STRATEGIC URBAN PLANNING FOR ECO-Smart City

: a Korea example for the connectivity of the world and urban connectivity

Kwi-Gon Kim, Ph.D. (UCL, England)
Professor Emeritus, at Seoul National University
President, of IUTC

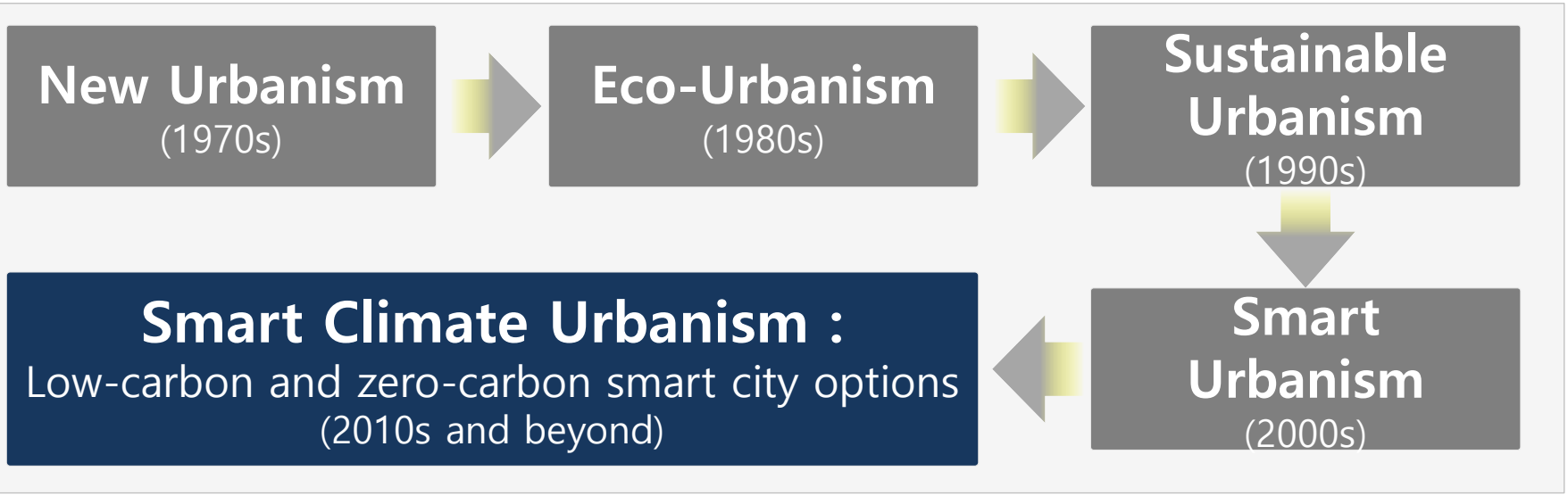
GANGWON PROVINCE

International Urban Training Center
IUTC

UN HABITAT
FOR A BETTER URBAN FUTURE

Contents

1.1 Change in Urbanism



Holistic Citywide Approach of the Smart City.

- The new climate system includes Mitigation, Adaptation, Finance, Technology, Capacity-building and Transparency.

1.2 Climate Smart City Models

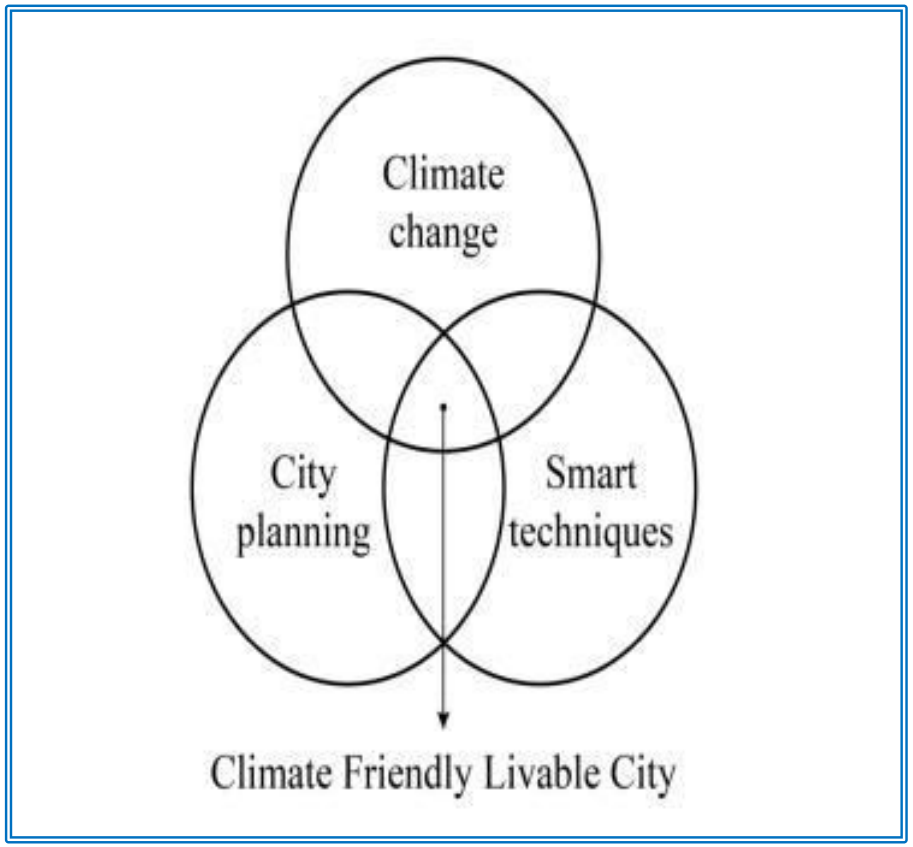


Fig. 1 Three pillars of climate smart city

Source: kwi-Gon Kim, Low-carbon Smart Cities: Tools for Climate Resilience Planning, Springer, Heiderberg, Germany, 2017

Fig. 2 The virtuous cycle – How Cap & Trade and the Climate Action Plan Work Together

Source: https://www.ontario.ca/page/climate-change-action-plan

1.2 Climate Smart City Models

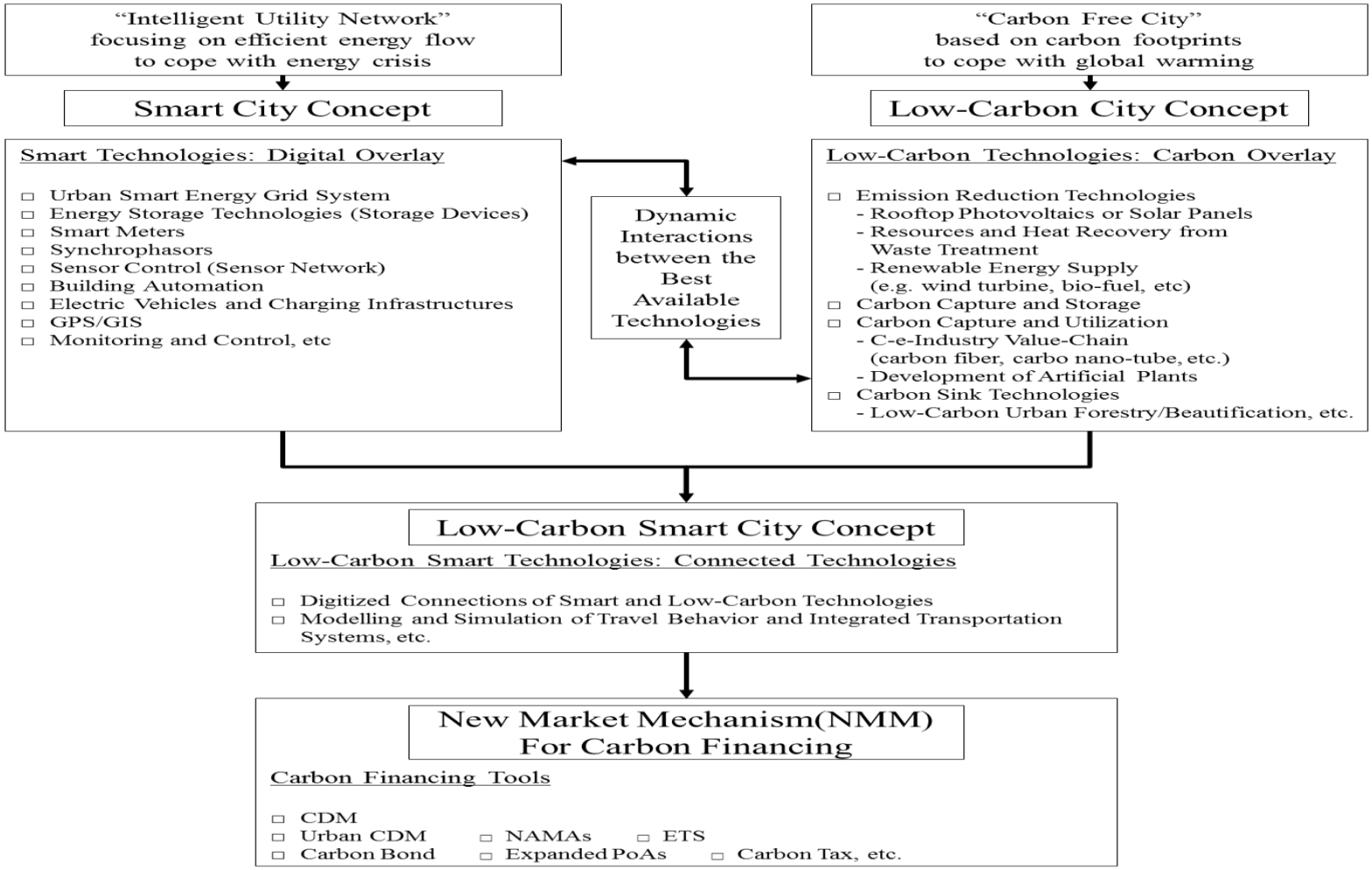


Fig. 3 Technologies for the digitalizing connections of smart city and low-carbon city

Source: kwi-Gon Kim, Low-carbon Smart Cities: Tools for Climate Resilience Planning, Springer, Heiderberg, Germany, 2017

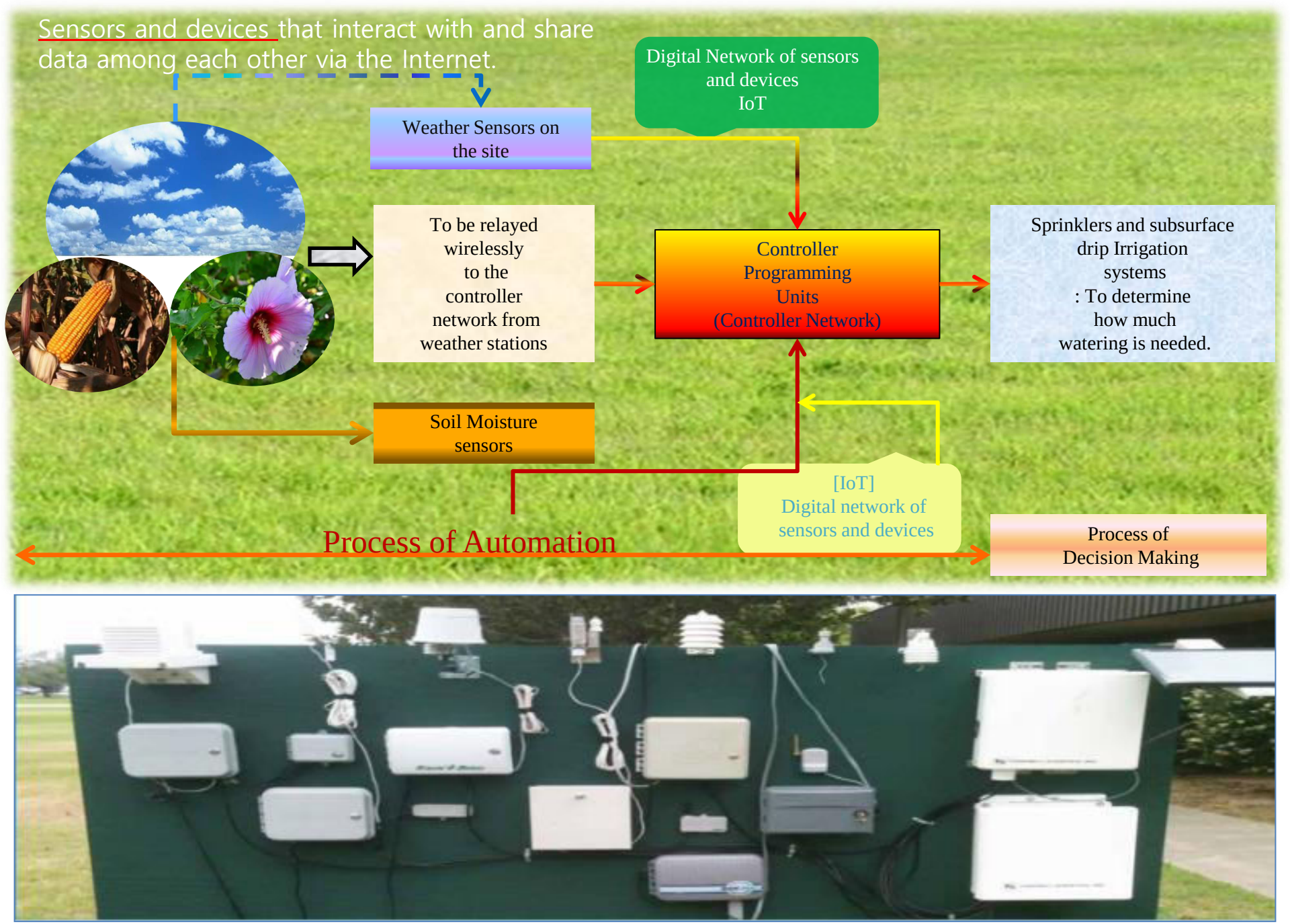


Fig. Smart controllers adjust watering cycles using data from ground and weather sensors. The rectangular boxes are controller programing units; the nonrectangular piece mounted on top of the green panel are weather sensors.

1.2 Climate Smart City Models

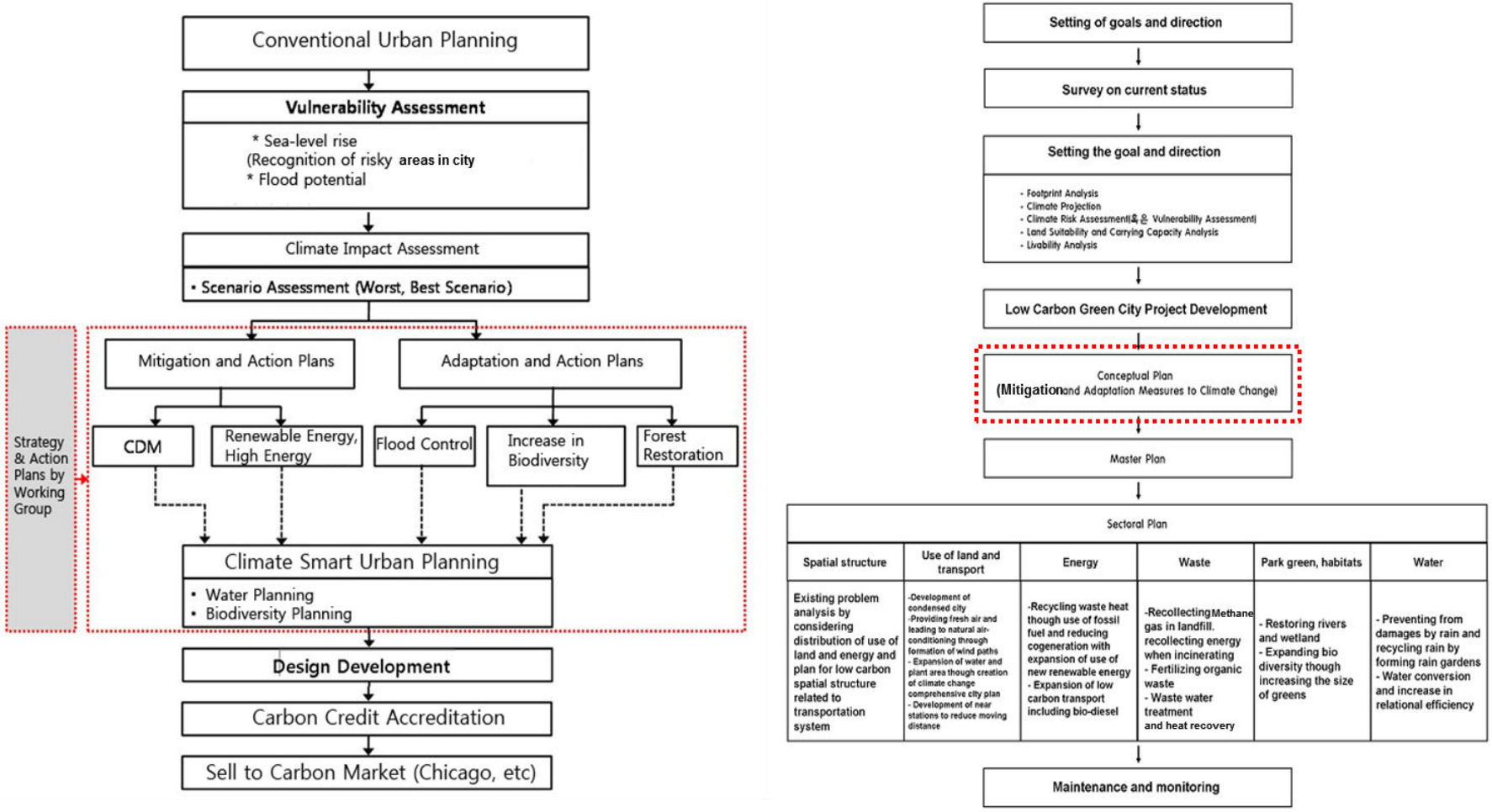


Fig. 4 Climate smart comprehensive urban planning model

Source: kwi-Gon Kim, Low-carbon Smart Cities: Tools for Climate Resilience Planning, Springer, Heiderberg, Germany, 2017

1.2 Climate Smart City Models

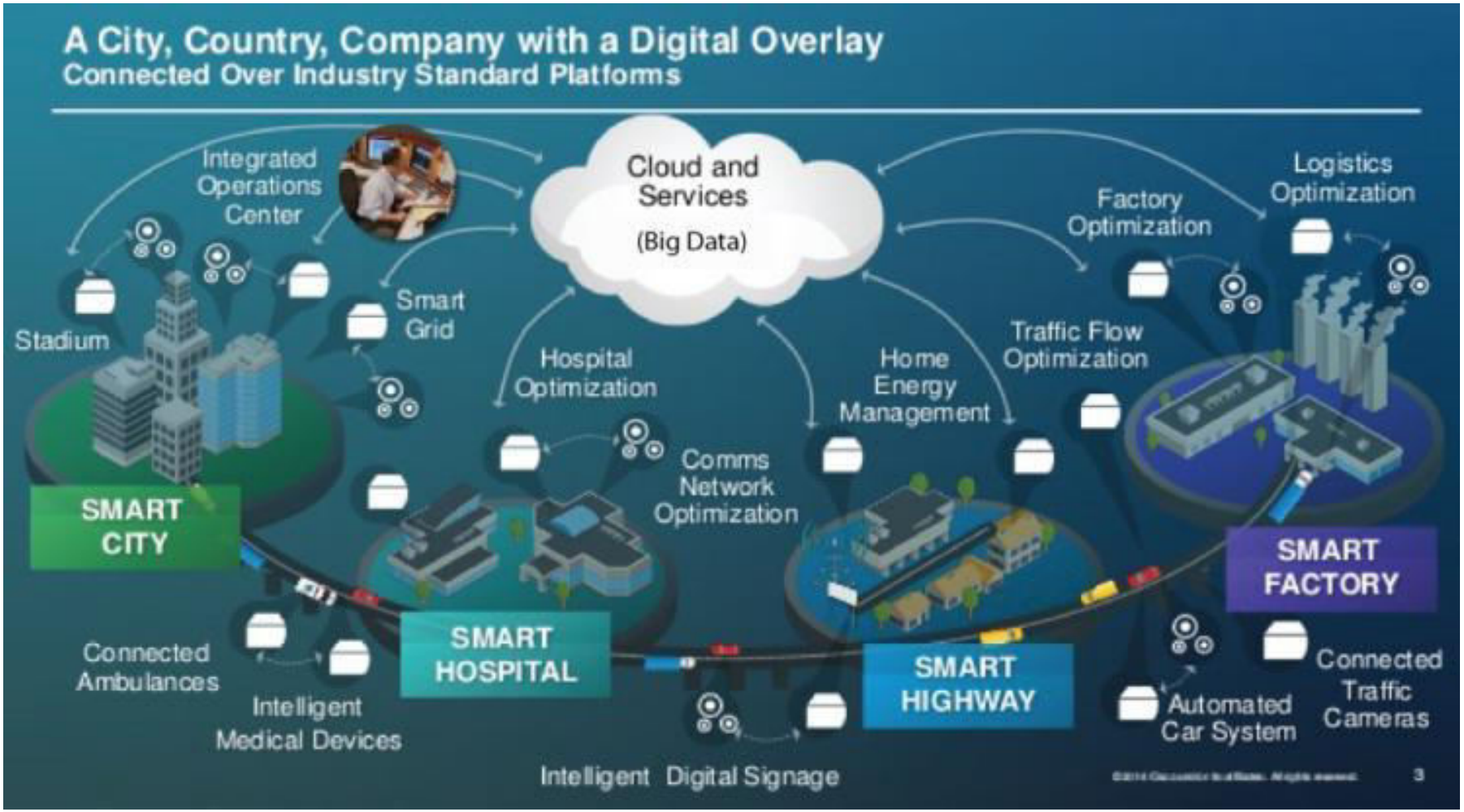


Fig. 5 A big data image for a city, country, company with a digital overlay connected over industry standard platforms

Source: Cisco, 2014

2. Selected Approaches to the Green Urban Development and Low-Carbon Economy at the City Level in Korea

As concerns about climate change grow, green growth in the form of low-carbon economy (LCE) has been an effective policy as an alternative in the transition from fossil fuels since global warming has become a critical issue facing the planet.

Korean government officials say green growth is more than just a concept to tackle climate change. They say it involves a fundamental shift in the growth paradigm-from the current one oriented toward quantitative growth and based on the massive consumption of fossil fuels, to one prioritizing quality of life and founded on a virtuous cycle of economy growth and environmental protection.

In 2009, the Korean government unveiled the 5-year Green Growth Plan, a medium-term plan for implementing the green growth strategy. The development of low-carbon green city was a key area.

In order to combat climate change and to adapt national vision for low-carbon green growth, Korean government designated some municipalities as low-carbon green cities. With the Ministry of Environment, Korea, the Green Growth Committee implemented demonstration projects in these municipalities. Gangneung city, a city located east of Seoul, made the "model & vision for low-carbon green city" and took a leadership role in embodying a green society.

President Lee Myung Park has remarked in the Forum for Development of Gangwon Area on February 10, 2009 that "we need to develop the low-carbon and green city in Gangwon province and promote the city as the global premium city, setting an example for low-carbon and green growth. Korean government has launched the service for development planning of the pilot city on March 31, 2010.

- The Gangneung low-carbon green city strategies for green growth made several political implications for low-carbon economy:
  1. It was expected that production and additional values triple the budget of green city development.
  2. The program was expected to create over 5,000 jobs by 2013.
  3. The program was expected to stimulate the local economy by increasing the number of tourists by about 6.7% (920,000) and generating tourism revenues of KRW 85 billion.
  4. The program would significantly reduce green house gas emission by recovering lakes and improving the green transportation system.
  5. The programs had developed the model to save energy and respond to climate change by promoting of bicycles and distributing green homes.
  6. The program has been utilized as channels for education, promotion and experience for the public.
  7. The program has served as the testbed to create new growth engines and build the foundation for overseas market entries.

One of key components of low carbon economy is to drive city competitiveness. Cities clearly see addressing city climate change as a way to drive growth and competitive advantage in their jurisdictions. Addressing climate change and green smart urban development will lead to development of new business industries in cities.

- Considering increasing attention put on urban-related issues, cities are in the age of low carbon green growth. These are effective ways to both decrease our carbon footprint and adapt to climate change through urban planning techniques that incorporate energy conservation, use of renewable energy, ecological restoration, green transportation and buildings.

As an example, Suwon City, Korea, is a member of the EcoMobility Alliance and has achieved excellent results in certain dimensions of sustainable mobility. The city has adopted an eco-mobile lifestyle to experience how EcoMobility can influence lives of residents in a neighborhood in Suwon. Local Agenda 21 Movement is very strong in Korea with the slogan "Think globally, act locally". The Korea Climate and Environment Network plays a main role in promoting the Movement in Korea. Virtually all local governments in Korea have adopted their Local Agenda 21 plans and have secretariats for the implementation of their plans with active participation from 9 stakeholder groups which were identified by UNCED. The Korea Climate and Environment Network took over the job of the Korea Green Star Network which was responsible for the Local Agenda 21 activities.

2. Selected Approaches to the Green Urban Development and Low-Carbon Economy at the City Level in Korea

- The Ministry of Environment has launched Eco-City initiative according to the 2012 UN Earth Summit for Sustainable Development Rio+20. Korea is one of countries to create UN sustainable cities, "Agenda 21 Eco-Cities". Urban eco-cities claim to regulate climate change, food distribution, water securitization, culture and support in ways that are not facilitated by the current living conditions.

  In April 2012, Seoul Metropolitan Government (SMG) has launched a program with the slogan "One Less Nuclear Power Plant", to reduce the city's use of energy by 2 million tons of oil equivalent, equal to the annual output of a nuclear power plant, and to reduce its environmental impact accordingly. The citizens of Seoul were inspired. They achieved their target in June 2014, six months ahead of schedule. Now SMG has launched phase 2 of the program, confident that the citizens of Seoul can do even better. Their crucial aspect of phase 1 was its success in enlisting active participation from the citizens of Seoul, individuality and in their many affiliations.

  Carbon Banking System is a voluntary GHG reduction campaign in the manner of governance approach to climate change at the household level. The Gwangju City's carbon banking system is a carbon finance system which has implemented in 2008 as the first of its kind in Korea to reduce GHG emissions per capita. Because Gwangju's household and commercial levels accounted for 39% of GHG emissions in the city, reductions at the household level were urgently needed. Gwangju signed an agreement as a pilot study for climate change response (10 April, 2008), and planned activities around a carbon banking system to draw citizens' attention on the plan to reduce GHG emissions by 10%. Gwangju Bank issued a "Green Card", loaded with "Carbon Points" to individuals who reduce energy consumption compared to past usage.

- The card operates like a debit or credit card, providing card usage fees to the bank. For the consumers, the carbon points are redeemable for a wide range of green goods, public transportation and discounts at public sector facilities. The carbon baking system in Gwangju has led to a reduction of nearly 85,000 tons of $CO_2$from 2008-2012 and projects an estimated 983,188 tons of CO_2emission reduction by 2020.

The latest approach in developing a low carbon economy in Korea is to establish Jeju Island as a zero carbon island by 2030. On 1 July, 2006, Jeju Island received provincial status. After the establishment of the governing institutions, economic and other reforms had been carried out including environmental protection laws. In June 2012, Jeju Province and the Korean central government jointly announced the plan to establish the "2030 zero carbon Jeju Island", aiming at being carbon-free by 2030 and achieving a sustainable development through the only use of renewable energy.

On the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change in December 2015, Korea's President Park delivered a speech reaffirming the 2030 plans for Jeju Island being transformed "into a carbon free island by replacing its entire fleet of cars with electric vehicles and meeting 100 percent of its energy needs through renewable energy sources". As for power generation, the envisaged program has three phases:

- In the first phase, a "zero-carbon island demonstration model" will be built. On-shore, seven wind energy pilot areas are being established with expected power generating capacity of 143MW. Three off-shore wind power generation test areas will be established with a total power generation capacity of 398MW (Fig. 8).
- In the second phase of the plan, by 2020, a "zero carbon island" infrastructure shall be established with the use of smart grids for renewable energy transmission. According to the plans, Jeju renewable energy generation shall account for more than 68% of total primary energy supply by 2020.
- In the third stage, up to 2030, Jeju Island will entirely use on-shore and off-shore wind power, solar energy and energy storage systems (ESS) to replace all fossil primary energy. The ultimate goal of the Jeju government is to install 2.35GW wind power (350MW of on-shore and 2GW of offshore).

It is planned to even produce 20% more electricity than needed on the island and feed in the surplus energy into the national grid in order to compensate for remaining fossil fuels used in other sectors of the economy and to become a true "zero-carbon island".

- Very recently, Korean government has announced that new public buildings should be zero-energy buildings from 2020 according to "The 2030 National GHG Reduction Basic Roadmap".

On Tuesday (6 December, 2016), the Korean government announced mid and long-term action plans to reduce greenhouse gas emissions in the country.

The pan-governmental comprehensive framework, approved by the cabinet, is intending to achieve the country's goal of cutting carbon emissions by 37 per cent, or 315 million metric tonnes, as set out by the Paris Agreement.

In the new plan, the government seeks to boost incentives for renewable energy and cleaner power projects, in the hope of raising the share of renewables to 7 per cent by 2020.

They also plan to introduce a cap-and-trade system to expedite industry innovation and environmentally friendly investment, while helping to integrate in to the future global carbon market.

The plans also pledge to expand funding in the development of climate technologies such as solar and fuel cells and conversion of waste gas, as well as doubling investment in clean energy research to 1.12 trillion won ($957 million) by 2020.

According to the International Energy Agency, Korea is the world's seventh-largest polluter, with its carbon output reaching 572 million metric tonnes in 2013.

Under the plan, the government aims to slash 219 million metric tonnes, or nearly 70 per cent of the total reduction goal, from eight different areas including power production, industry and buildings.

The largest reductions would come from electricity generation with 64.5 million metric tonnes, followed by industry with 56.4 million metric tonnes, buildings with 35.8 million metric tonnes and new energy sectors including electric vehicles and energy storage with 282 million metric tonnes.
Seoul also looks to curb 96 million metric tonnes through international market mechanisms, focusing on carbon credit trading and funding sources.

Upon the release of the plans, the government said: "The action plans were formulated in a way that helps to shift the reduction-focused responses to climate change to a fresh paradigm centering on the market and technology ... and strengthen the private sector's role and promote the acceptability of the policy."
The government ended the report by leaving room for future revisions, saying plans would be adjusted according to changing economic condition (Climate Action, December 2016).

Wind power generators, Jeju island, Korea

Energy Technology Center, Jeju island, Korea

Fig. 6 Zero carbon island demonstration facilities

Fig. 7 The Gasiri testbed of renewable energy including solar collector fields and wind power generators in the Jeju zero carbon island

3.1 Summary of City Example at the Strategic Level

Model of Goyang City and Ministry of Science, ICT and Future Planning, Korea

This is a bold, new initiative. In order to provide a tested model for creating a sustainable IoT-integrated smart city, Goyang city will implement well established urban IoT service package program.

This program aims to solve problems commonly faced by cities through the strategic use of open smart city platform.

Goyang Smart City will be created under the Smart City Project supported by the Ministry of Science, ICT and Future Planning of Korea, through the consortium of six companies and institutes between the public sector (Goyang city and Goyang Knowledge and Information Industry Promotion Institute), private sector (LG U+), and research institutes. Based on the four themes "City of Smartness", "City of Safety", "Environment City" and "Energy Saving City", the city will be developed as an IoT-integrated City, which will be a smart solution provider.

Goyang city agreed to establish "Happy hope city" as a smart city supporting IoT solutions in May 2016 and was selected by the government in June 2016.

The city will foster the Korean Silicon Valley (Goyang Techno-Valley) and has hosted the Smart Cities Innovation Summit Asia, for the first time in Korea, in September 2016.

3.1 Summary of City Example at the Strategic Level

Model of Other Smart City Projects in Korea

The achievements and milestone of smart cities promoted by Korean cities include:

Seoul

-Hosted Seoul Digital Summit with more than 150 association and enterprise to discuss exporting K-smart city model.
-Awarded at "world smartcity award in Barcelona"

Daegu

-Established IoT testbed with Samsung and SK
-Fostering Automatic water reading system and water leak

Busan

-Will establish global smart city in Haeundae region till 2018
-Invested $2.5 trillion dollars to build U-city in Busan
-Agreed to cooperate in forging smart city together with Barcelona, Spain

Paju

-Executing Smart water service
-Controls water purity through ICT technology

Incheon

-Applied smart service starting from 2008 in Songdo.
-Exported Smart service of Incheon in Ecuador in 2013
-Cooperating with Thailand about Incheon's smart city business

Gimpo

-'Smartopia Gimpo' project being executed since 2014
-Will construct future city converged with ICT solutions such as security, Smart home, Smart transportation, life style, green service, Smart welfare etc

In a recent seminar on climate change preparation projects (CCPP) utilizing the GCF in Korea, climate change business models have been suggested as follows:
Project for combining new and renewable energy and energy storage system (ESS)

- Environmental-friendly energy town project
- Electric vehicle project
- Smart farming project
- Water resources management project, and
- Forest project
- Knowledge-based Economy;

Source: Korea Ministry of Strategy and Finance, Convention center, Songdo, 6 September 2016

3.1.1 Jeju Smart Strategy

Fig. 8 Conceptual miniature of the smart grid island
Source: Jeju Smart Grid Information Center, undated, unpaged

3.1.2 Sustainable Seoul Smart city : Seoul e- Government

VISION

GLOBAL DIGITAL SEOUL 2020

by Citizen — DIGITAL SEOUL 2020 — to Citizen → Global Digital Leader

GOAL

- **Digital policies driven and made by the citizens**
  Accomplish 50% of digital projects driven and made by citizens
- **Improving Citizen's life by digitizing city governance.**
  Applying digital technology to the field of economy, tourism, traffic, safety, welfare and environment, etc.
- **Creating Jobs by digital technology, the new growth power**
  Supporting 645 companies in Digital Industry
- **Sharing Seoul's ICT solutions with the world**
  Contributing to the development of world smart cities

FEATURES

Social Seoul City (By Citizen)	Diginomics (Growing Economy)	Digital Social Innovation (Changing Citizen's life)	Global Digital Leader (Leading the World)
1-1 Digital Governance, led by citizens 1-2 Improving Communicating channel with Citizen 1-3 Cooperate with private sectors.	2-1 Activate Venture incubating. 2-2 Integrated digital economic platform 2-3 Fusing traditional and digital industry	3-1 Solving city problems with digital technology 3-2 Improve citizen's life value through digital technology	4-1 Adapting cutting-edge technology preemptively 4-2 Establish world-best digital infrastructure. 4-3 Enhance digital business capability. 4-4 Share the digital experience with citizens in the world.

3.1.3 Naju Innovative City Strategy : A energy smart city

1) Objective

- **Development of sustainable smart energy environment**
- **Establishment smart city testbed for overseas export**

2) Duration, June, 2016~ May 2019

Fig. 9 Conceptual Smart Energy City

3.1.4 Wyrae Smart Green Infrastructure Strategy Planning and Implementation

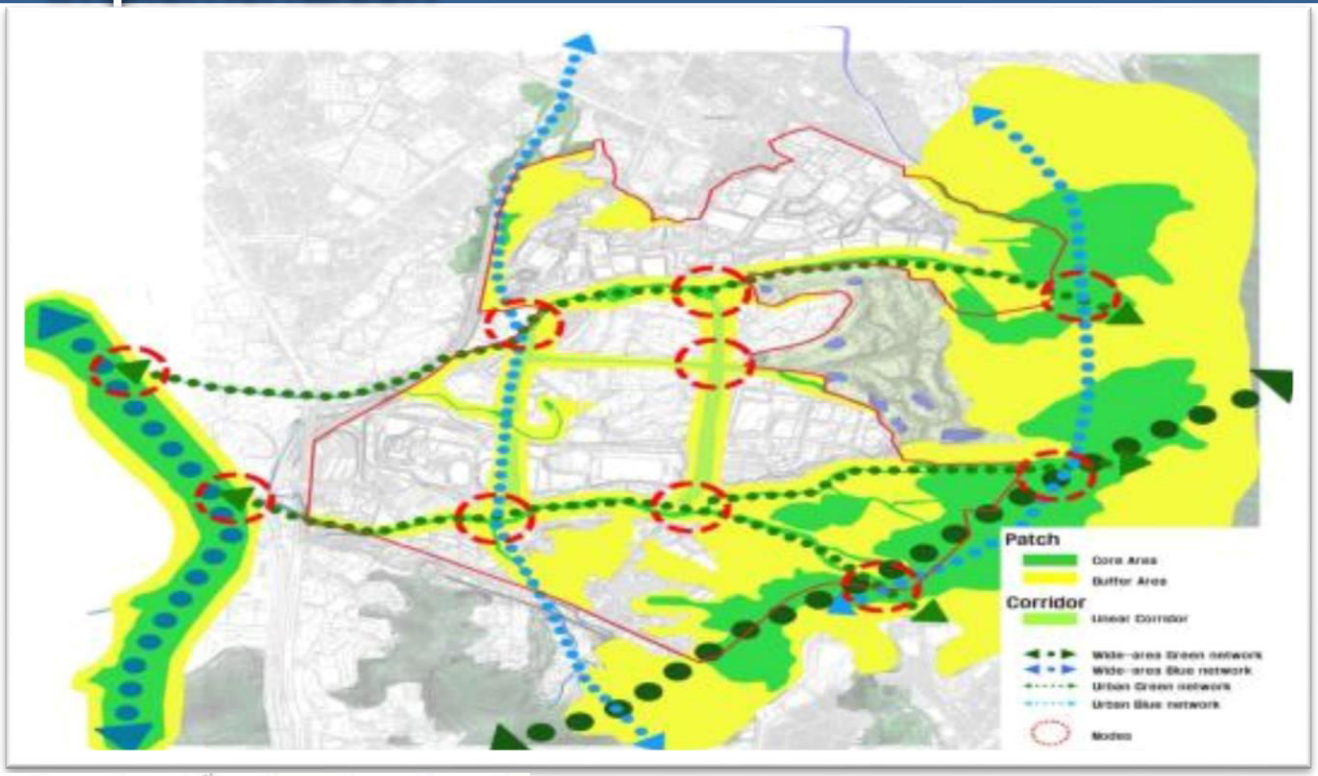


Fig. 10 Panned Components of a Green Infrastructure

3.2 Eco-Smart Examples at the Technical Level

3.2.1 Summary of Eco-Smart Tech

Table. 1 Strategy and projects used in the low-carbon green city projects Korea

Strategy	Project Contents
Land use	• Low energy structure and function of city • Compact city
Application of plan for reducing heat islands	• White network, blue network and planning schemes • Heat dispersion through traffic and site planning
Better efficiency in energy supply; Use of renewable energy	• Geothermal power, CHP • Renewable energy plants
Creation of energy consumption limits in each sector; Renovation of energy production sources	• Energy use standards for each size and type of building • Renovation of transportation energy fuel, Renewable energy in buildings
Creation of sustainable mobility system	Limiting automobile use in urban space Public transportation linkage system, pedestrian/bicycle oriented roads
Rainwater use; Creation of graywater reuse system; Reuse of sewage	Use of porous pavement to reduce rainwater runoff Gray water system Methane gas energy plant, Compost of sludge
Plan for urban green network, conservation and restoration of ecology	Greening plan for entire city Conservation of urban ecosystem Restoration and linkage (creation of eco-green corridor)
Reuse of solid wastes, management of business and construction waste	Wastes management from construction stage Separated recycling system Waste reuse business District heating system

3.2 Eco-Smart Examples at the Technical Level

3.2.1 Summary of Eco-Smart Tech

Table. 2 The Application of ICT and sustainable technologies in smart ecosystem grid for neighborhood planning

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 11 Logo on the training course on eco-city & low-carbon smart city, IUTC, Korea

Fig. 12 IUTC smart water grid planner members

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 13 Ministry of Science, ICT and Future Planning, National IT Industry Promotion Agency (nipa) and Korea IT Business Promotion Association (iPA), SW R&D: Creative·Idea·Challenge, COEX, 2016

Fig. 14 Gwangju's carbon banking system is a practical effort which many cities can implement, says Dr. Kim (photo credit: World Bank)

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Wind power generators, Jeju island, Korea

Energy Technology Center, Jeju island, Korea

Fig. 15 Zero carbon island demonstration facilities

Fig. 16 The Gasiri testbed of renewable energy including solar collector fields and wind power generators in the Jeju zero carbon island

Source: kwi-Gon Kim, Low-carbon Smart Cities: Tools for Climate Resilience Planning, Springer, Heiderberg, Germany, 2017

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 17 Digitalized real time temperature measurement in the outdoor hot bath tub in the aqua-world, Sol Beach Samchok, Gangwon province, Korea

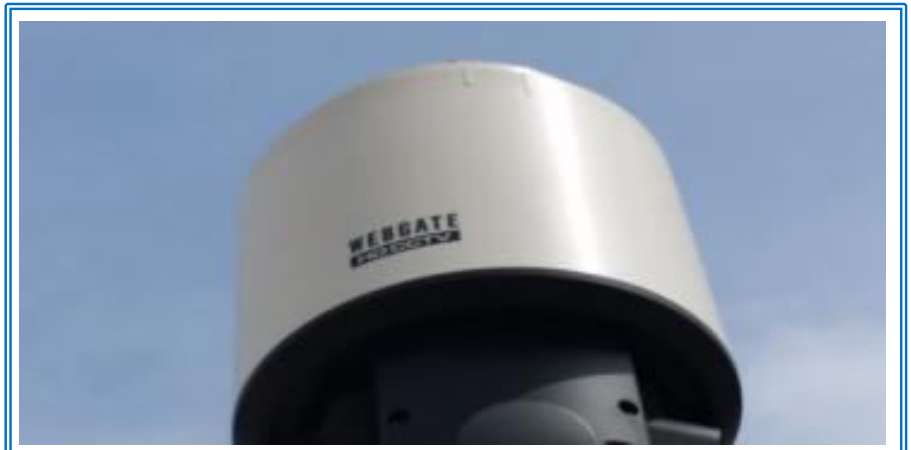


Fig. 18 Installment of CCTV cameras for safety and surveillance information in the aqua-world, Sol Beach Samchok, Gangwon province, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Sub-way station:
Arrival and departure information

Sub-way station:
Ticketing and traffic card charger

Bus stop with information terminal (BIT): Citizens have access to real time, information concerning temperature, air quality and arrival time of buses

Fig. 19 Digital signage, digital city of Seoul, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 20 Photovoltaic module, Seoul, Korea

Fig. 21 Agricultural drone used for pesticide, Incheon, Korea
Source: Chosun Daily News, No.29715, 22 July 2016

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 22 Digital café village, Wolcheong-ri, Jeju, Korea
Source: Chosun Daily News, No.29579, 15 February 2016

Fig. 23 Smart electric meters

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 24 Digital village: Drinking water, city gas, and energy consumption metering, solar village, Gwangju, Korea

Fig. 25 Dispersal of room arrangements through overlay of new transfer technologies and new types of heat, electricity and air-conditioning network, The Green, Korea Land and Housing Corporation

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 26 Water and energy nexus: Drinking water purification plant connected with the Jeju Renewable Energy Smart Grid System, Jeju island, Korea

Source: Jeju Smart Grid Information Center, undated, unpaged

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 27 Crack gauge to monitor horizontal and vertical movement across cracks on different rock surfaces, Seoraksan National Park, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 28 Measuring system of precipitation and snowfall with its protector, and a solar panel for power supply, Seoraksan National Park, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 29 Gabion walls to retain earth slopes on roadsides, Seoraksan National Park, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

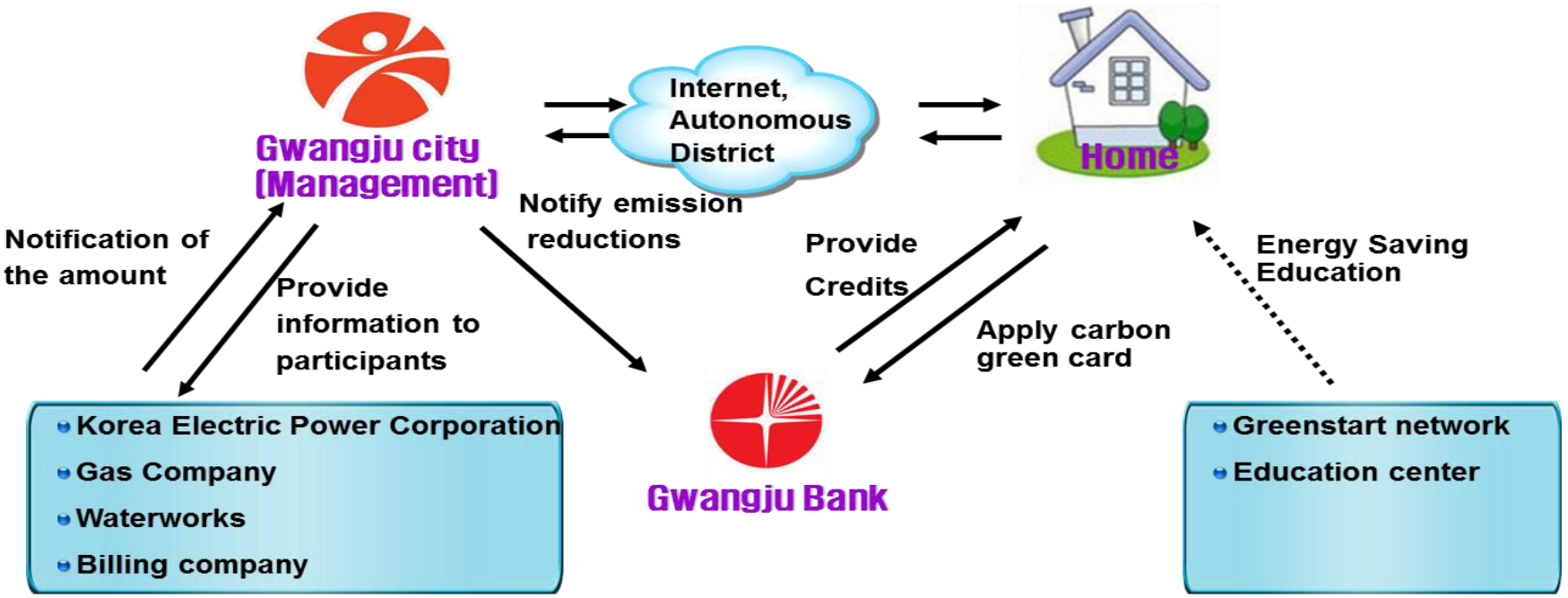
Fig. 30 Use of smart mobile phone in sub-way train, digital city of Seoul, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

- Urban Governance CPA: Carbon Banking System

Grant points by reduction of Co_2 emissions to the participants (Credits granted by Gwangju Bank)



Urban Technology CPA
Case 1: LED CDM business (already accredited in Gwangju)

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Case 2: LFG CDM business of waste landfill (already accredited in Gwangju)

• Program of Activity: Multiple Program of Activity Gwangju Multiple PoA as a planned program

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Hygienic Landfill using cutting edge technology

Making every city bus powered by natural gas

Building 'Green Way'

Returen to a green downtown-city redesigned to be green

Fig. 31 Examples of GHG reduction activities in Gwangju

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 32 The economics of low-carbon green city: The case of Gwangju

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

a. Card used in 2008-2013

b. New card used from 2014

Fig. 33 Green card

Photo 1 Electricity meter

Photo 2 City gas meter

Photo 3 Drinking water meter

Fig. 34 Smart metering devices

Source: photo 1, Taken at Sinhyochon solar village, Gwangju, by the author, on 10 January, 2014
photo 2, http://blog.naver.com/mosechu?Redirect=Log&logNo=20191100381
photo 3, http://blog.naver.com/jimmy44?Redirect=Log&logNo=140165673316

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 35 Combined electricity generation of solar energy and wind energy: Hybrid system generated by natural energy, Pasar, Japan

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 36 Combined electricity generation of solar energy and wind power: Hybrid system generated by natural energy, Seoraksan National Park, Korea

Fig. 37 T-Smart mini drone

Fig. 38 Bike ride, Munster, Germany

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 39 Smart parking facility, Seoul, Korea

Fig. 40 Digital parking space

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

Fig. 41 Solar LED garden lighting, Jeju island, Korea

Fig. 42 Wind power generators, Seoraksan National Park, Korea

3.2 Eco-Smart Examples at the Technical Level

3.2.2 Korean Examples

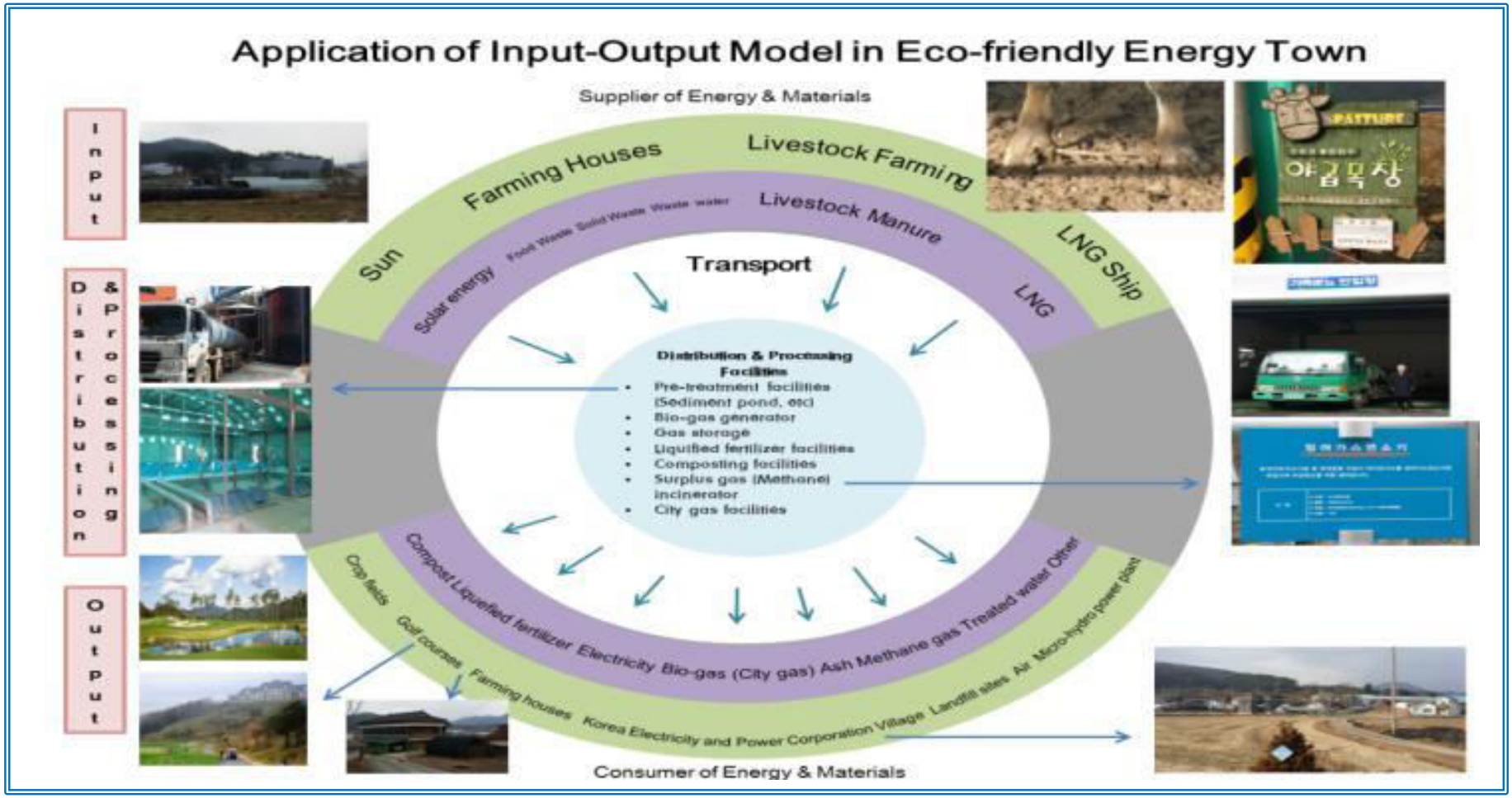


Fig. 43 Application of Input-Output Model in Eco-friendly Energy Town

4.1 Living Labs and ICT

4.1.1 ICT: A Prime Sector for Living Labs

Living Labs are a response to the innovation challenges related to ICT. According to the Living Labs Roadmap Work Group (2010), 70 to 95% of public and private investment in the research and development of ICT products and services does not succeed in producing a significant market value. It is estimated that one idea in 3,000 achieves the commercial stage. Living Labs thus fill the gap that exists between research and commercialization by fostering a deeper understanding of market potential and the needs of users.

Living Labs are an excellent way to support innovation in the ICT sector, by encouraging a faster cycle at a reduced cost for the development and adoption of products, services or existing technologies.

ICTs are also useful in supporting the participation and cooperation of all Living Lab collaborators by offering everyone involved the possibility of contributing, even from a distance. For example, it is possible to bring together citizens from all corners of a territory to reflect on the vision of cities in the 21st century.

The Advantages of Living Labs

The comparison of Living Labs to other research and innovation methods (testbeds, empathic design, etc.) allows us to identify the type of project that is best suited to this method of innovation.

4.1 Living Labs and IT

4.1.1 ICT: A Prime Sector for Living Labs

- **Multi-Party Collaboration**
  - Access a diverse knowledge base
  - Benefit from a research infrastructure
  - Obtain political and financial support from a community or territory
  - Create a market
  - Raise awareness among external collaborators

- **Real-life Environments**
  - Understand the "sense" that is associated with a particular product/service
  - Understand the situations and moments related to use
  - Understand the deployment of a use within a particular community. For example, in the case of a technology meant for elderly people, this approach could potentially circumvent an initial aversion to products or services.

4.1 Living Labs and IT

4.1.1 ICT: A Prime Sector for Living Labs

- **User Implication**
  - Test technological uses within particular communities
  - Invest in areas of use associated with uncertainty or particular risk factors
  - Explore and discover new needs/desires (innovation by the diversification of usage)

Living Labs are particularly pertinent in the following cases:

- Projects focussed on technologies needing adjustments or adaptations for new markets
- Projects having problems related to market adoption
- Projects centred on technologies having a specific and relatively homogenous use within a community of users
- Projects necessitating the input of users' tacit knowledge in real-life conditions
- Research and development projects for products or services where the revelation of industrial secrets is not problematic

To learn more, consult: www.openlivinglabs.eu

4.1 Living Labs and IT

4.1.1 ICT: A Prime Sector for Living Labs

Several Examples of Projects in the ICT Sector

- **Mobile Applications**
  - Mobile Communications and Computing for Quality of Life : http://www.qol.unige.ch/mQoL.html

- **Smart Cities**
  - SmartCity (France): http://www.smartcity.fr/
  - City-zen (Amsterdam, Hollande) : http://amsterdamsmartcity.com/projects/detail/id/78/slug/city-zen

- **Online Training**
  - University of Reunion Island Living Lab for Teaching and Learning (France) http://www.openlivinglabs.eu/livinglab/university-reunion-island-living-lab-teaching-and-learning
  - Living Lab Øresund: http://www.openlivinglabs.eu/node/128

4.1 Living Labs and IT

4.1.1 ICT: A Prime Sector for Living Labs

Telemedicine

- TELESAL (Rome, Italie) http://www.openlivinglabs.eu/livinglab/telemedicine-living-lab
- Living Lb e-santé Aquitain (France) http://cluster-tic-sante-aquitain.com/lancement-du-living-lab-e-sante-aquitain?lang=fr

Assisted Living

- BAALL Bremen Ambiant Assisted Living Lab (Allemagne) http://www.openlivinglabs.eu/sites/enoll.org/files/BAALL.pdf
- Living Lab Schwechat (Autriche) http://www.openlivinglabs.eu/sites/enoll.org/files/schwechat.pdf
- Digital Lifestyle Center (Essex, Royaume-Uni) http://www.openlivinglabs.eu/node/138

Source: http://livinglabs.technomontreal.com/en/living-labs-and-ict

4.1 Living Labs and IT

4.1.2 ICT: Korea Living Labs Cases

- **Seoul Innovative Center**
- **Busan Creative Economy & Innovation Center**
- **Daejeon Techno-Park**
- **Gwanju Community Living Lab .**

Goyang city is now collaborating with UNFCCC to prepare a eco-climate smart project proposal for the urban CDM in the manner in the living labs context.

4.1 Living Labs and IT

4.1.3 Seoul, City of IoT : Together with Citizens

Current Progress of Implemented Business

Progress timeline

2015
Jongno-gu (Bukchon)

2016
Cheonggyecheon Stream
City Tour Bus Line
Geumcheon-gu (Byucksan Apt.)
Mapo-gu (Hongik University)
Seodaemun-gu (Ewha Womans University in Sinchon)
Seocho-gu (Gangnam Station)

2017
Seoulto 7017
Seoul Children's Grand Park
Public Parking Lot
Traditional Market
Nowon-gu (Junggyebon-dong)
Seodaemun-gu (Yeonhui-dong)
Yongsan-gu (Itaewon)
Eunpyeong-gu (Hyangnim Village)

2020
Expand to 50 sites

Current Progress

1.Jongno-gu(Bukchon)
- IoT smart garbage bins
- Smart houses preventing disasters using IoT techniques
- Bukchon VR information guide

2.Cheonggyecheon Stream
- Notification service for Cheonggyecheon's history and culture based on beacons

3.City Bus Tour
- Voice service based on beacons
- Providing Seoul square information such as bus lines, famous places near bus stops, events, shopping information, etc.

4.Geumcheon-gu(Byucksan Apt.)
- Smart care service for mental health
- Management service for smart home energy
- Enter and exit system using smart phones for public entrances of apartments

5.Mapo-gu(Hongik University)
- Electronic menu service
- Information service for facilities and stores

6.Seodaemun-gu (Ewha Womans University in Sinchon)
- Face recognition door locks
- IoT home service for robbery and fire prevention
- DIY smart farming solutions based on IoT

4.2 City-zen Methodolgy Approach

The City-zen Roadmap Amsterdam launched in Pakhuis de Zwijger and in Dutch media (NOS, BNR) : Energy Master Plan

The City-zen Methodology Approach For Urban Energy Transitions: the energy master plan for Amsterdam, Grenoble and all other European cities.

European cities and municipalities have considerable goals in becoming carbon neutral and energy self-sufficient in line with the Paris Agreement. To be successful in reaching climate ambitions we must start now, but it is complex and easier said then done. It requires radical changes such as far-reaching energy renovations, specific approaches, new heating networks, large-scale production facilities for solar power, geothermal energy and green gas. This needs the attention and action of all stakeholders: companies, knowledge institutions, companies, housing corporations and citizens. The European research project City-zen an Urban Energy Transition Methodology is developed to draw an Energy Master Plan for a city.

The plan, a roadmap, exists of several (practical and local oriented) energy interventions and measures, both at the technical and strategic level which can be put on a timeline.

In this City-zen approach the roadmap with urban energy measures for Amsterdam and Grenoble is made in helping achieving their ambitious climate goals. With concrete examples for local neighbourhoods it explains the different scenarios that are necessary to reach ambitious climate and energy targets.

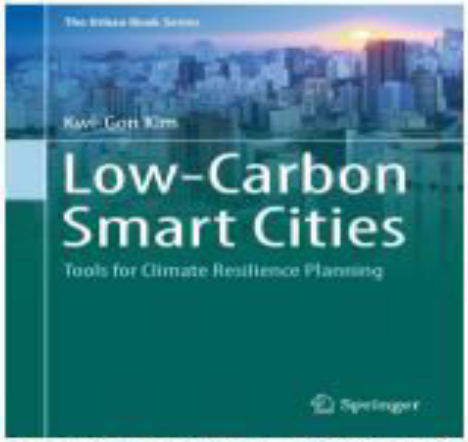
5. Lessons Learned from Korean Experiences

- ✓ Making efforts towards global mega trends
- ✓ Adopting holistic approach of the smart city for the realization of carbonizing society
- ✓ Initiating innovative leaderships
- ✓ Building intelligent urban structure & Function
- ✓ Establishing cross-industry and cross-benefits

- ✓ Introducing integrated technological systems
- ✓ Analyzing value chains
- ✓ Establishing detailed strategies and action plans
- ✓ Bringing together citizens from all corners of a city

6. References

1. Kwi-Gon Kim, Sustainable Urban Development and the Green Economy, paper presented at the EGM on Green Economy and Sustainable Urban Development, 17-20 February, 2011, Nairobi, Kenya
2. Kwi-Gon Kim, Low-Carbon Smart Cities : Tools for Climate Resilience Planning, Springer Heidelberg, Germany, 2018
3. Kwi-Gon Kim, "Korea should take the lead in 'fourth industrial revolution' " May 26, 2017, The Korea Herald
4. Kwi-Gon Kim, "Cities in the age of low carbon, green growth : It is time to connect urban planning with challenges of global climate change" The Korea Herald, March 19, 2009
5. Kwi-Gon Kim, "Mechanism for clean development", The Korea Times, September 27, 2011
6. Kwi-Gon Kim, "For low-carbon economy", The Korea Times, May 29, 2016
7. Kwi-Gon Kim, Extending Korea's ODA contribution diplomacy, The Korea Herald, July 22, 2009



1st ed. 2018, XXVIII, 342 p. 213 illus., 181 illus. in color.

K.-G. Kim

Low-Carbon Smart Cities

Tools for Climate Resilience Planning

Series: The Urban Book Series

- Groundbreaking book dealing with the impact of urbanization on climate and how cities can adapt to climate change
- Provides innovative, practical and hands-on guidelines that can be implemented in cities around the globe
- Presents a variety of case studies of sustainable cities

This book aims to integrate climate mitigation and adaptation tools into conventional urban planning. It emphasizes the value and importance of ICT as connected technology. The author believes that ICT and IOT can facilitate controlling climate change attributes when deployed with appropriate ingredients and composition in cities in an integrated comprehensive manner. It was written with the author's firm belief that cities play an important role in mitigating climate change by reducing energy consumption, promoting the use of renewable energy sources, or by trading emission permits and selling Certified Emission Rights (CERs). This book looks at green growth based on the circular economy using green smart technology as a sustainable tool for green economic development. Also for climate change adaptation, cities have to take actions to reduce the adverse impacts of climate change on people, property and ecosystems in the urban planning process.

It has been written with the author's works for Urban Environment Accords (UEA) and International Urban Training Center (IUTC) in collaboration with UNEP, World Bank, UNFCCC and UN-HABITAT. It can be used as a training source book for city climate planners and urban practitioners of local governments. It will be utilized as a more practical guidebook for climate change policy makers as well as a futuristic research agenda for next generations.

“Thank you very much For Your kind attention!”