy and economic aspects)

Important to secure the energy performance of a building in the early stage due to the characteristics of a building that is maintained for at least 30 years once it is built.
Starting from 2020, public new buildings with a total floor area of more than 1,000 m² will be implemented in phases.

- **2020**: Public 1,000 m² ↑ (ZEB Grade 5)
- **2023**: Public 500 m² ↑ (ZEB Grade 5), Apartment (Public) 30 Households ↑ (ZEB Grade 1.5)
- **2024**: Private 1,000 m² ↑ (Almost ZEB Grade 5), Apartment (Private) 30 Households ↑ (Almost ZEB Grade 5)
  * one-year postponement ('25~)
- **2025**: Public 1,000 m² ↑ (ZEB Grade 4, Some Parts), Private 1,000 m² ↑ (Almost ZEB Grade 5)
- **2030**: Public Undetermined (Almost ZEB Grade 3, Some Parts), Private 500 m² ↑ (Almost ZEB Grade 5)
- **2050**: Undetermined (Almost ZEB Grade 1, Some parts)
Korea’s Visionary National Policies for Enhancing Building Energy Efficiency

Zero Energy Building (ZEB) Certification System
Zero Energy Buildings (ZEB) Certification System

The definition of ZEB changes significantly depending on the priorities of various stakeholders.

- **Reduction of Energy Demand and Application of EE Measures**
- **Production of Renewable Energy on site**

The term "zero energy building" means a green building in which energy requirement is minimized by minimizing the energy load needed for the building and by utilizing new and renewable energy.
Zero Energy Buildings (ZEB) Certification System

Reduced energy load with passive technology, Energy efficiency improvement with active technology, Energy self-sufficiency with new & renewable energy

**Passive**
- High insulation, high airtight windows, external awning, etc.

**Active**
- High-efficiency equipment, LED Lighting, energy management system, etc.

**New & Renewable Energy**
- Photovoltaic, Geothermal cooling and heating, Fuel cell, etc.

- High airtight
- Balcony Plan
- Linear thermal bridge prevention
- Heat recovery ventilation system
- Photovoltaic Systems

- Terrace greenhouse
- Window area ratio control
- High insulation plan
- High-efficiency windows

- Power supply by solar cell
- Hot water supply by solar heat

- Summer Sun
- Winter Sun
- Sunlight Solar heat
- Fresh Air
- High insulated roof
- Kitchen and bedroom
- Waste heat utilization
- High insulated wall
- High airtight window
- Awning system
- Geothermal
- High insulated floor
Zero Energy Buildings (ZEB) can be constructed through step-by-step integrated energy optimized design.

- **Efficient Energy Management**
- **Maximization of Energy Self-Sufficiency**
- **Maximization of Energy Efficiency**
- **Minimization of Energy Requirement**

**Passive Design**: The design of architectural elements that do not consume separate energy such as electricity and heat (building orientation, building shape, insulation, airtightness, etc.)

**Active Design**: The design of engineering elements that consume separate energy (boiler, chiller, energy recovery ventilator (ERV), etc.)
Zero Energy Buildings (ZEB) Certification System

Building energy efficiency rating 1++ or higher, Installation of building energy management system (BEMS) or remote electricity meter, Divided into 5 grades according to the energy self-sufficiency rate

### Zero Energy Building Certification Criteria

#### Building energy efficiency rating 1++ or higher

- A system that gives grades to high-efficiency buildings, Must be in the top 2 ranks (1+++), 1++)
- Evaluation of cooling/heating/hot water supply/lighting/ventilation consumption and new and renewable energy production
- Calculation and evaluation of total primary energy consumption per unit area of a building

(\text{\text{kWh/m}^2\text{y}})

<table>
<thead>
<tr>
<th>Grades</th>
<th>Residential</th>
<th>Non-residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+++</td>
<td>60 under</td>
<td>80 under</td>
</tr>
<tr>
<td>1++</td>
<td>60 over 90 under</td>
<td>80 over 140 under</td>
</tr>
</tbody>
</table>

#### Energy Self-Sufficiency Rate 20% or higher

- Primary energy per unit area of a building the ratio of primary energy production to consumption, which must be achieved at least 20%
- Evaluation of cooling/heating/hot water supply/lighting/ventilation consumption and new and renewable energy production

\[
\text{Energy Self-Sufficiency} \quad (\%) = \frac{\text{Primary energy production}}{\text{Primary energy consumption}} \times 100
\]

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<thead>
<tr>
<th>Grades</th>
<th>Energy Self-Sufficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEB 1</td>
<td>100 over</td>
</tr>
<tr>
<td>ZEB 2</td>
<td>80 over 100 under</td>
</tr>
<tr>
<td>ZEB 3</td>
<td>60 over 80 under</td>
</tr>
<tr>
<td>ZEB 4</td>
<td>40 over 60 under</td>
</tr>
<tr>
<td>ZEB 5</td>
<td>20 over 40 under</td>
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#### BEMS or Remote Electricity Meter installation

- Assess whether the building has the function for energy efficiency and is continuously operated and managed
- Determination of whether to apply the system checklist for each evaluation item

**Evaluation items by systems**

- **BEMS** 9 items
- **Remote Electricity Meter** 6 items
How to Evaluate the ZEB Certification System

Energy consumption = Amount of energy required for heating, cooling, hot water supply, lighting, and ventilation installed in a building (evaluation by 5 types of use)

“Energy consumption calculation method (per unit area)”
\[ \sum \text{(the amount of energy required / the floor area of the space that requires the energy)} \]

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<tbody>
<tr>
<td>Floor area of space requiring heating energy</td>
<td>Floor area of space requiring cooling energy</td>
<td>Floor area of space requiring hot water energy</td>
<td>Floor area of space requiring lighting energy</td>
<td>Floor area of space requiring ventilation energy</td>
</tr>
</tbody>
</table>

※ In the case of residential buildings without air-conditioning equipment (compartment houses excluding single-family houses and dormitories), cooling evaluation items are excluded.
※ Primary energy consumption per unit area = Energy consumption per unit area × Primary energy conversion factor
※ New and renewable energy production is reflected in energy consumption and included in efficiency rating evaluation

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<tr>
<th>Residential</th>
<th>Grades</th>
<th>Non-residential</th>
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<tbody>
<tr>
<td>Primary energy consumption per unit area per year (kWh/m²/year)</td>
<td></td>
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<tr>
<td>60 under</td>
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ZEB Certification System Operating Hierarchy

**Hierarchic**
KEA has been designed by the government as the operating organization for the ZEB certification system.

**Legal Basis**

<table>
<thead>
<tr>
<th>Division</th>
<th>Law name</th>
<th>Main Contents</th>
</tr>
</thead>
</table>
| Law               | 「Green Buildings Construction Support Act」                                  | • Article 2 (Definitions)  
                    |                                               | • Article 17 (Certification of Building Energy Efficiency Rating and Certification of Zero Energy Buildings)  
                    |                                               | • Article 41 (Administrative Fine)                                                            |
| Presidential decree | 「Enforcement Decree of The Green Buildings Construction Support Act」       | • (Article 11) Easing construction standards for zero-energy buildings  
                                                                 |                                               | • (Article 12) Buildings subject to certification and obligatory buildings                   |
| MOLIT, MOTIE Ordinance | 「Municipal Rules for Building Energy Efficiency Rating Certification and Zero Energy Building Certification」 | • Designation of operating institutions and certification bodies, etc.  
                                                                 |                                               | • Certification application, evaluation, standard, issuance, etc.                           |
                                                                 |                                               | • Request for re-evaluation, preliminary certification, fact-finding, etc.                   |
                                                                 |                                               | • Organization and operation of the Certification Steering Committee, etc.                   |
| MOLIT, MOTIE Notice | 「Building Energy Efficiency Rating Certification and Zero Energy Building Certification Standard」 | • Certification application supplement, return, standard and grade, etc.  
                                                                 |                                               | • Recertification and re-evaluation, committee operation, etc.                              |
Thank you

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