



Korean BEMS Building Energy Management System

Towards

Net Zero Building/Industry/City

Global Societies

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I. <u>Global Current Status</u>

II. Korean Policies and BEMS

III. Future Plans

01 UN Climate Crisis Convention

Why We need Net Zero Society.

"Limiting GHG¹) Global Warming to 1.5°C implies net zero globally around 2050 " (IPCC²) Special Report, 2018.10) 1) Greenhouse gas: CO2, CH4, N2O, HFCs, PFCs , SF6 ; 2) IPCC, Intergovernmental Panel on climate change;



To preserve the global ecosystem, it is necessary to suppress the temp. rise to less than 1.5°C by 2100 through Net Zero





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02 What is Net-Zero?

UN recommended Net Zero as a means of stabilization policy

UN 197 countries Efforts to protect the global ecosystem from climate crisis





Net Zero includes greenhouse gases (Six major gases) and is offset by the same amount of emission and reduction

(and absorption), so that "Net" GHG Emission or Energy Use is "0(Zero)"

Example) Zero Carbon(Energy) Building, carbon offset, eco-friendly hydrogen/electric vehicle, etc.

(US) Net Zero, Net Zero Ready, ('15.09, USDOE) (EU) Nearly Zero ('16.11, EPBD, Energy Performance Building Directive) (ISO) Defining various levels of Net Zero definitions (TC 301 WG16 Zero Net Energy)



03 Global Net Zero, NZ Conference

Building-Oriented Global cooperation

Starting 2016, the world's largest net zero cooperation focusing buildings (Building is more effective than other sectors)



04 Global GHG Emission by sector

Building-Oriented Global cooperation

Energy (73%), agriculture (18%), refrigerants (5%), and waste (3%) account for the share of global greenhouse gas emissions

Prioritize for national

policy implementation

In Energy sector, Industry (24%), Building (18%), Transport (16%)



OurWorldinData.org – Research and data to make progress against the world's largest problems. Source: Climate Watch, the World Resources Institute (2020). Licensed under CC-BY by the author Hannah Ritchie (2020)



Figure Source : World Resource Institute (2020)



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05 Life Cycle of Buildings

(Global Trend) Rapid growth of Zero Net Energy (ZNE) market demand around world

Needs Transparent and consistent guidance for ZNE implementation





06 International Guidance

Net Zero Energy International Standard is developing in ISO TC 301
 The WG16 Zero Net Energy, US and South Korea are leading this standard towards net zero GHG

• Title: Energy management and energy savings - Guidance for zero net energy in operations

• Scope

This document provides guidance on how to effectively achieve, maintain and surpass zero net energy in organizations and their facilities (buildings or industries) through integration of renewable energy and using the principles of ISO 50001(Energy Management System, EMS) through:
a) Improvement of operational and maintenance practices based on zero net energy principles
b) Improving facilities beyond zero net energy
c) Integration of renewable energy in operations and maintenance
d) Planning for facilities, systems, equipment or processes





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07 Infographic of Zero Net Energy

Building-Oriented Global cooperation



[Note] (a) The leftmost bar graph shows the annually delivered energy consumption of an organization, (b) the dotted line in blue bar shows energy savings by the design and construction (other TC scope), (c) the dotted line in red shows the energy savings through ISO 50001 (TC301) operation, (d) the green bar indicates the renewable energy production which can be replaced with the energy consumption left for zero energy.



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01 Korean Policies

New Building-Oriented Policies

Mandatory scheme for Achieving national GHG emission target and create new jobs





02 Korean Policies on Building

Based on National Framework Act on Low Carbon, Green Growth (2010) In 2013, GREEN BUILDINGS CONSTRUCTION SUPPORT ACT, <u>New Net Zero Framework might be enacted in 2021</u>

NEW

EXISTING

- Accelerate Zero Energy Building
- Energy conservation construction standard

- Initiate Green Retrofit
- Mandatory BEMS installation (over 10,000 m2)
 for Public buildings

Open building energy performance data Promote energy conservation and education

- Certification(2021)
 - Green Building
 - Building Energy Efficiency Rating
 - Smart Building
- Building Energy Evaluator (Through Exam)
- Extend BEMS





CONDUCT

03 Zero Energy Building Certification

Minimize energy usage from building's design and construction stage

In 2013, GREEN BUILDINGS CONSTRUCTION SUPPORT ACT, New Net Zero Framework might be enacted in 2021

- Target buildings: Retails, Commercial and public (public sector and private sector)
- Applicants: Building owner, Building owner & constructor,



Subsidy

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- Relieve Standard (floor area ratio $15\% \downarrow$) and contribution rate (Residential, $15\% \downarrow$),
- Financial support on renewable energy (ex Roof 50%, BIPV 70%)
- Housing and Urban Fund Ioan (20%, within budget allowance)... 7 Different types of incentive



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04 Building Energy Management System (BEMS)

Mandate requirement for Zero Energy Buildings (new construction)

BEMS Installation Guidelines (2017), an ICT-based real-time management tool

•Sensors are installed in building energy use (lighting, cooling/heating, ventilation, hot water, etc.) and connected to a communication network to monitor energy consumption by energy source (power, gas, fuel, etc.) in real time

Korea Energy Corporation BEMS installation guidelines (2017)





05 BEMS overview & issues

Mandate requirement for Zero Energy Buildings (new construction)

- 1. (Existing) Mandatory (July 2017) to install BEMS in large-scale public buildings (over 10,000m2 in total floor area)
- 2. (New) Mandatory (Jan 2020) for new public buildings (over 1.000 m2, over 500 m2 in 2025)

Points for each BEMS item

Items		Points	
		installation confirmation	Extension of validity period
1	Data collection and display	10	5
2	information surveillance	15	5
3	data lookup	5	5
4	Energy consumption analysis	15	5
5	Facility performance and efficiency analysis	15	5
6	Provides indoor and outdoor environmental information	10	5
7	Energy consumption forecast	10	5
8	Energy cost inquiry and analysis	10	5
9	Control system interface	10	5
10	Operational goals and promotion system	-	10
11	operating organization	-	10
12	Operational performance evaluation and improvement	-	15
13	Instrument management	-	10
14	data management	-	10
15	(Additional points) Energy saving performance	-	5
(주)제로엔	Total	100	
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06 BEMS Example

Government Support

- 1. Support the limit of KRW 150 million (US \$ 0.1M) in government subsidy per participating building
- 2. Submission of annual performance utilization report (Every year)

Major functions of BEMS



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07 World First BEMS Standards

BEMS Standards Developments

- 1. (2014.8) KS F BEMS 1800-1 (Part 1) Publish
- 2. (2021) KS F BEMS 1800-2 (Part 2) Publish

(MOLIT, KEA) BEMS Standardization (2012~)

(Effectiveness)

The criteria and method* for energy saving calculations are standardized



08 Incentive of EMS

Legal Basis

Enforcement Rules of the Energy Use Rationalization Act (Revised in 2015) Partial revision of the Enforcement Rules of the Restriction of Special Taxation Act (Amended in 2015)

Overview of National Law related

Enforcement Rules of the Energy Use Rationalization Act	Act Detail
Article 28-2 (Support of Energy Management System) ① The Minister of Trade, Industry and Energy shall recommend the introduction of a company-wide energy management system for energy efficiency improvement to energy users or energy suppliers, and may provide necessary support to those who introduce it.	Article 29 (Exemption from Energy Audit) 5. With respect to the management and control system for the supply or use of energy (hereinafter referred to as "energy management system"), an energy management system that meets the requirements set by the Minister of Trade, Industry and Energy has been established and energy is efficiently used. person notified by the deputy minister

Enforcement Rules of the Energy Use Rationalization Act

Article 25-2 (Tax Credit for Investment in Energy Saving Facilities)

(1) Where a Korean invests in energy-saving facilities prescribed by Presidential Decree (excluding used goods and investment under lease prescribed by Presidential Decree), <u>3/100 of the investment amount (5/100 in the case of a medium-sized company</u> prescribed by Presidential Decree; In the case of <u>SMEs, an</u> <u>amount equivalent to 10/100</u>) is deducted from income tax (applicable only to income tax on business income) or corporate tax.





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09 Zero Energy Building Certification





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10 (BEMS Related) Green Building Certification

Minimize energy usage from building's design and construction stage In 2013, GREEN BUILDINGS CONSTRUCTION SUPPORT ACT, <u>New Net Zero Framework might be enacted in 2021</u>

Building Sustainability assessment measuring environmental impact during building construction process Focus on reducing energy, resources and pollutants

Applicants: Building owner, Architect, Builder

• Applied buildings: all new buildings, existing buildings(Public sector required/ Private sector recommended)

Certification Status (Total about 15,179)

Criteria : 1. land use and transportation, 2. energy, 3. environmental pollution, 4. materials & resources, 5. water cycle management, 6. ecological environment, 7. indoor environment.

Extend certification for existing buildings (G-SEED 2021)

- Apply Global Standard: Introduced LCA, Emphasize GHG emission reduction
- Apply and readjust with new technologies: Add new categories and set new standard
- Revise current certification's O&M system: 10 building types, individual standards(346 items)
- Create new certification for existing building and green retrofit
- Innovative design plan and train Green Building experts





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01 Zero Energy Buildings Alliance

Participating around 50 experts from Corporates, Universities, Institutes



- → Innovative Zero Energy industry cooperation
- ➔ Commercialization of Zero Energy technologies, finance and policy solutions







III. Future Plans

02 2050 Net Zero Future

Contribution to GHG reduction, Net Zero Future of Korea is introduced

Towards net zero carbon, Design (Long Life/ZEB) \rightarrow Maintenance (Green Remodeling/BEMS) \rightarrow Demolition (Waste Recycling)





Thanks for your attention!

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