Korea Green Building Design Code and Role & Outcome of KIRA

ACGSA Report

5th Nov, 2019

Korea Institute of Registered Architects(KIRA)

arcasia
Architects Regional Council Asia

대한건축사협회
KOREA INSTITUTE OF REGISTERED ARCHITECTS

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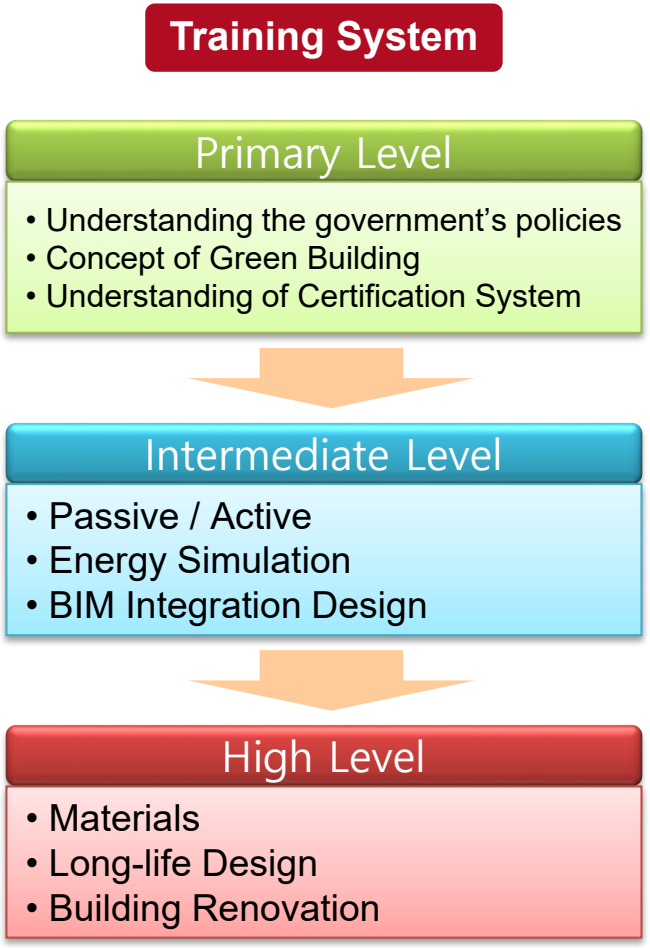
Sustainable Architecture Academy of KIRA

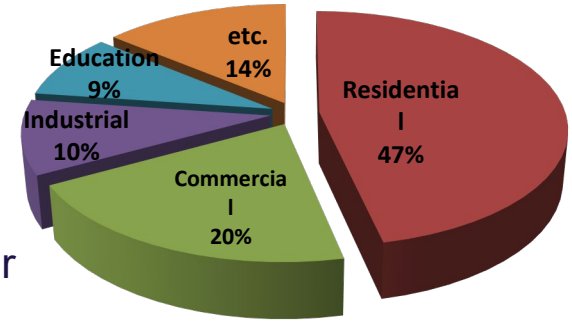
- KIRA started to operate Sustainable Architecture Academy, commissioned education program for green building experts from MOLIT since 2009.
- 2009 ~ Present : **1,113 trainees**
- 59 instructors : professors, experts etc.
- Education Program :
  - G SEED ID course : 40 hours (7days)
  - Expert course : 130 hours (24 days)



Why Green Building?

Since 1960s, Korea has achieved rapid developments of cities and buildings and now the cities have entered into a period of stability. From now on, Urban Regeneration and Green Building would become a task for cities and buildings in Korea.

- Existing Building = 7.10 million buildings/3,376,000,000㎡
- Approximately 230,000 buildings are under construction every year(150,000 new buildings, remodeling of 55,000 buildings, others 25,000 buildings)
- Construction Investment Size = 195 billion US dollar (15% of GDP) (OECD average 13%)
- Construction Production Size = 59 billion US dollar (4.5% of GDP)
- Architectural Design Market = Approx. 2.7 billion US dollar



Current condition of existing buildings in Korea (based on area)

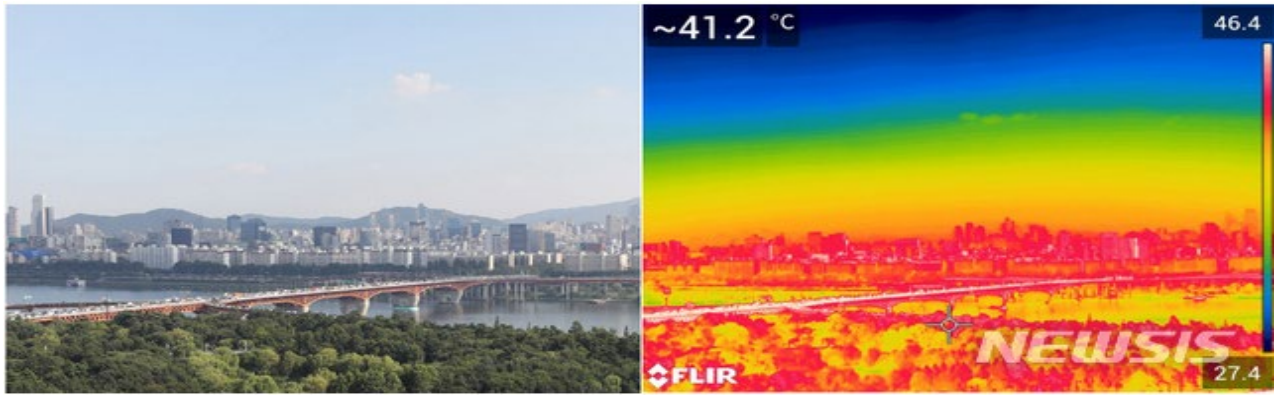
Why Green Building?

Architects face new challenge to reduce 26.9% of CO2 compared to 2010, through buildings by 2020

- Currently buildings take 25% of CO2/ Emission and 21% of energy consumption
- 4% of self-sufficiency in energy / New Renewable energy ratio of 2%
- In Seoul, buildings use 63% of energy (Consolidation of Design Standard)
- In 2012, 「Green Building Construction Support Law」 is established
- Green Building becomes a significant issue to Architectural Design Industry

Seoul in 2019
Heat wave,
Fine dust, Ozone…

Climate change
→Climate crisis

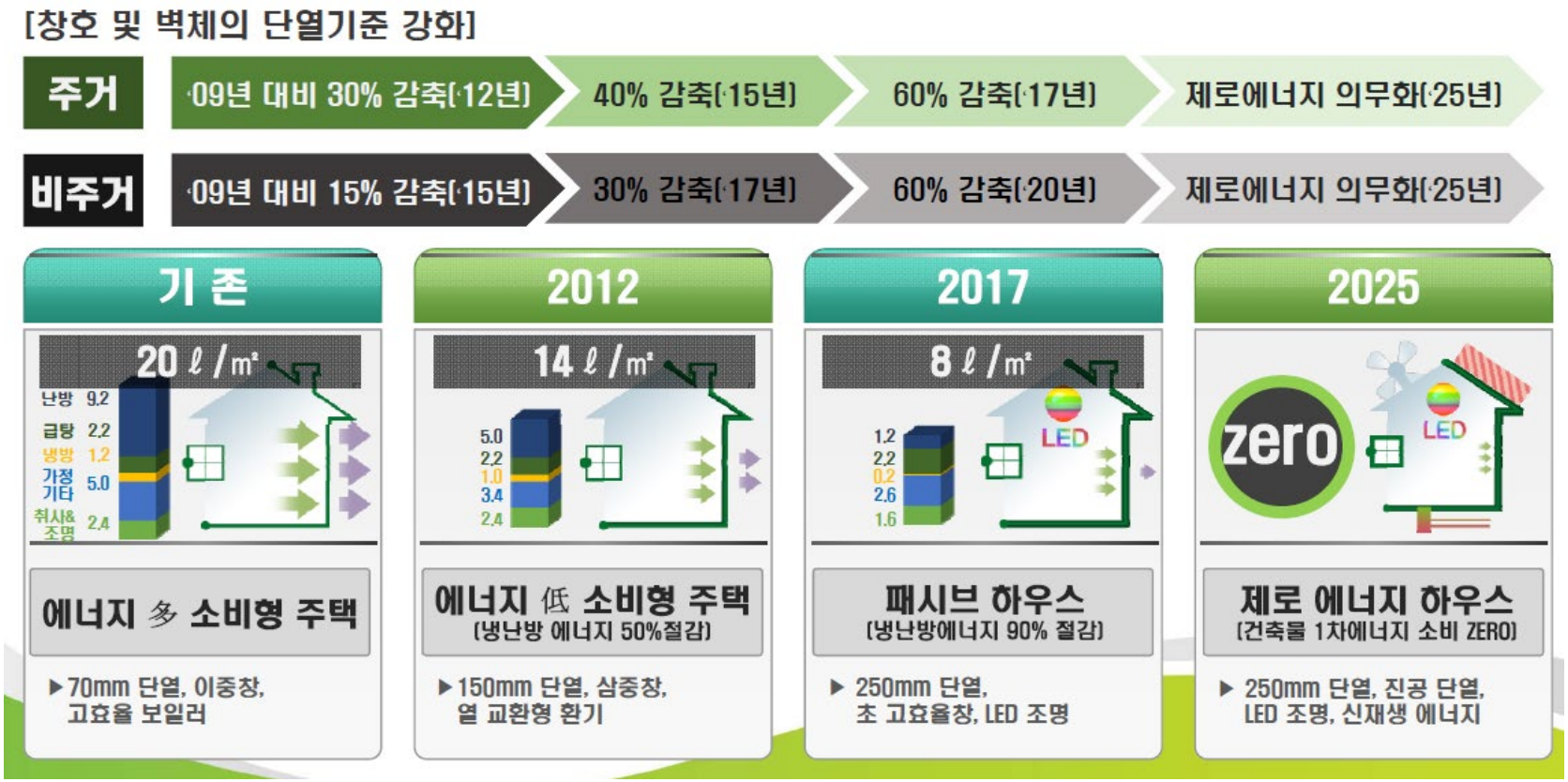


How is your country coping with the global Heat wave?

Why Green & ZEB ?

Korea's Green Building Support Law will become ZEB mandatory by 2025 under PH standards in 2018 Is reinforced.

2018: PASSIVE HOUSE ➡ 2025: ZERO ENERGY BUILDING(ZEB)



Green Building Code

Korea Green Building Code has been established in 1979 and it has been highly upgraded since 2017. It applies to public buildings by priority and is promoted to be applied to private building

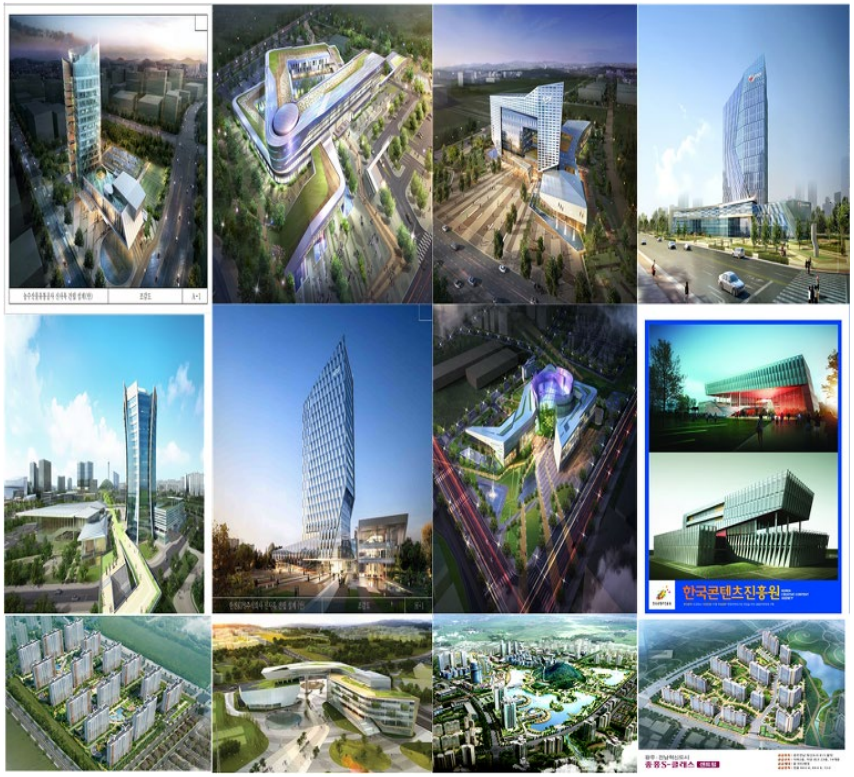
1979 ~2002	2003 ~2015	2016 ~2025
Initial Stage	Development Stage	Upgrading Stage
• Establishment of code for thermal insulation thickness for each building part • Submission of Energy Saving plan (1992, office with 3,000㎡, or above)	• Energy Efficiency Rating System(2003) • Green Building Certification System(2005) • Environment-friendly Housing Performance Grading Indication System (Green Home, 2012) • Certification for Environment-friendly Building Materials • Certification for New Renewable Energy(2010)	• Development of EPI Code(2018) •Development of Energy Saving plan • Total Building Annual Energy Use System • Development of Energy Efficiency Rating System (10 grades) •Green Remodeling(2013) • Energy Consumption Certification System(2013) • Development of Maintenance and • Inspection(2013) **•Development of Green Standard for Energy and Environmental Design (2018: G-SEED 2016-2 VERSION)** **• Zero Energy Buiding(2025)**

Green Building Code

Energy Efficiency Rating System(2013~)

- Comprised of 10 grades(Grade 1 ~ 10)
- Application = Detached housing, Apartment, Office, building with 500㎡ or above
- Central Government Act = Compulsory for public service facility with over 500㎡(Grade 1), public rental housing with over 500 households (Grade 2), private building with over 3,000㎡ or 500 households(Grade 7 or above)
- Local authority (Seoul) = building over 3,000㎡, apartment housing with over 20 households = Above Grade 2 (application to the private)
- Accomplishment('01~'13) = 2,121 buildings certified
- Incentive for the private = Appeasement of Building regulation

  (floor area ratio, height etc.), tax reduction



Green Building Code

Several Green Building Guidelines are provided to promote sustainable built environment.

1. Energy Efficiency Rating System (2013~)
2. Green Standard for Energy and Environmental Design / **G-SEED** (2012~)
3. Energy Saving Plan (2013~)
4. Zero Energy Building Certification (2017~)

Green Building Code

- G-SEED (2019: 2016-2 version)

Green Standard for Energy and Environmental Design-

- 4 grades in total(Grade 1 ~ Grade 4)
- Central Government Act = compulsory for public service facility with above 3,000㎡ (Above Grade 2), Apartment housing with over 500 households(Above Grade 2)
- Local authority (Seoul) = compulsory for building with over 3,000㎡, apartment housing with over 20 households (Above Grade 2) (application to the private)

G-SEED Symbol

Green Building Code

Development of Submission of Energy Saving Plan(2013~)

- Application = building with 500㎡ or above with above 65points from EPI(Energy Performance Index)
- Central Government Act = public(74points or above), private(65points or above)
- Seoul(Application to the private) = building over 10,000㎡, apartment housing with 200 households or above(74points or above)
- Applied since September, 2013(Approximately 15,000 buildings per annum)

Total Building Annual Energy Use System(2013~)

- Application = apartment housing with over 100 households (below 190kmh/㎡y), office building(below 280kmh/㎡y)
- Planned to be applied to every building by 2020

Zero Energy Building Certification System(2017~2025)

- Application = Public building pilot project
- Planned to be applied to every building by 2025

Role of Architect

Development of Green Building Code is providing new opportunities and challenge to Architectural Design Market.

Opportunity

- New Design Market(Green Building, Green Remodeling)
- Creation of demand of Energy Consulting
- 2017 New certificates(G SEED Integrared Designer: G-SEED ID)
- Opportunity to contribute for sustainable society

Challenge

- Adaptation and Retraining
- Integration of design and energy technology
- Balance of policy and market(due to 5~20% increase in construction cost)
- Expanding Basics of Green Building

Role of Architect

Korea Institute of Registered Architects(KIRA) is an organization established according to「Certified Architects Act」and as a leading group of registered architects in Korea. KIRA is major provider for CPD and especially commissioned to give the training for Professionals of Green Building by MOLIT.

KIRA's Education Board(KEB)

- Target of Number of Education = 12,887 people (registered architects)
- Education Period(compulsory) = 40hours (for 5 years)
- Education Method = online / offline
- Curriculum = comprised of 125 courses in total, within those programs 25 courses about Green Building (20% of total courses) are now provided
- G SEED ID: Expert Education 40hours

Building of KIRA

Sustainable Architecture Academy of KIRA

Academy of Sustainable Architectural Design (Environmental Friendly)

-Environmental-friendly Architectural Design Academy operated by KIRA.
-This program functions as a core in Korea Green Building Architectural Education for registered architects which is commissioned by MOLIT in Korea.
-The G SEED ID course has been in operation since 2017.

- 2009 ~ Present = 1,113people have accomplished education
- Comprised of 59 instructors(professors, experts etc.)
- Education Program
  - Expert course = 130 hours training (24 days)
  - **G SEED ID** course (2017~)= 40 hours training (7days)
- Education Subject(6 subjects)

Environmental knowledge / Landscape design / Passive design /
Energy Integration design / Materials and Environment
Regeneration / Practice of Green Building Certification System

Training System

Primary Level
- Understanding the government's policies
- Concept of Green Building
- Understanding of Certification System

Intermediate Level
- Passive / Active
- Energy Simulation
- BIM Integration Design

High Level
- Materials
- Long-life Design
- Building Renovation

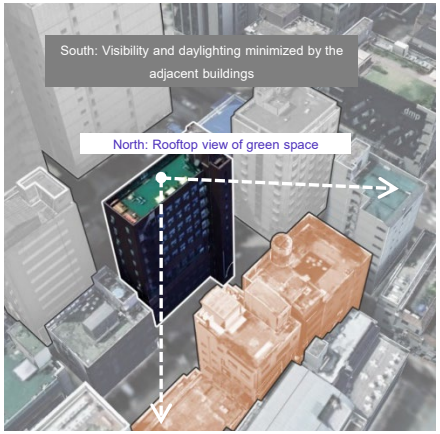
EAN Technology Headquarters

Green Remodeling

Location : 11-19, EAN Bldg, Teheran-ro 77-gil, Gangnam-gu, Seoul
Building Type : Office
Site Area : 377.70㎡
Building Area : 222.97 ㎡
Gross Floor Area : 1997.28 ㎡
Building Coverage Ratio: 59.03%
Floor Area Ratio : 463.45%
Levels: 1 Basement Floor, 10 Ground Floors
Parking : Ground Floor 8EA

Site Analysis

Convenient access to public transit and national park, the precedent building in Samsung-dong was used as an office and residential building. The building condition was outdated and environmentally irresponsive. Hence, the renovation project aims to maximize the positives (superior views) and mitigate the negatives (north facing façade and surrounding environment) of the site characteristics.



North Facing Facade

Rooftop view of green space

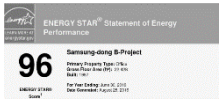
Entertainment District

Energy Usage Analysis of Existing Building

Energy efficiency analysis of the existing building demonstrated poor energy performance of the building

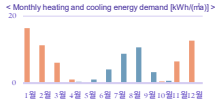
Energy Star Portfolio Manager Analysis

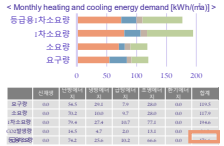
Based on the actual energy input to Energy Star, 84.7kBtu/ft2 (267.19kWh/m2) was analyzed.



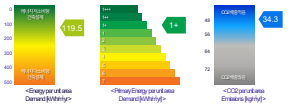
ECO2 Analysis

Result: 176.6kWh/㎡





Evaluation Result of the Building Energy Efficiency Rating



Energy requirements per unit area: 119.5

Primary energy consumption per unit area: 1+ grade

CO2 emissions per unit area: 34.3

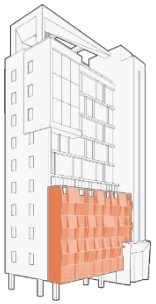
Design Concept

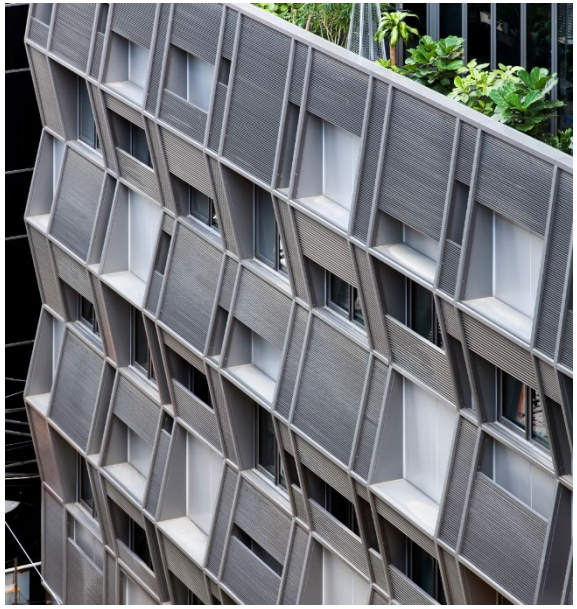
Create a new image for the building by improving its design, removing unnecessary functions and incorporating functional elements into the design.

Facade design (North)

Horizontal Facade Louver

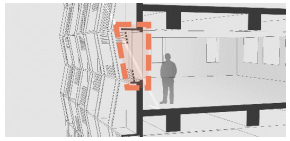
Horizontal louvers were installed at the façade of lower floors to achieve acoustic and visual comfort of building occupants. The occupants also have control over the louver to adjust the daylight / solar radiation according to the season. The horizontal louvers at the lower floors eventually improves the workplace environment and image of the building.





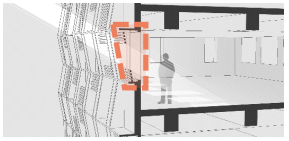
Daylight / Solar Radiation Control of Horizontal Louvers in Summer Season

Prevent direct daylight and ensure visual comfort



Daylight / Solar Radiation Control of Horizontal Louvers in Winter Season

Maximize the amount of daylight entering the room



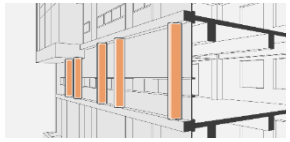
Facade design (North)

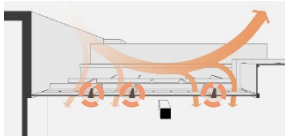
Wind-capture Design

Wind-capture design was proposed to improve natural ventilation performance of the building's higher floors. Considering the high wind speed at the upper part of the building, extruded vertical louvers were installed for higher floors to maximize natural ventilation performance.

Wind-capture Design

Wind-capture design utilizes the infiltration between buildings. (Façade is designed with a structure that allows wind to flow through.

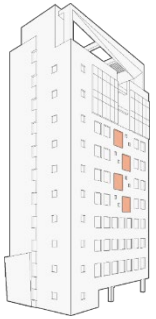


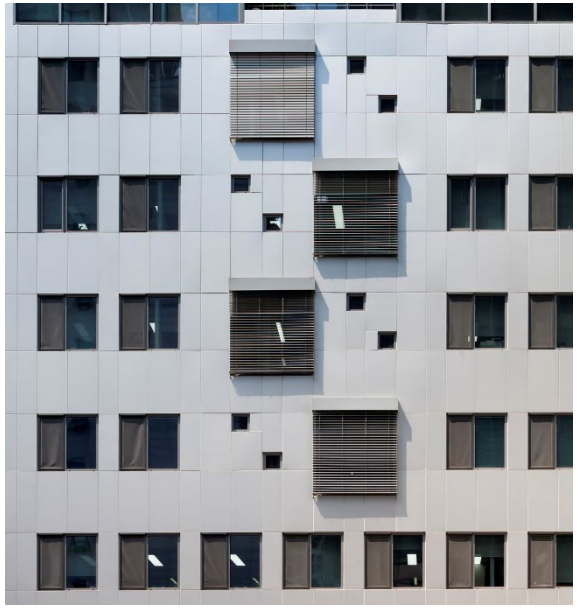


Facade design (South)

EVB (Electric vertical blind)

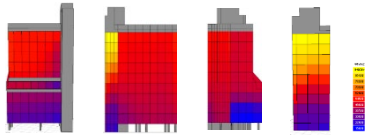
The size of the south-facing window which has large amount of solar radiation were enlarged and EVB (Electric vertical blind) were installed to achieve two design elements: highlight view of urban landscape and control incoming daylight / solar radiation.





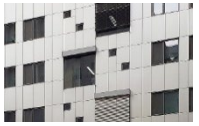
Solar Radiation Simulation for External Shading and External Electric Blind Installation

Cumulative solar radiation of the building façade were analyzed and excessive cumulative solar radiation at the back/core was identified.



EVB Installation to Improve Work Environment

A sense of openness was achieved by adjusting daylight/solar radiation.

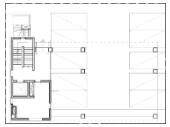


1F Floor Plan

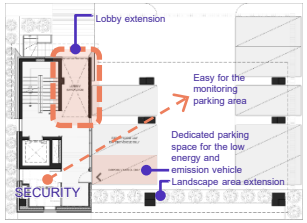
Main Entrance

The main entrance and lobby provided a sense of openness. They act as a main symbol of the company as it emphasizes the vision in achieving excellence in sustainability.

Existing 1F Floor Plan



1F Floor Plan After the Renovation

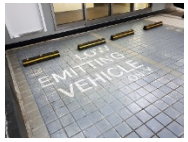


Lobby Extension

Improving a sense of openness and emphasizing the firm's vision

LEV Preferred Parking

Meet LEED LT standards



Fine dust inflow prevention mat

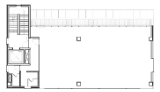
Meet LEED standards

2~5F Floor Plan

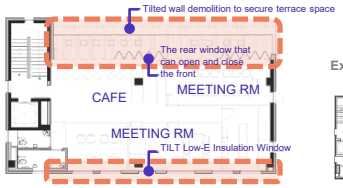
Communal Space

Horizontal louvers were implemented for securing visibility and daylight / solar radiation, and high-performance win-dows were installed in the south facing facade. The communal space was designed to improve work efficiency and performance of building occupants through giving a sense of openness and a comfortable atmosphere.

Existing 5F Floor Plan



5F Floor Plan After the Renovation

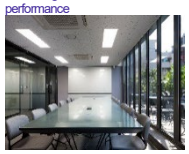


Resting terrace installation

Improving the utilization of the existing terrace space

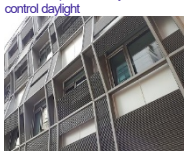
Expansion of natural ventilation opening area

Increasing illuminance and enhancing natural ventilation performance



Installation of horizontal lovers

Securing occupants' visual comfort in the workplace and system to control daylight

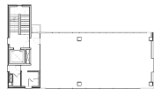


8~10F Floor Plan

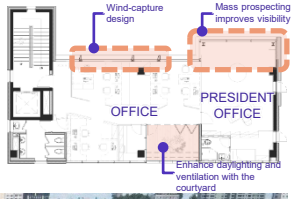
Higher Level

The upper levels of the building have excellent views. Plans were adjusted to maximize views of the surrounding landscape and design elements were applied to maximize natural ventilation performance.

Existing 9F Floor Plan



9F Floor Plan After the Renovation



Curtain wall installation at the north facade

Securing occupants' visibility of the surrounding environment

Courtyard in the south facade

Maximizing indoor daylighting

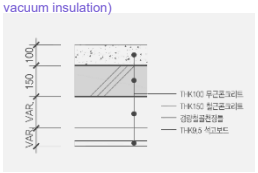
Communal space on the rooftop floor

Providing a resting area with solar lighting

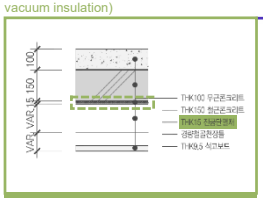
Indoor Thermal Environment

Improving Insulation Performance

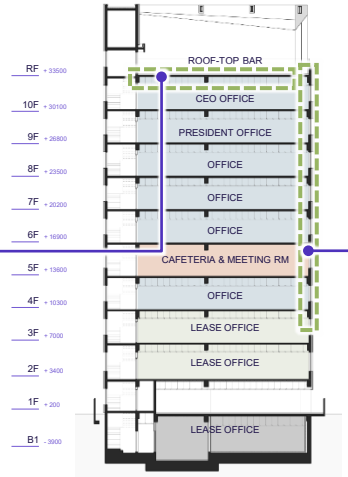
Roof Insulation Before Renovation (without vacuum insulation)



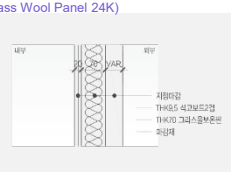
Roof Insulation After Renovation (with vacuum insulation)



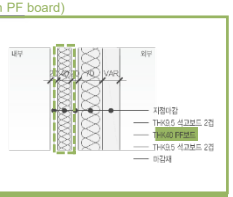
2.73 times better performance of roof insulation



External Wall Insulation Before Renovation (Glass Wool Panel 24K)

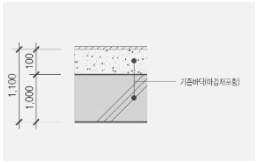


External Wall Insulation After Renovation (with PF board)

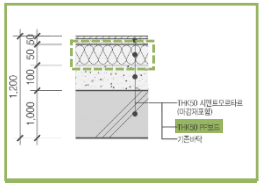


2.23 times better performance of external wall insulation

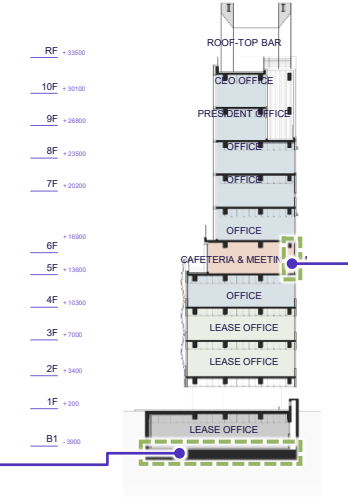
Floor Insulation Before Renovation (without floor insulation)



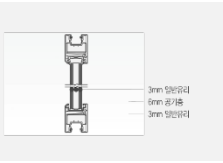
Floor Insulation After Renovation (with PF board)



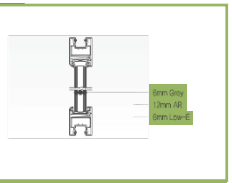
1.93 times better performance of floor insulation



Window Before Renovation



Window After Renovation



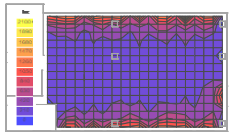
2.25 times better performance of window with the application of high airtight thermal window

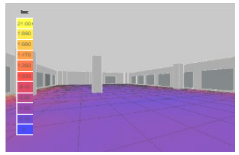
Indoor Lighting Environment

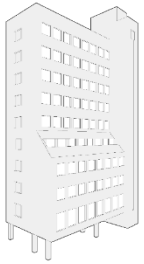
Increasing Daylighting

Daylight Simulation Before Renovation

The higher illuminance was investigated around the window, but the illuminance of the internal zone is below the recommended lighting level for the office (300~600 lux)



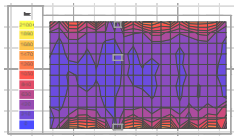


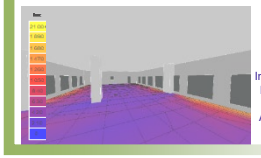


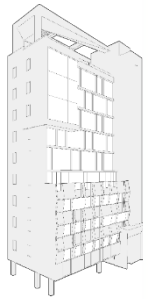
Opening area 50%
Poor thermal performance of windows
Unable to control the daylight

Daylight Simulation After Renovation

Extended window width to bring natural light into the internal space (up to 420lux)







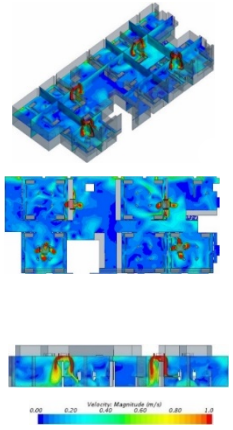
Opening area 50% + curtain wall
Improving Daylighting Performance
Enhancing Thermal Performance with Low-E Glass
Adjusting daylighting with internal shading

Indoor Air Quality Environment

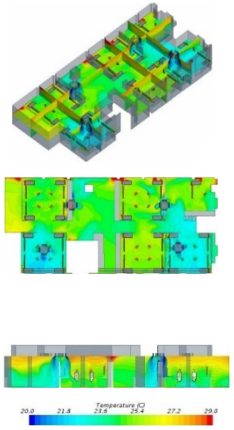
Enhancing Ventilation Performance

The simulation was conducted to analyze occupants' thermal comfort in the summer season.

Indoor Airflow Simulation

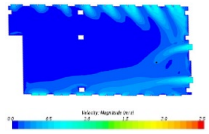


Indoor Temperature Simulation



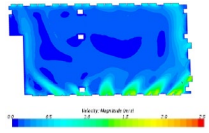
Airflow Environment _ Before Renovation

Due to the influence of surrounding buildings, the previous building has low indoor airflow speeds and low air circulation.



Airflow Environment _ After Renovation

Natural ventilation performance was maximized through expanding ventilation (opening and closing) area of window and applying turn and tilt windows.



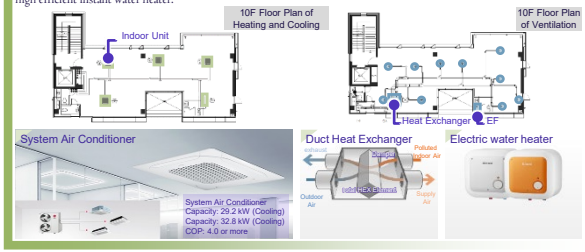
Technical Items / Machinery and Electrical Facilities

Energy Saving

Heating and Cooling - Before Renovation

Heating and Cooling – After Renovation

The energy-efficient cooling and heating system creates a pleasant airflow environment, and saves energy through using high efficient instant water heater.



Lighting Control Facility - Before Renovation

Lighting Control Facility – After Renovation

Energy saving by dimming control, occupancy sensor, lighting reduction control and LED light application (lighting density - Office facility 6.42W/㎡)

Technical Items / BEMS, PMV, CO2 Monitoring

BEMS Developed by EAN

Applying in-house development of BEMS

To maximize the energy efficiency of the building, the energy consumption of the building, the environment variables for the building, and the operation pattern of the facility system were analyzed.

Monitoring Scope

Objective

Energy consumption, lease operating costs, inefficient equipment discovery and action, efficient execution of M&V

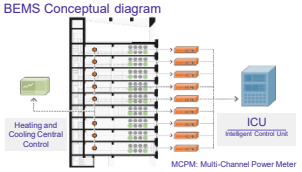
Monitoring Duration

Data gateway server → Monitoring server

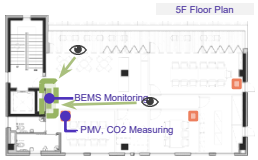
Function of BEMS

Identify Building Type and usage	Long-term Data Storage	Analysis of collected data

BEMS Conceptual diagram

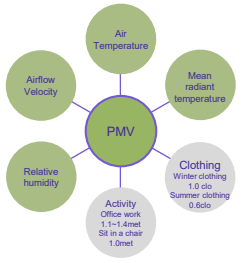


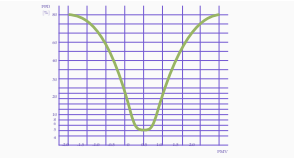
Occupant Thermal Comfort: PMV and CO2 Monitoring



PMV Evaluation
This remodeled building was set up to be able to represent PMV by BEMS through receiving input values of the following six factors.

CO2 Monitoring
The air conditioner operates when the CO2 value in the occupied space exceeds the legal standard (1,000ppm).





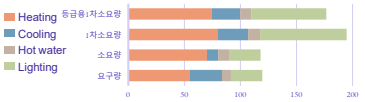
3	Hot
2	Warm
1	Slightly warm
0	Neutral
-1	Slightly cool
-2	Cool
-3	Cold

Technical Items / BEMS

BEMS Verifying Actual Energy Consumption

Verifying improvement in environmental performance compared to the precedent building by using the information collected from BEMS

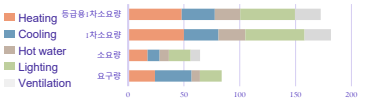
Before Renovation



Demand	119.5
Saving Rate	-
Usage	176.6

Unit : kWh/㎡·yr)

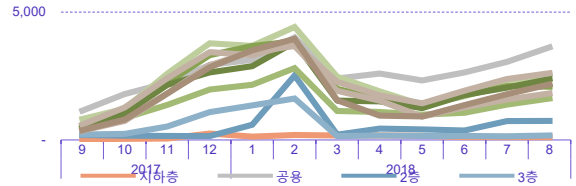
After Renovation



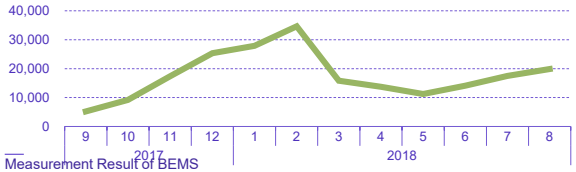
Demand	74.6
Saving Rate	38%
Usage	172.4

(Unit : kWh/㎡·yr)

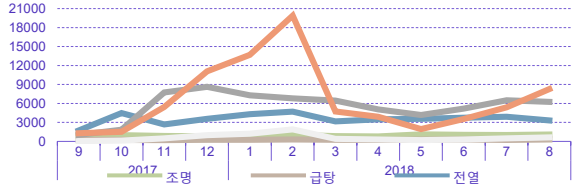
Actual Energy Consumption



Total Actual Energy Consumption



Measurement Result of BEMS



Energy performance evaluation for the first year of operation: Primary energy consumption 170.44 kWh/㎡·yr

▶ Variables such as error due to the first operation and sudden increase in the cooling / heating requirement due to abnormal temperature were considered

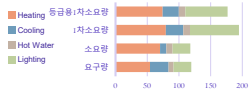
Future Improvements

▶ Improve measurement accuracy / analysis performance of BEMS
▶ Establishment of Optimal Operation Control Strategy

Achievements

Optimized Building Performance

Building Before Renovation



Demand	119.5
Saving Rate	-
Usage	176.6

Unit : kWh/㎡·yr

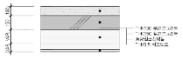
Poor daylighting and ventilation performance affected by the window design

ON/OFF Manual Lighting Control

Improper Insulation outside the legal range

External wall before the renovation - Glass wool panel 24K

A roof before the renovation – Without vacuum insulation panel

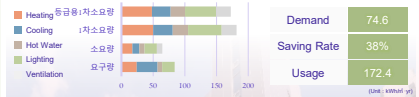


Deteriorated and Inefficient Facility System

No External Shading Devices

Inadequate Energy Usage Monitoring

Building After Renovation



Demand	74.6
Saving Rate	38%
Usage	172.4

(Unit : kWh/㎡·yr)

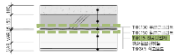
Systematic Window Application

Automatic control such as occupancy sensor, dimming control

10% Improved Insulation Performance

External Wall After the Renovation - PF Board Application

Roof After the Renovation - Vacuum Insulation Panel Application



Application of High-Performance Facility System

External Shading Devices Application

BEMS Monitoring Installation

Major Green Building Technology and Certification

Green Building Certification _ Outstanding

Certified in 2017.10.31 / Total Score 89pts)

Building Energy Efficiency Rating _ 1+

Certified in 2017.10.26 / Certification No. : 17-비-본-1+-0162

Division	Main Construction Related Contents and Items
Energy and Environmental Pollution	Securing Energy Saving Rate 1) Reduced Energy Requirements by 37.6% 2) Reduced Energy Requirements by 39.5% Application of BEMS system 1) Capable of measuring and analyzing data for energy source such as heating and cooling, ventilation, hot water supply, lighting, heat transfer etc.
Materials and Resources	Use Environmental Product Declarations (EPD) products
Water Circulation Management	Application of water-saving type sanitary facilities (36.27% saving rate compared to the previous one) 1) Water-saving Faucet 2) Water-saving Toilet 3) Water-saving Urinal 4) Water-saving Shower Head
Maintenance	Operation and maintenance of buildings through information on green remodeling 1) Green Remodelling Construction Details 2) Green Remodelling Elements Notice 3) Green Remodelling Maintenance Guidelines 4) Green Remodelling Related Construction Information Plans to minimize the impact of existing structures through the Green Remodeling Project 1) Green Remodelling Process Plan 2) Green Remodeling Work Plan and Notes 3) Construction Site Noise / Dust Generation Management Plan 4) Construction Site Waste Management Plan
Indoor Environment	Improve the indoor environment for warm, light, air and sound environment to create pleasant indoor environment 1) Thermal Comfort : Wall Insulation and Window Reinforcement 2) Visual Comfort : Replace High-efficiency LED Lighting Equipment 3) Air Quality : Installation of Heat Exchanger 4) Acoustic Comfort : Noise Barrier Through Window Reinforcement

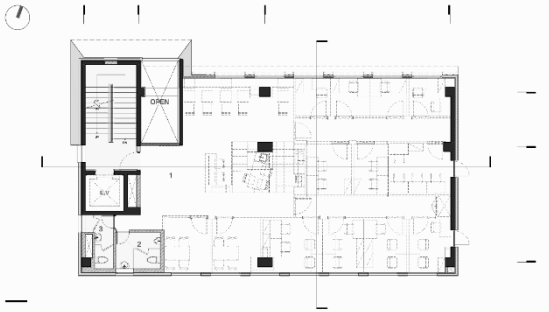
LEED NC v3.0_ GOLD

Acquired GOLD rating with a total score of 61 points

Division		Main Construction Related Contents and Items	
SS	Sustainable Sites	Establishment and Implementation of Construction Management Plan Preferred Parking Space for Low Emissions Vehicles (LEV) and Carpool and Vanpool	21점
WE	Water Efficiency	40% Reduction in Water Consumption (Use of Water-saving Fixture)	8점
EA	Energy & Atmosphere	Enhanced Commissioning M&V Plan(BEMS) Reduced Annual Energy Consumption Costs by 18% or more Compared to ASHRAE 90.12007	11점
MR	Materials & Resources	Construction Phase Waste Management Plan Use Recycled Materials Use Local Materials	4점
IEQ	Indoor Environmental Quality	CO2 Sensor Installation Construction Phase Indoor Air Quality Management Plan VOC Low Emission Material (Adhesive / Sealant) Individual Control of Lighting and Thermal Comfort System	7점
ID/R P	Innovation in Design	At Least One LEED AP Qualifier Participates in the Project	10점
TOTAL			61점

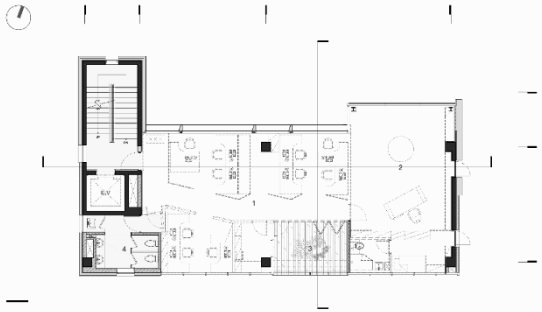
Architectural Drawings

Site Plan, Floor Plans, Section Drawing



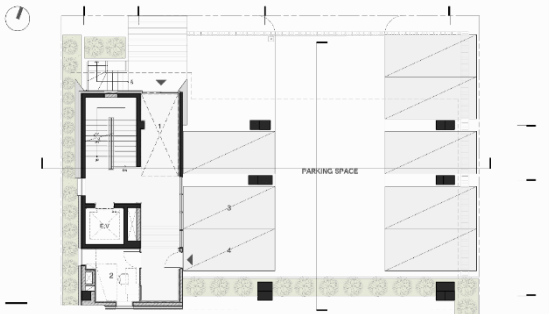
2F Floor Plan
1/250

1. Office
2. Male Toilet
3. Female Toilet



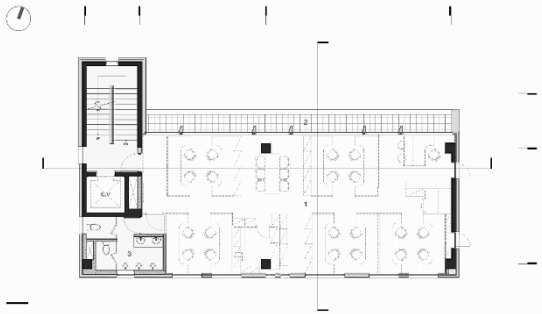
9F Floor Plan
1/250

1. Office
2. Male Toilet
3. Female Toilet
4. Female Toilet



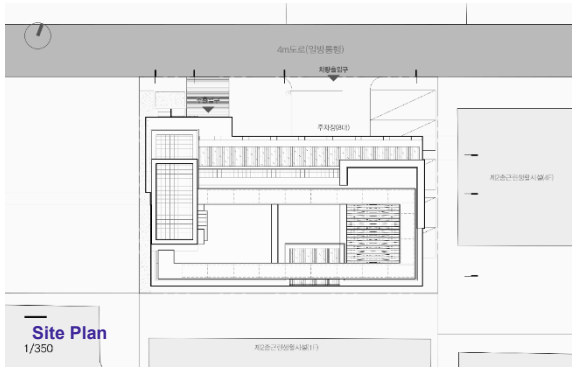
1F Floor Plan
1/250

1. Lobby
2. Security Office
3. Preferred parking for Carpool
4. Preferred parking for LEV vehicle

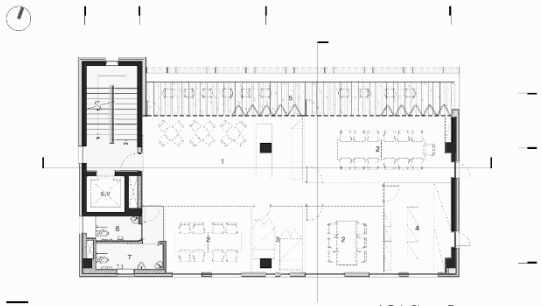


6F Floor Plan
1/250

1. Office
2. Terrace
3. Male Toilet

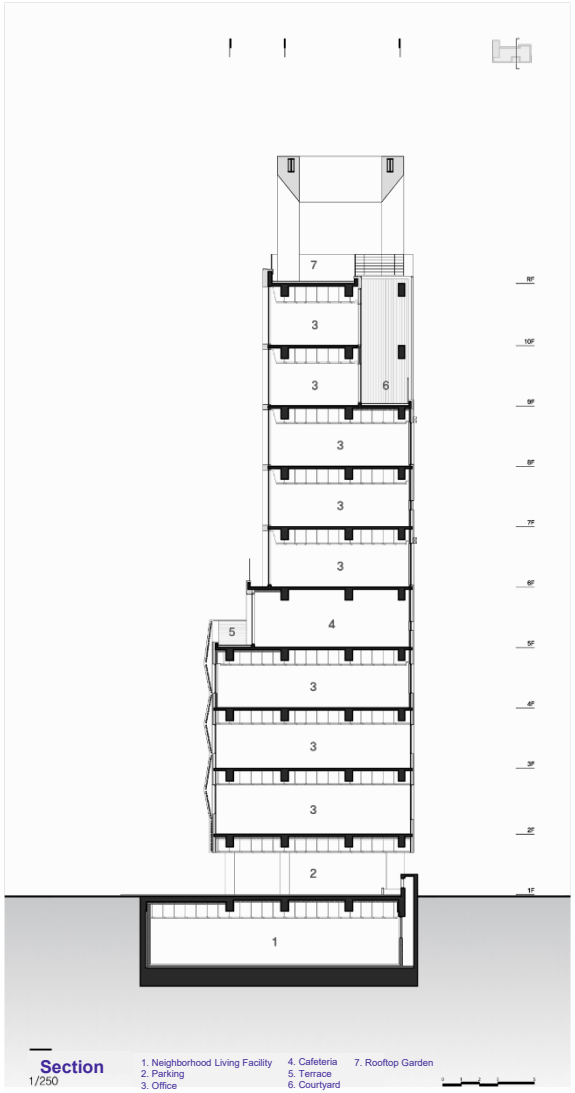


Site Plan
1/350



5F Floor Plan
1/250

1. Cafeteria
2. Meeting Room
3. Data Server Room
4. Data Storage Room
5. Terrace
6. Female Toilet
7. Male Toilet



Section
1/250

1. Neighborhood Living Facility
2. Parking
3. Office
4. Cafeteria
5. Terrace
6. Courtyard
7. Rooftop Garden

Culture Platform

DAEGU BANK SECOND HEADQUARTERS

Republic of Korea

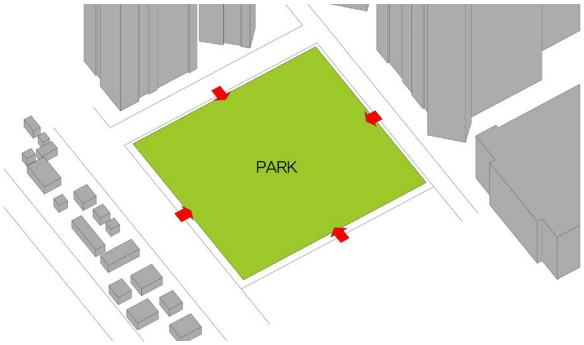
PROJECT NAME	: DAEGU Bank 2nd H.Q.
LOCATION	: Daegu, Korea
BUILDING TYPE	: Financial Office
PROJECT COST	: $ 65,000,000
COMPLETION	: 2016
LAND AREA	: 9,638.90㎡
BUILT AREA	: 3,637.12㎡
GROSS AREA	: 37,055.34㎡
ARCHITECT	: JUNGLIM ARCHITECTURE, Co., Ltd.
MEP & IBS	: Woowon M&E | Jungwoo Eng. | I-Controls
STRUCTURE	: I'ST Structural Engineering Group
LANDSCAPE	: Solto Landscape Architecture
CERTIFICATION	: LEED NC 2009 – Gold
	G-SEED – 1st class
	Building Energy Efficiency Rating – 1st class
	Intelligent Building Certification – 1st class

Project Narration

This project is the Second HQ of Daegu Bank, the first regional bank in Korea established in 1967. It contains not only the functional requirements of a company, but also its values, philosophy, history, and vision. Daegu Bank has been a leader in regional environment conservation and environmentally friendly businesses with 'sustainable management' as its motto. From the early stages of planning, Daegu 2nd HQ had a clear goal of not only satisfying the basic requirement of expanding the lacking work area, but also to build a world-class sustainable building that protects the environment and conserves energy in order to realize the corporate value of 'sustainability.' Hence the project was not planned through conventional design process in which sustainable technology is applied bluntly, but through Integrated Design process in which all project officials discuss the requirements, functions, and the performance of sustainable design factors and develop the design together. This project completed 'Integrated Project Delivery' through the close supervision in the phase of construction for the realization of variable sustainable items on design concept. Such environmentally friendly ideology has been maintained even to the management level. Sustainable design concept flows consistently from the planning, design, construction, and operation phase of this project, making Daegu Bank 2nd HQ an innovative green building.

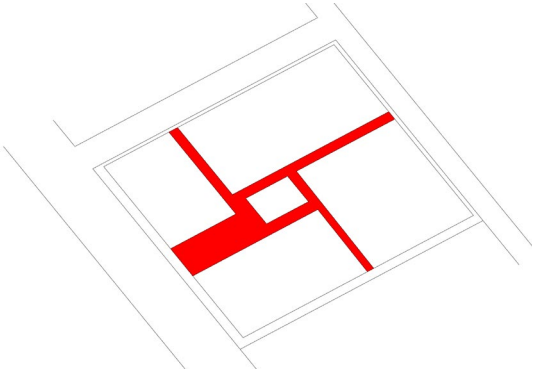
Design Concept

Proposing a common point of interest between the public, civic, regional community and corporate



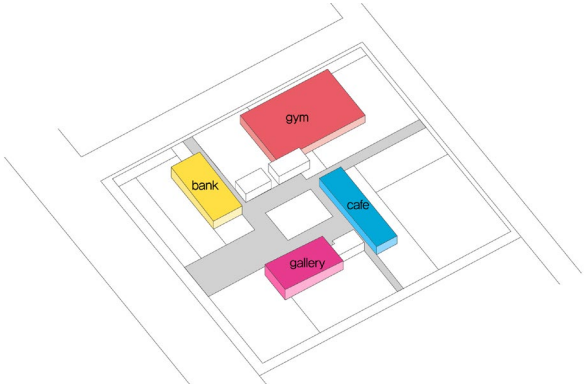
Step1_PARK

Park within the city



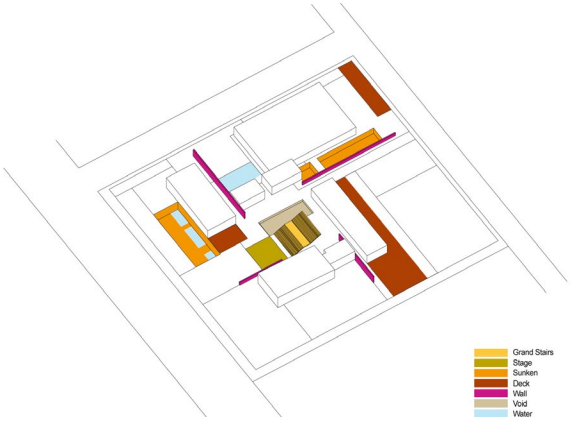
Step2_RED CARPET

Accessible and open culture street



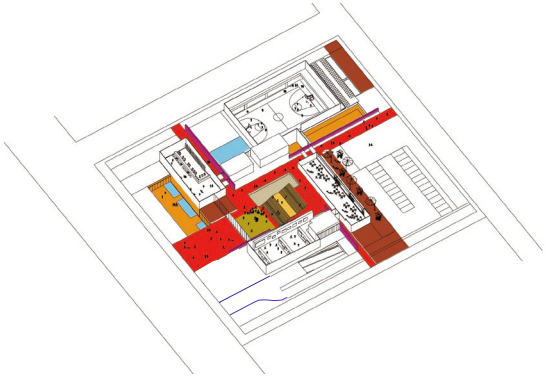
Step3_CULTURE PROGRAM

Accessibility and independence achieved by placing programs around culture street



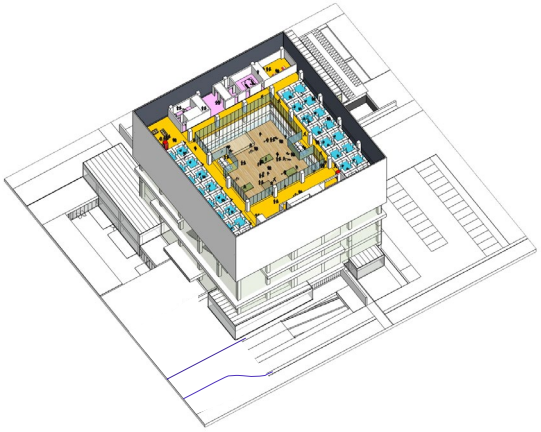
Step4_EVENT ELEMENTS

Various architectural elements to enrich the cultural experience



Step5_CULTURE PLATFORM

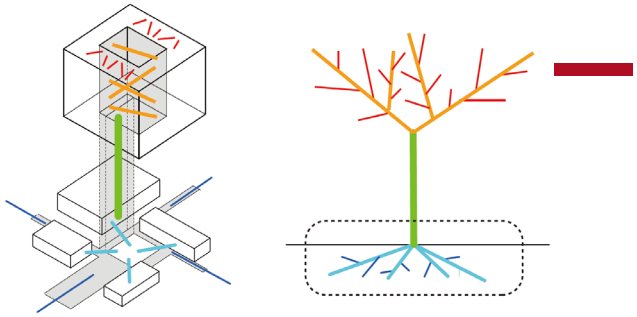
Fulfilling the corporate's culture marketing



Step6_FLOATING BOX

New office with employee communication, working environment, and welfare

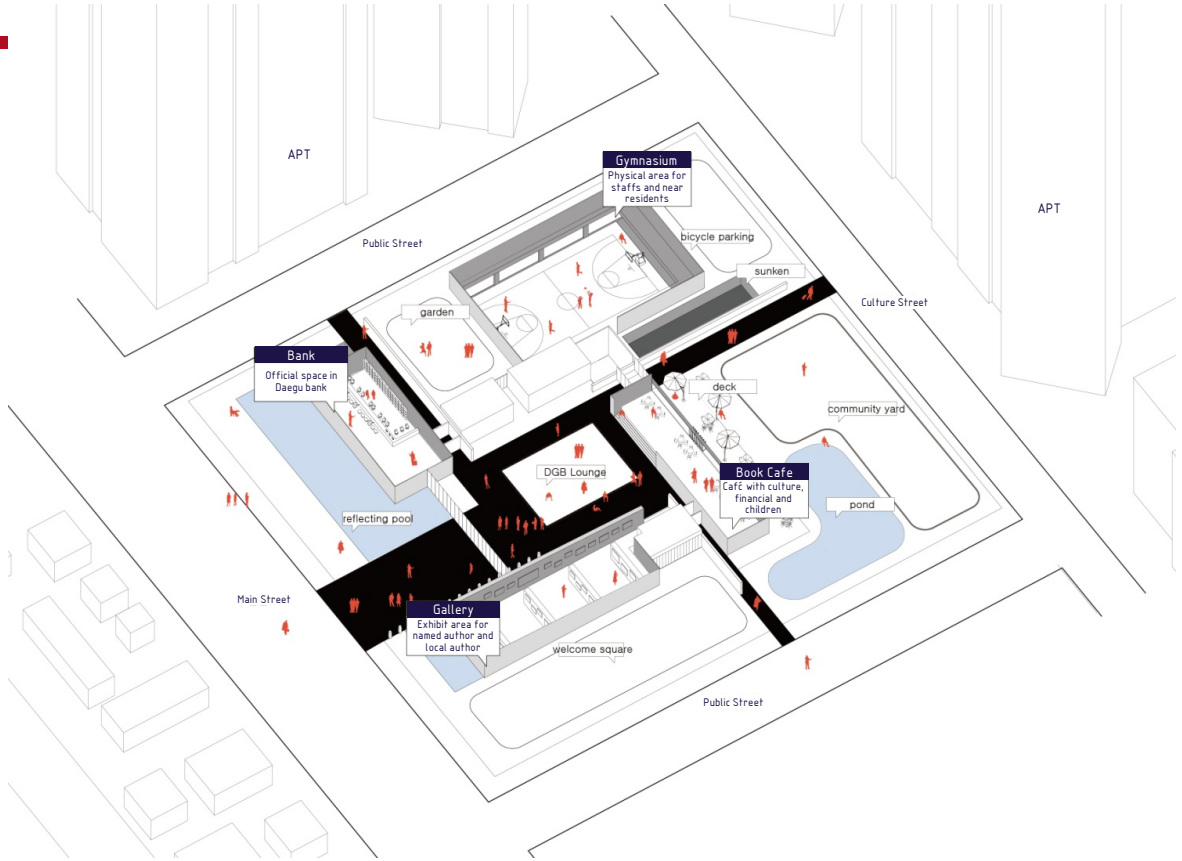
Communication Spectrum



The overall concept of Daegu Bank 2nd HQ is 'communication and interaction." This concept is consistently applied in large scale such as relationship – building between the exterior and interior, and to smaller scale such as interaction between the occupants. The core concept of the lower levels is to propose a spatial organization consisted of the intersecting points and the borders between the regional community, corporate, city and a building.

CULTURE PLATFORM

Daegu Bank 2nd HQ breaks the conventional large podium design typical in bank architecture and reinterprets the program in order to divide the space into human-scale. By doing so the space not only benefits the surrounding residential buildings and the pedestrians, but also allows for spatial independence of each program while opening the possibility of active interaction between the program and the exterior space. Separated mass are arranged along the path. The intersection point of the roads is an open courtyard in which the regional community and the corporate interact through culture. Bright light falling from the ceiling and the sound of piano from the lounge – this space will deliver the first impression of the building.



· Gallery

· Book Cafe

· Gym

Green Measures : Atrium

Operable Clerestory

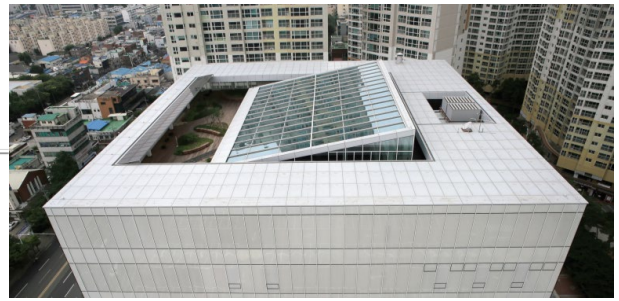
· Allows for trapped hot air to escape during summer

· Increased natural ventilation during spring/fall

Interior Operable Windows

· Increased natural ventilation during spring/fall

· air quality improvement



Protruding Sloped Skylight · Effects of hot air trap in the upper levels removed

· Direct light reflection from skylight reduced

Exterior Roll Blind

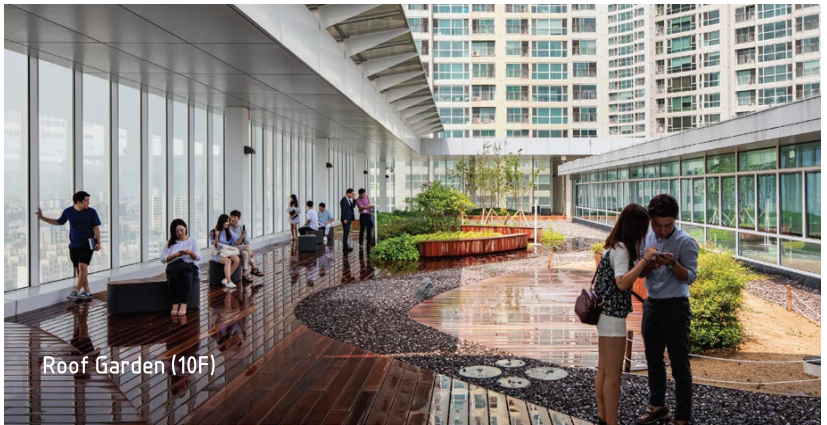
· Controlling the passage of light and heat

GREEN MEASURES : Outside


Roof Garden (2F)


Forest Biotope (exterior)


Standing Water Biotope (exterior)


Roof Garden (10F)

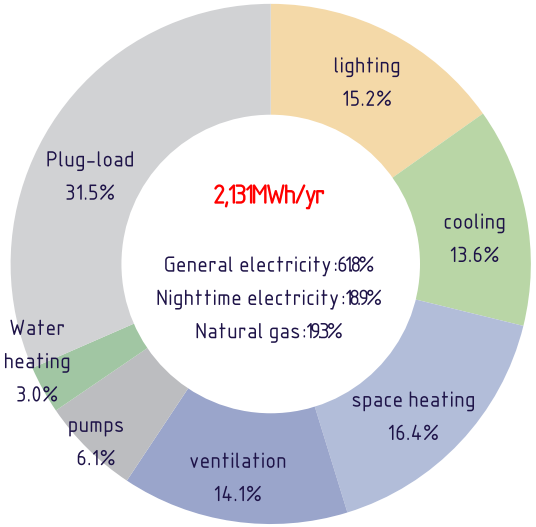
Greenery Planning

The greenery located on the exterior of the building as well as the roof not only provides the occupants and the local community with pleasant resting area, but also restore the ecosystem and reduce the heat island effect.

BUILDING ENERGY CONSUMPTION

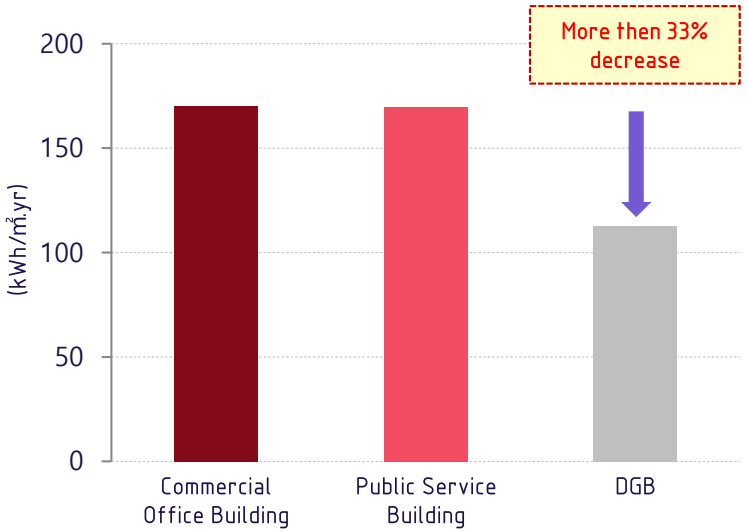
'Expected Annual Energy Consumption of 2,131MWh/yr, which is more than **33% less** than the average energy consumption of newest commercial buildings."

Expected Annual Energy Consumption



(Estimated values from design phase simulation)

Comparison with Average Commercial Building Energy Consumption

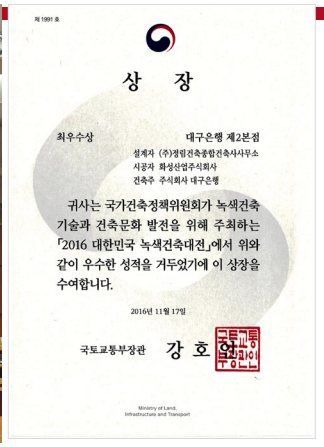


※ Based on large scale buildings built after 2011 – 2014 Energy Consumption Survey

Type	Annual Energy Consumption (kWh/㎡.yr)		Annual Primary Energy Consumption (kWh/㎡.yr)		Notes
	Including Process Load	Excluding Process Load	Including Process Load	Excluding Process Load	
per total floor area	57.52	39.37	137.58	88.58	Energy Efficiency Rating of " 1+ " Grade
per air conditioning area	112.79	77.21	269.78	173.71	

※ Final Building Energy Efficiency Rating evaluation via ECO2 program resulted in 214.7kWh/㎡.yr, which is equivalent of 1 grade.

AWARDS



2014 BIM Design Awards "Good Practice" / 2015 Korea Institute of BIM "Best BIM Design" / 2016 Daegu Architecture Awards "Gold Prize"
2016 Korea Green Building Awards "Minister Prize" / 2017 Korea IBS Building Awards "Grand Prize" / 2018 APIGBA Awards "Gold Prize"

Thanks!!