Korea Green Building Design Code and Role of Architect

ACGSA Report

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KOREA INSTITUTE OF REGISTERED ARCHITECTS

Contents

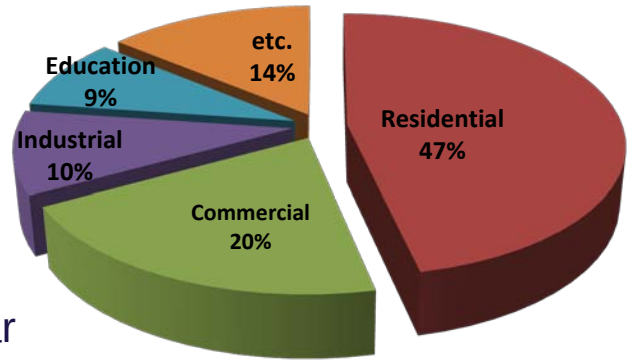
- Why Green Building?
- Green Building Code
- Role of Architect
- Examples of Green Building

-Green AsiARCH 2018

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)

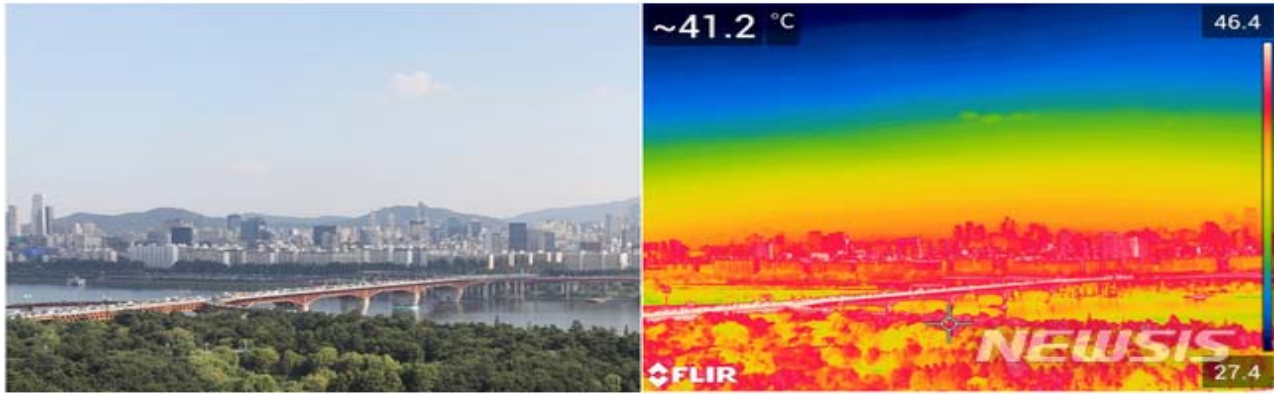
Why Green Building?

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 2018
Heat wave, Fine dust,
Ozone…

Climate change
→Climate crisis

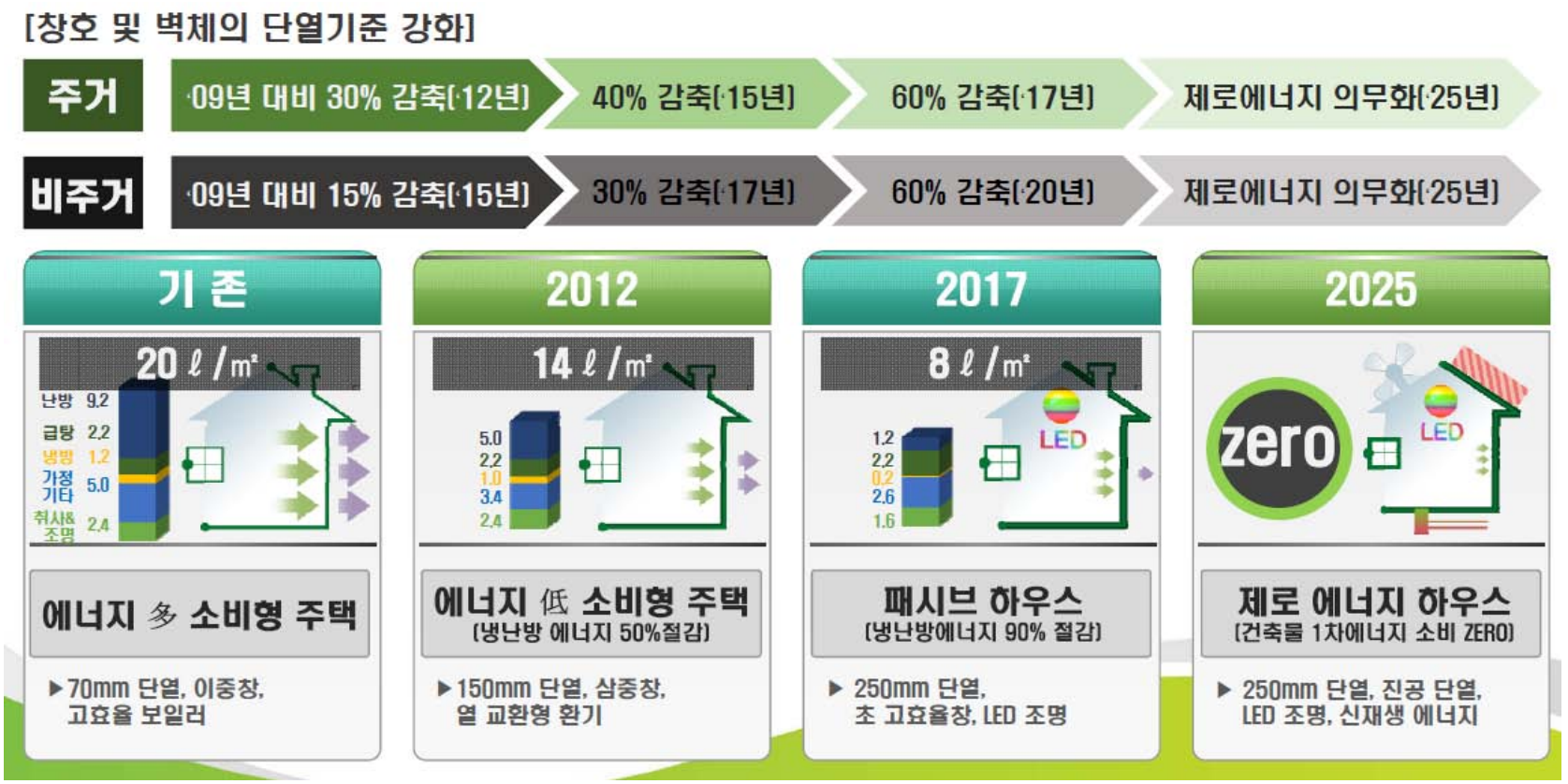


How is your country coping with the gobal Heat wave?

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 priorly applies to public buildings 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

-G-SEED (2018: 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, it makes an effort at Green Building education.

KIRA's Education Center

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

Building of KIRA

Role of Architect

Academy of Environmental-friendly Architectural Design

-Environmental-friendly Architectural Design Academy operated by KIRA.

-This program functions as a core in Korea Green Building Architectural Education for registered architects and is an only education program in Korea.

-The G SEED ID course has been in operation since 2107.

- 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

Examples of Green Building

Samyang Dicovery Center

(grand prize in KOREA Green Building Competition 2017)

- **Country:** Republic of Korea
- **Location:** Seongnam-si, Gyeonggi-do
- **Land Area:** 5,732.90 sm
- **Built Area:** 44,984.63 sm
- **Year of Completion:** 2016
- **Architect/s:** NIKKEN SEKKEI / Okamoto Keiichi
  JUNGLIM ARCHITECTURE / Jinwoo Lim
- **Engineers:** Structure_Cross Structure
  MEP_Doul Eng. / Jungwoo Eng.
  Landscape_HAK
  Interior_Spackman Associates
- **Cost of the Project:** 97,200,000 USD
- **Awards:** Grand prize at Korea Green Building Award
- **Certification:** LEED v3 Gold, G-SEED 1st class

Samyang Discovery Center is the research and development center for Samyang Group which has nearly a centennial history since its establishment in 1924, playing a pivotal role in "open innovation," the goal pursued by the group. As a research laboratory and office in the food and bio industries, this center intends not only to satisfy the functions of work and research required of the R&D center for the headquarters, but also to provide the space that can be shared with local residents, thus realizing a building that enables coexistence and synergy through communication and exchange.

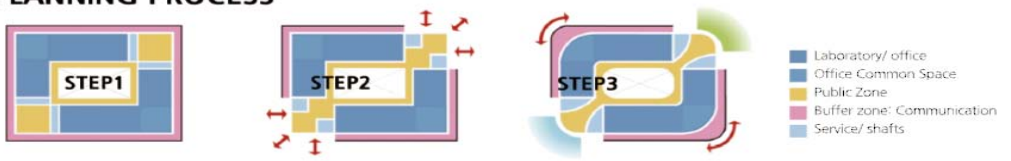
As the main functions of the building, research space was made up of the following zones: the Desk Zone for data analysis; the Lab Zone to prepare for experiments and conduct brief experiments; and the Lab Support Zone to carry out such experiments as to deal with toxic agents or engender mechanical noises. This make-up was to ensure the safety of researchers and the amenity of indoor environmental quality.

As passive design elements, a large-scale atrium was placed at the center of the building to facilitate daylighting and natural ventilation, with facade modules applied by orientations in consideration of solar geometry to enable the optimal indoor environmental condition and energy-saving. Besides, various and reasonable green technologies were utilized in tandem to realize the best sustainable building.

Examples of Green Building

GREEN AsiARCH2018

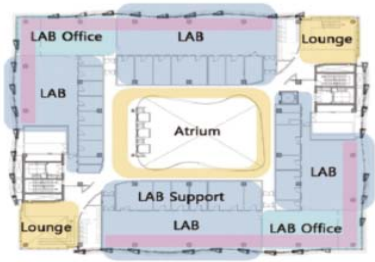
PLANNING PROCESS



LAB Office
a small-scale meeting room for refreshing and chatting in a free atmosphere

LAB
increases communications between researchers in a continuous large-scale lab; responds freely to the change of membership in the lab team.

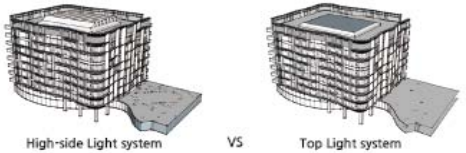
Atrium
enables communications in the upward, downward, leftward, rightward directions.



Lounge
a space that enables comfortable communication

LAB Support
equipped with a shared instrument or a special laboratory; space was reasonably made up by integrating service utilities; a laboratory with risk factors was planned as a detached room to increase safety.

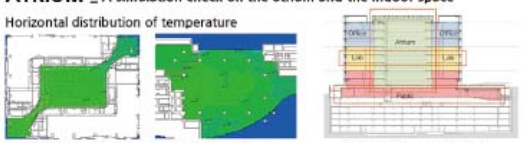
TOPLIGHT _ A pre-check on the feasibility of the atrium



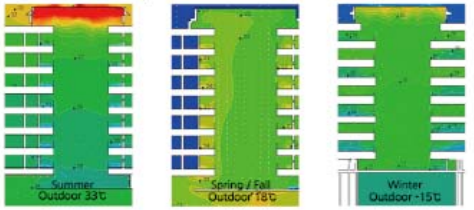
	Cloudy day (12:00)	Autumn equinox (12:00)	Winter solstice (12:00)	Summer solstice (12:00)
High-side Light system	GF Illuminance 80 Lx	GF Illuminance 140 Lx	GF Illuminance 200 Lx	GF Illuminance 130 Lx
Top Light system	GF Illuminance 830 Lx	GF Illuminance 1,350 Lx	GF Illuminance 800 Lx	GF Illuminance 29,000 Lx

ATRIUM _ A simulation check on the atrium and the indoor space

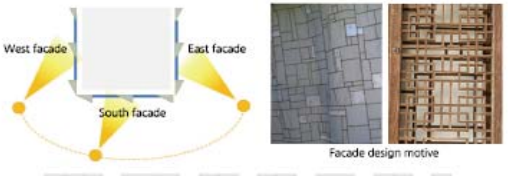
Horizontal distribution of temperature



Vertical distribution of temperature



FACADE _ Control of insolation through facade design



LIGHT SHELF _ A pre-check on the feasibility of light shelf

Examples of Green Building

Cheongla International Library

(top prize in KOREA Green Building Competition 2017)

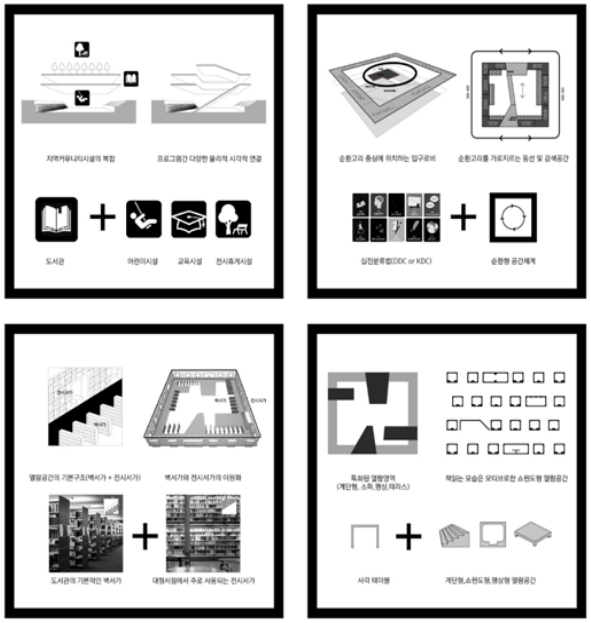
COUNTRY	KOREA
NAME OF THE PROJECT	CHEONLA INTERNATIONAL LIBRARY
LOCATION CITY	INCHEON
GROSS AREA	1,994.95㎡
LAND AREA	1,500㎡
BUILT AREA	1,240.16㎡
YEAR OF COMPLETION	2015
ARCHITECTS	JAEWON CHOI(FLO ARCHITECTS) DESIGNGROUPOZ ARCHITECTS
MEP.	HANIL MEP. CONSULTANTS
STRUCTURE	THEKUJO
COST OF THE PROJECT	$ 4,000,000
AWARDS	2017 KOREA GREEN AWARD 2ND PRIZE

Enjoy your library

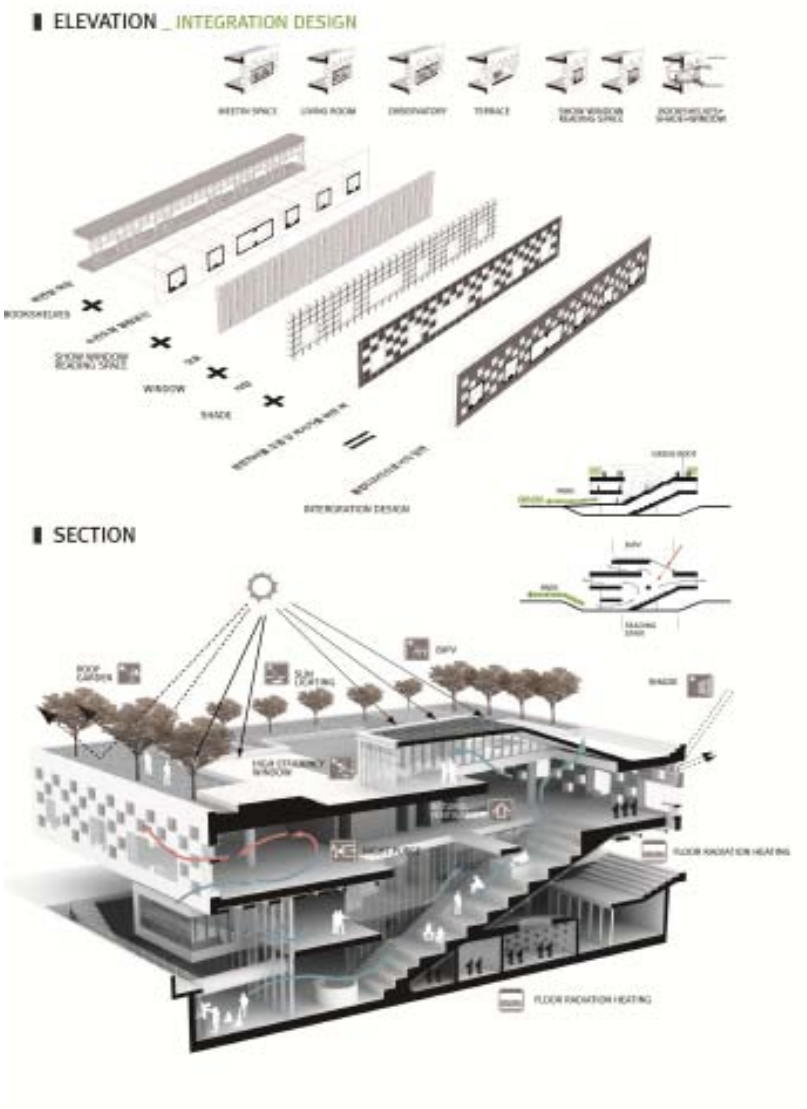
The library is the center of the local community. A variety of spaces including children's playgrounds and cultural classrooms are stacked together with the library space along with rooftop parks. The layers of each program are visually connected and communicated in various ways through the tilted plate and opening.

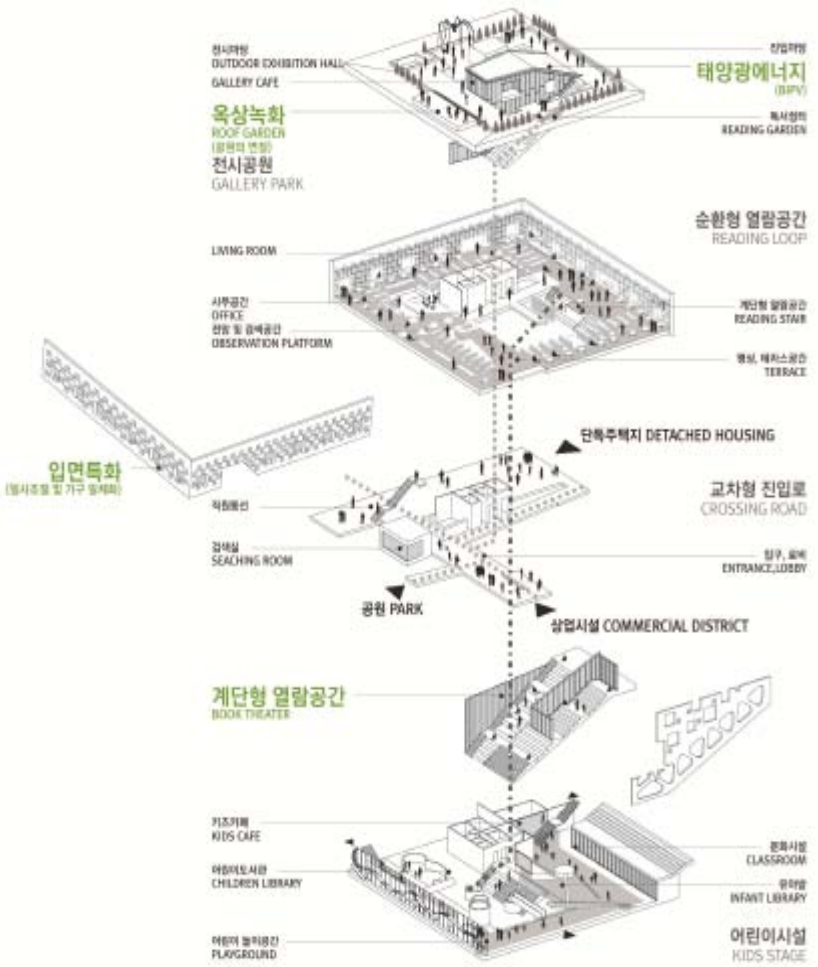
Experience the loop of knowledge.

In the Cheongra Library, the book shelf is arranged in line with the decimal classification, and it is proposed to circulate the space of knowledge through the beginning and the end. This is a space of knowledge through the open space floating on the entrance lobby.



Examples of Green Building





Thanks!!