The background of the slide is a detailed architectural rendering of a modern urban development. It features several multi-story buildings with glass facades and green walls, interspersed with lush green spaces, walkways, and a central water feature. The scene is set in a bright, clear environment, suggesting a sustainable and livable urban environment.

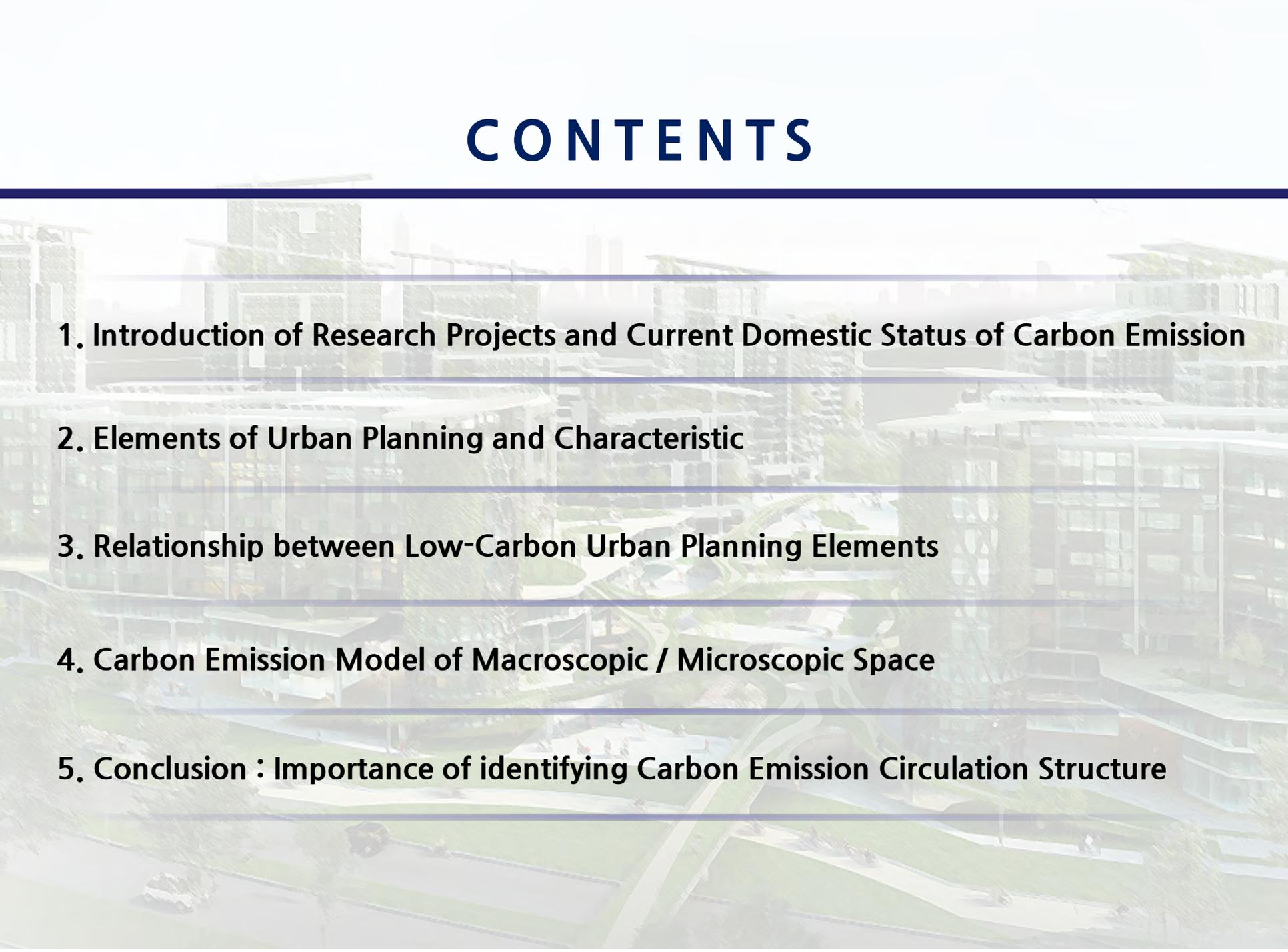
Current Condition of Carbon Emission, and Carbon Emission Model in Urban Scale in Korea

2014. 05. 13.

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Prof. Kim, Seiyong

CONTENTS



- 1. Introduction of Research Projects and Current Domestic Status of Carbon Emission**
- 2. Elements of Urban Planning and Characteristic**
- 3. Relationship between Low-Carbon Urban Planning Elements**
- 4. Carbon Emission Model of Macroscopic / Microscopic Space**
- 5. Conclusion : Importance of identifying Carbon Emission Circulation Structure**

1 Climate Change and the Need of Low-Carbon City

1-1 Climate Change

▪ Heighten the Need of Strategy Development corresponding to Climate Change

- The average world temperature has risen 0.74°C for the past 100 years, and the sea level is rising 1.8mm per a year after 1961
- It is more severe for domestic cases that a rise in temperature is twice as much as the global average (increased 1.5°C), and the sea level rise is about three times as much as the global average (increased 22cm for the past 40 years in case of Jeju-do)
- Developed countries such as the USA, the UK, and Japan are trying for green growth by recognizing green industry and green technology as the new national growth engines for coping with climate change
- While cities are the places where take 60%~80% of global energy consumption and generate more than 50% of CO₂, they are also the sole places for minimizing one-sided sacrifice between economic development and environmental preservation

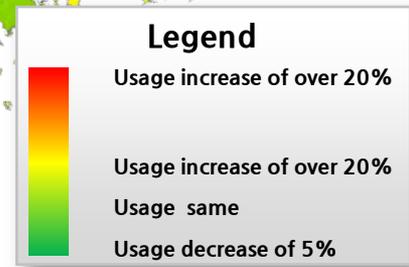
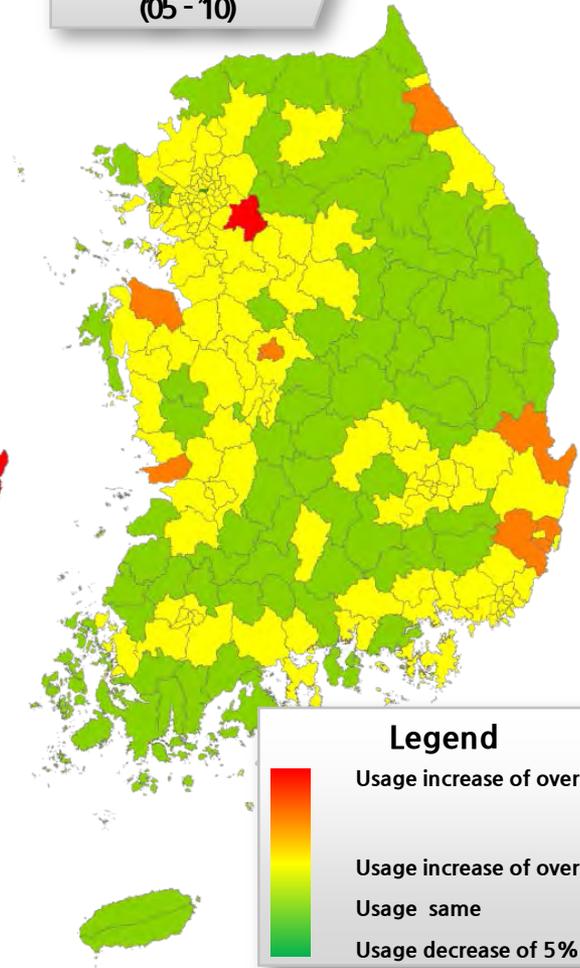
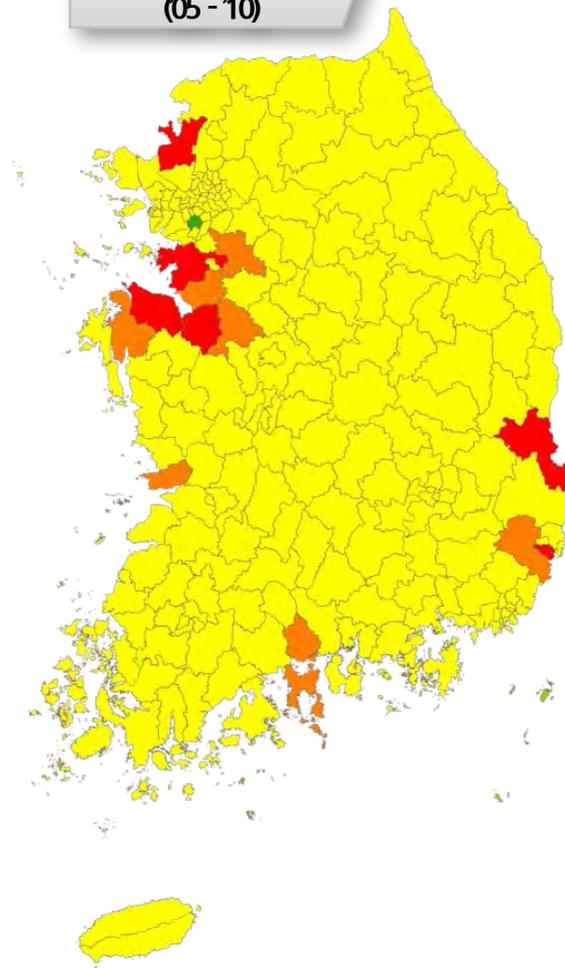
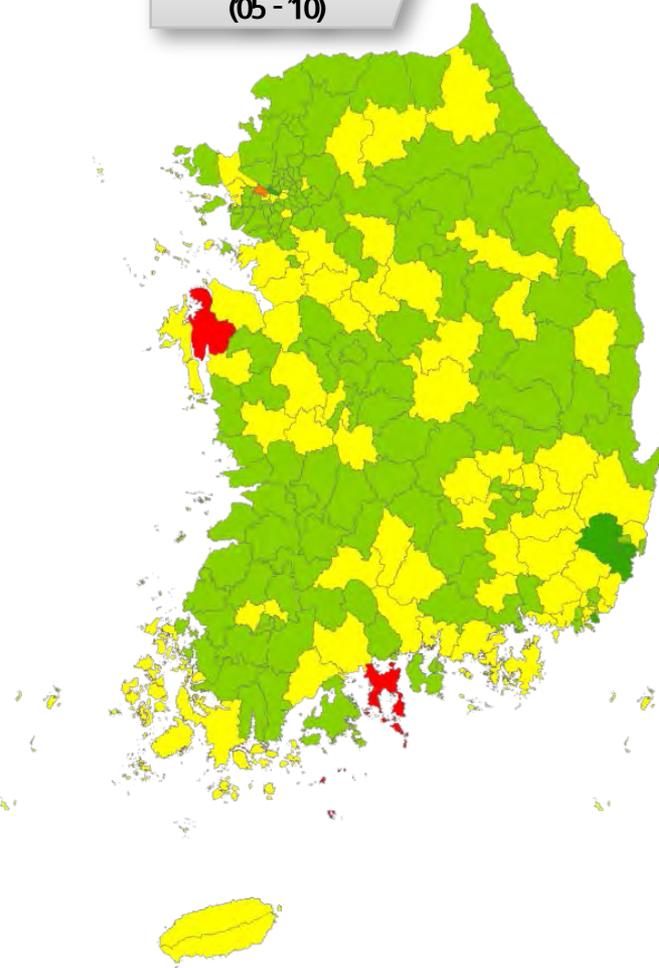
1 Climate Change and the Need of Low-Carbon City

1-2 Current Domestic Status of Carbon Emission

Change of
Oil Consumption
(05 - '10)

Change of
Electricity Consumption
(05 - '10)

Change of
Gas Consumption
(05 - '10)

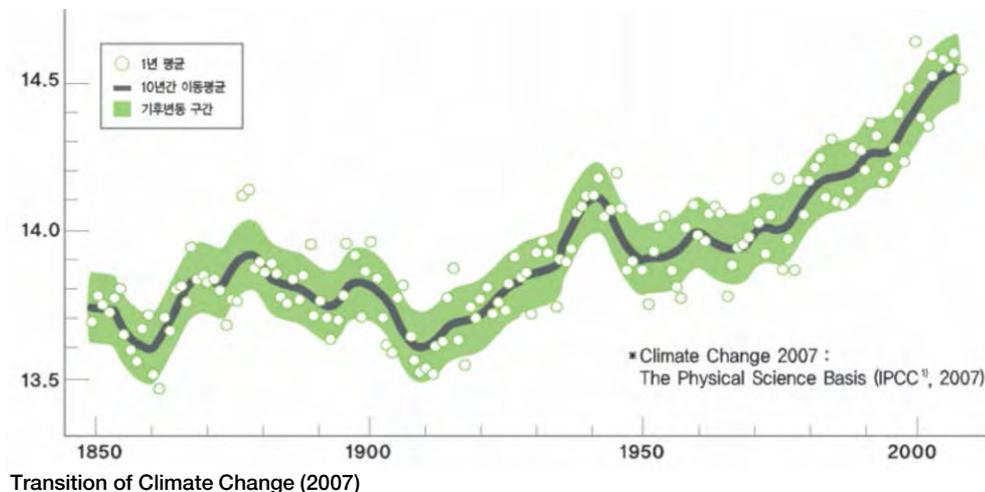


1 Climate Change and the Need of Low-Carbon City

1-3 The Need of Riposte in the aspect of Urban

■ Increase of Urban Role to cope with Climate Change

- It is expected that the temperature will be risen maximum of 6.4°C at the end of the century when mass consumption of fossil fuel continues (IPCC Intergovernmental Panel on Climate Change)
- It is predicted that economic loss by climate change will reach about 5~10% of world GDP every year if the current amount of carbon is continuously produced
- The necessity of approaching in the aspect of local community based urban for coping with climate change is propounded in Nottingham Declaration 2000, and Fukuda Vision 2008



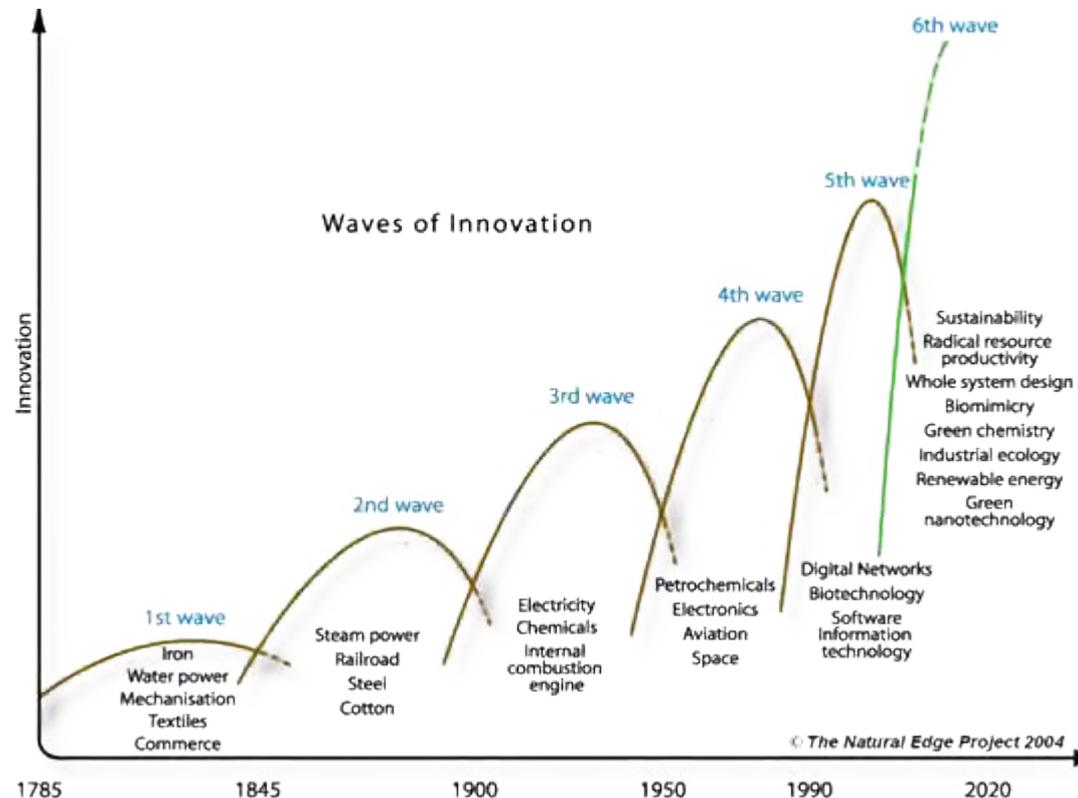
Emphasizing
Efforts in the
aspect of
Urban for
coping with
Climate
Change

2 Definition of Low-Carbon City

2-1 Change of Paradigm

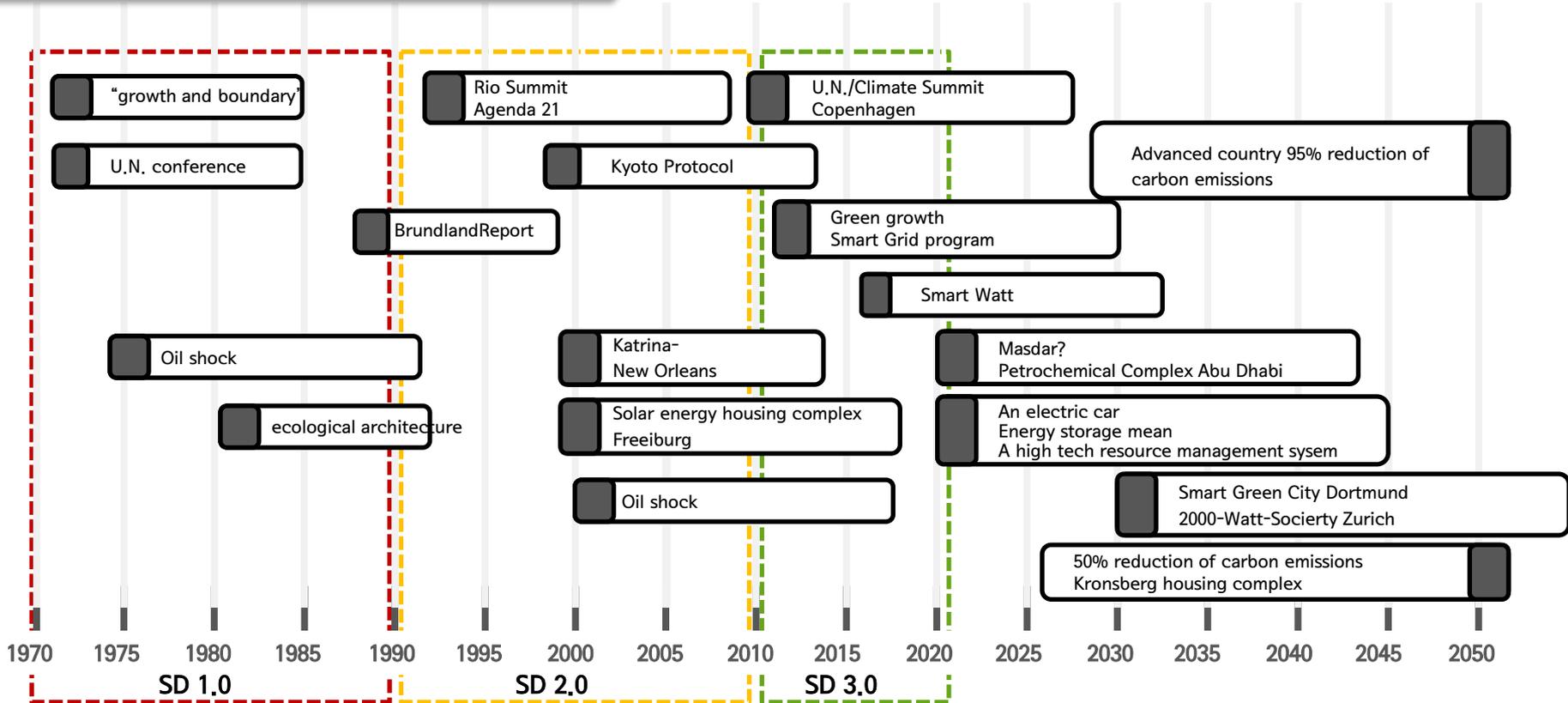
▪ Change of Technology Paradigm

- There were 5 transitions of technology paradigm for the past 250 years, and the sixth transition of technology paradigm is notified hereafter
- It is expected that green technology related industries will lead the sixth transition of technology paradigm with the flow which is based on water power, steam, electricity, petrochemistry, and nuclear energy



2 Definition of Low-Carbon City

2-1 Change of Paradigm



SD 1.0 Compliance (1970~)

- End-of-the-pipe solutions
- Bubble concept

SD 2.0 Citizenship (1991~)

- Stakeholder engagement, reporting, standards
- Websites, email, blogs

SD 3.0 Creativity (2008~)

- Science, technology
- Business models, market models

Smart Green City Milestone

2 Definition of Low-Carbon City

2-2 Definition of Low-Carbon City (Domestic)

- Definition of Concepts

Devison	Content	Concept
Lee, Jaejoon (2008)	A city that plans to enhance city competitiveness and seek structural change to a sustainable city through eco-friendly city and industrial foundation with maximizing suppression of carbon emission in terms of energy saving, resource saving, green and water resources planning by aiming reduction and absorption of carbon	Low-carbon green city
Lee, Sangmoon (2009)	A city that creates low-carbon community through active participation of residents, and reducing generated CO2 through environment planning and design technology by considering foundation of ecology, land-use, clean natural environment, natural symbiosis, climate stability, natural sensibility with having planning objective of low-carbon, carbon offsetting, abdicating carbon as the counterstrategy for local global change	Low-carbon green city
Byun, Byungseol (2009)	A sustainable and eco-friendly city with consideration of eco-friendly land-use, green transportation, natural ecology, energy efficiency, resource circulation, supporting system as aiming carbon reduction and absorption, and energy saving	Low-carbon growth city
Choi, jungeun (2008)	A city that aims to minimize fossil fuel energy consumption by utilizing natural environment and minimizing environmental disruption	Ecological housing complex
LH (2009)	A future city that materializes the concept of green growth in the aspect of urban; A city that seeks sustainable city competitiveness through eco-friendly urban planning and green industrial foundation, and suppresses carbon emission	Green growth city
LH (2009)	A city interacts as cyclical metabolism between input and output, and uses drawn bio-gas from waste water as fuel, uses or recycles dumped waste as energy by utilizing renewable resources and preserving irreproducible resources	Green city
Yoon, Yonghan (2009)	A city interacts as cyclical metabolism between input and output, and uses drawn bio-gas from waste water as fuel, uses or recycles dumped waste as energy by utilizing renewable resources and preserving irreproducible resources	Green city

2 Definition of Low-Carbon City

2-3 Definition of Low-Carbon City (Foreign)

▪ Concept definition

실현요소	국제기구(8)								NGO(3)				합계	
	UN	WB	WMO	UNEP	IEA	WWC	UNDP	OECD	빈도	Green peace	FOE	WWF		빈도
탄소저감	●	●	●	●	●	●	●	●	8	●	●	●	3	11
물	●	●	●	●		●	●	●	7	●	●	●	3	10
생태계보호	●		●	●		●	●	●	6	●	●	●	3	9
폐기물			●	●		●	●	●	5	●	●	●	3	8
자연재해		●	●	●		●	●		5	●	●	●	3	8
농업		●	●	●		●		●	5	●	●	●	3	8
위생	●	●	●	●		●	●	●	7					7
신재생에너지			●	●	●	●			4	●	●		2	6
빈곤	●	●		●		●	●		5					5
자연자원	●								1	●	●	●	3	4
교육	●	●				●	●		4					4
성평등	●	●					●		3					3

3 Introduction of Research Projects

3-1 Summary of the Research

1 **Name of the Research : Developing for Low-carbon Urban Planning System**

2 **Study Period : 2011.12.16 ~ 2016. 6.29**
Study Period of pertinent year : 2012.08.30 ~ 2013.06.29

3 **R&D cost : total 6,795,040 thousand won**

4 **Composition of the consortium**

Managing department [1] - Korea University

Joint research institution [4] - Yonsei University, KRIHS(Korea Research Institute for Human Settlements), Hyundai-dvp(development company), JUNGDO UIT

Committed research institution [2] - Postmedia / Sejong University

3 Introduction of Research Projects

3-1 Summary of the Research

Vision

Development Strategy

Final and Quantitative Goal

The Five Strategically Critical Technology

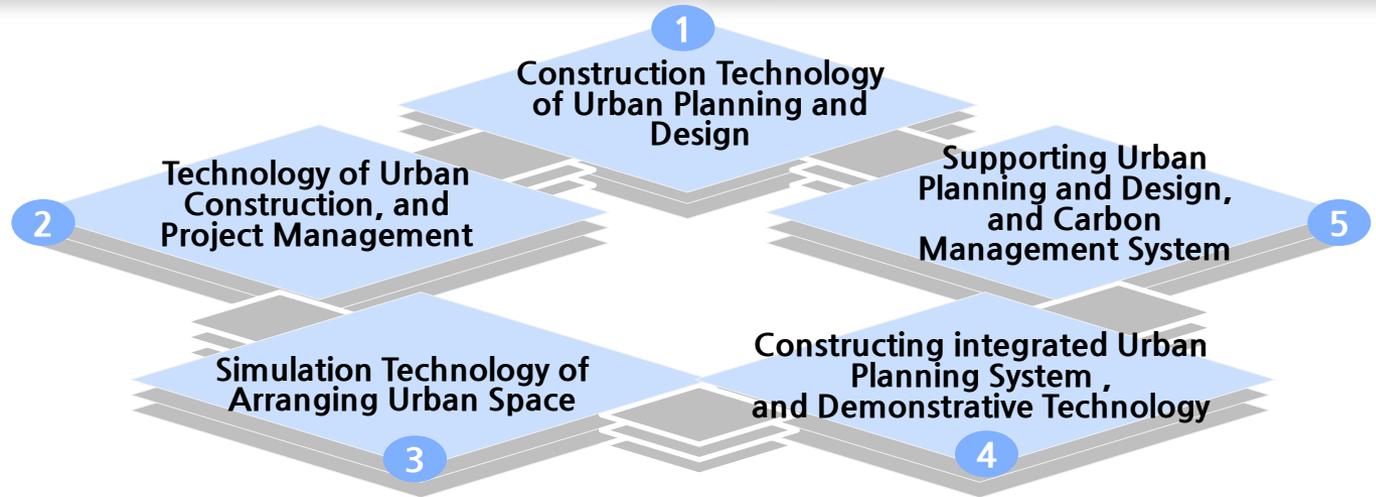
Constructing Korean-Style Low-Carbon City

1. Establishing network of the best domestic and foreign researchers
2. Drawing practical result of study, and establishing judging system
3. Demonstrating development technology, and securing intellectual property rights

Constructing Systematic and Rational Low-Carbon Urban Planning System for creating Low-Carbon City

Developing all-in-one low-carbon urban construction process

Developing simulation software, and algorithm with support, verification, feedback



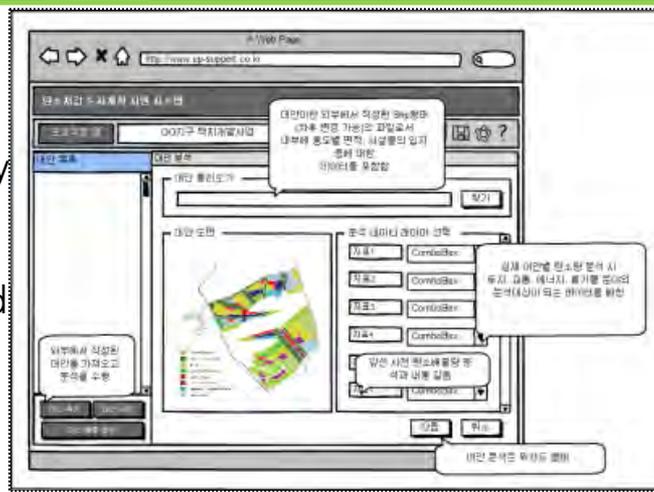
3 Introduction of Research Projects

3-2 Two planning support systems



[Soft Ware Using]

Forecasting carbon emission amount through simulation by inputting quatificable data which can be earned from planning area of land use, and planned blueprint in S/W



[Guideline Using]

Produce detailed design plan according to developed guideline by utilizing carbon reduction measure on qualitative data



3 Introduction of Research Projects

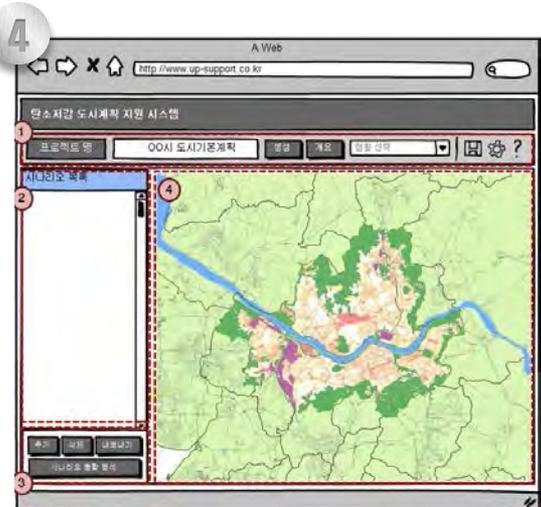
3-3 The final four goals of the study

1 Low-carbon urban planning and design guidelines

2 SPI-based guidelines for low-carbon urban development

3 Low-carbon urban design support S / W

4 Low-carbon urban design support S / W [Field of combined Research Areas of Low-Carbon City]



4 Major Research Result

1-1 Condition Analysis and Index Development of Model Development for Low-Carbon City Construction

Representative research result

구분	지표번호	계획지표	측정가능여부		측정 방법		공간차원		관련연구	
			정량	정성	계획	사후	도시	지구		
도시여류	배출량	1-1-1	민중합 도시출연구조	○	○	○	○	○	○	5
		1-1-2	배출량	○	○	○	○	○	○	5
	복합지표	1-2-1	복합지표지수	○	○	○	○	○	○	5
		1-2-2	복합지표지수	○	○	○	○	○	○	5
		1-2-3	복합지표지수	○	○	○	○	○	○	5
		1-2-4	복합지표지수	○	○	○	○	○	○	5
	배치	1-2-5	복합지표지수(100)	○	○	○	○	○	○	5
		1-3-1	스마트 시티지표	○	○	○	○	○	○	5
		1-3-2	스마트 시티지표	○	○	○	○	○	○	5
		1-3-3	스마트 시티지표(복합지표지수)	○	○	○	○	○	○	5
기반시설	1-4-1	기반시설 구축률	○	○	○	○	○	○	5	
	1-4-2	기반시설 구축률(복합지표지수)	○	○	○	○	○	○	5	
	1-4-3	기반시설 구축률(복합지표지수)	○	○	○	○	○	○	5	
	1-4-4	기반시설 구축률(복합지표지수)	○	○	○	○	○	○	5	
토지	지용지표	2-1-1	지용지표지수	○	○	○	○	○	○	5
		2-1-2	지용지표지수	○	○	○	○	○	○	5
	복합지표	2-2-1	복합지표지수	○	○	○	○	○	○	5
		2-2-2	복합지표지수	○	○	○	○	○	○	5
		2-2-3	복합지표지수	○	○	○	○	○	○	5
		2-2-4	복합지표지수	○	○	○	○	○	○	5
	지용지표	2-3-1	지용지표지수	○	○	○	○	○	○	5
		2-3-2	지용지표지수	○	○	○	○	○	○	5
		2-3-3	지용지표지수	○	○	○	○	○	○	5
		2-3-4	지용지표지수	○	○	○	○	○	○	5
교통	대중교통	3-1-1	대중교통 구축률	○	○	○	○	○	○	6
		3-1-2	대중교통 구축률	○	○	○	○	○	○	6
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		3-1-4	도로교통 구축률	○	○	○	○	○	○	6
		3-2-1	도로교통 구축률	○	○	○	○	○	○	6
		3-2-2	도로교통 구축률	○	○	○	○	○	○	6
	도로교통	3-2-3	도로교통 구축률	○	○	○	○	○	○	6
		3-2-4	도로교통 구축률	○	○	○	○	○	○	6
		3-2-5	도로교통 구축률	○	○	○	○	○	○	6
		3-2-6	도로교통 구축률	○	○	○	○	○	○	6
에너지	신재생에너지	4-1-1	신재생에너지 구축률	○	○	○	○	○	○	7
		4-1-2	신재생에너지 구축률	○	○	○	○	○	○	7
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		4-1-4	신재생에너지 구축률	○	○	○	○	○	○	7
		4-1-5	신재생에너지 구축률	○	○	○	○	○	○	7
		4-1-6	신재생에너지 구축률	○	○	○	○	○	○	7
	에너지관리	4-2-1	신재생에너지 구축률	○	○	○	○	○	○	7
		4-2-2	신재생에너지 구축률	○	○	○	○	○	○	7
		4-2-3	신재생에너지 구축률	○	○	○	○	○	○	7
		4-2-4	신재생에너지 구축률	○	○	○	○	○	○	7
기타	지정	5-1-1	지정지표지수	○	○	○	○	○	○	8
		5-1-2	지정지표지수	○	○	○	○	○	○	8
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		5-3-1	지정지표지수	○	○	○	○	○	○	8
		5-3-2	지정지표지수	○	○	○	○	○	○	8
		5-3-3	지정지표지수	○	○	○	○	○	○	8



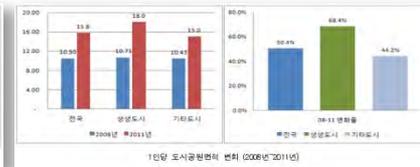
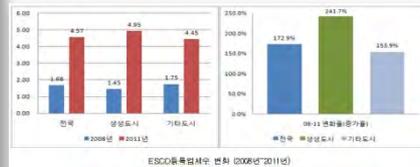
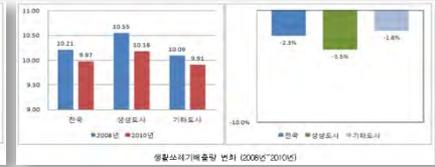
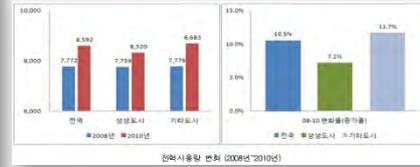
구분	지표번호	계획지표	측정가능여부	측정 방법	공간차원	관련연구	
도시여류	배출량	1-1-1	민중합 도시출연구조	○	○	○	○
		1-1-2	배출량	○	○	○	○
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		1-2-2	복합지표지수	○	○	○	○
		1-2-3	복합지표지수	○	○	○	○
		1-2-4	복합지표지수	○	○	○	○
	배치	1-2-5	복합지표지수(100)	○	○	○	○
		1-3-1	스마트 시티지표	○	○	○	○
		1-3-2	스마트 시티지표	○	○	○	○
		1-3-3	스마트 시티지표(복합지표지수)	○	○	○	○
기반시설	1-4-1	기반시설 구축률	○	○	○	○	
	1-4-2	기반시설 구축률(복합지표지수)	○	○	○	○	
	1-4-3	기반시설 구축률(복합지표지수)	○	○	○	○	
	1-4-4	기반시설 구축률(복합지표지수)	○	○	○	○	
토지	지용지표	2-1-1	지용지표지수	○	○	○	○
		2-1-2	지용지표지수	○	○	○	○
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		2-2-2	복합지표지수	○	○	○	○
		2-2-3	복합지표지수	○	○	○	○
		2-2-4	복합지표지수	○	○	○	○
	지용지표	2-3-1	지용지표지수	○	○	○	○
		2-3-2	지용지표지수	○	○	○	○
		2-3-3	지용지표지수	○	○	○	○
		2-3-4	지용지표지수	○	○	○	○
교통	대중교통	3-1-1	대중교통 구축률	○	○	○	○
		3-1-2	대중교통 구축률	○	○	○	○
	도로교통	3-1-3	도로교통 구축률	○	○	○	○
		3-1-4	도로교통 구축률	○	○	○	○
		3-2-1	도로교통 구축률	○	○	○	○
		3-2-2	도로교통 구축률	○	○	○	○
	도로교통	3-2-3	도로교통 구축률	○	○	○	○
		3-2-4	도로교통 구축률	○	○	○	○
		3-2-5	도로교통 구축률	○	○	○	○
		3-2-6	도로교통 구축률	○	○	○	○
에너지	신재생에너지	4-1-1	신재생에너지 구축률	○	○	○	○
		4-1-2	신재생에너지 구축률	○	○	○	○
	에너지관리	4-1-3	신재생에너지 구축률	○	○	○	○
		4-1-4	신재생에너지 구축률	○	○	○	○
		4-1-5	신재생에너지 구축률	○	○	○	○
		4-1-6	신재생에너지 구축률	○	○	○	○
	에너지관리	4-2-1	신재생에너지 구축률	○	○	○	○
		4-2-2	신재생에너지 구축률	○	○	○	○
		4-2-3	신재생에너지 구축률	○	○	○	○
		4-2-4	신재생에너지 구축률	○	○	○	○
기타	지정	5-1-1	지정지표지수	○	○	○	○
		5-1-2	지정지표지수	○	○	○	○
	지정	5-1-3	지정지표지수	○	○	○	○
		5-1-4	지정지표지수	○	○	○	○
		5-2-1	지정지표지수	○	○	○	○
		5-2-2	지정지표지수	○	○	○	○
	지정	5-2-3	지정지표지수	○	○	○	○
		5-3-1	지정지표지수	○	○	○	○
		5-3-2	지정지표지수	○	○	○	○
		5-3-3	지정지표지수	○	○	○	○

4 Major Research Result

1-1 Condition Analysis and Index Development of Model Development for Low-Carbon City Construction

Representative research result

구분	정책시	준법군	서울시 중마구	광주시 남구
상용/재용 구획 관련	친환경 상용 구획 촉진조례 (환경미래과, 2010.07)	친환경 상용 구획 촉진조례 (환경정책과, 2009.06)	녹색재용 구획 촉진에 관한 조례 (2011.11)	녹색재용 구획 촉진에 관한조례 (환경친과, 2012.04)
자한소 녹색성장 기본조례	자한소 녹색성장 기본조례 (환경수도과, 2010.12)	자한소 녹색성장 규칙 (기획과, 2010.12)	-	자한소 녹색성장 기본조례 (기후변화 대응과, 2011.08)
기후변화대응	-	-	기후변화대응조례 (2011.01)	기후변화 대응조례 (녹색성장 기획단, 2009.09)
형의회/운영회	녹색청원121실현협의회 설치 및 운영조례 (환경수도과, 2010.07)	-	녹색송파위원회 설치 운영 조례 (2011.12)	-
농업육성/지원	-	친환경 농업육성 및 지원에 관한 조례 (환경농업과, 2008.07)	친환경 도시농업 육성지원에 관한 조례 (2010.12)	친환경 도시농업 활성화 지원조례 (영재과, 2011.05)
자전거 활성화	-자전거이용 활성화에 관한 조례 (생태교통과, 2010.07) -시민공영자전거 운영에 관한 조례 (생태교통과, 2010.07)	자전거이용 활성화에 관한 조례 (도시개발과, 2009.4)	자전거이용활성화에 관한조례 (녹색교통과, 2007.12)	자전거이용 활성화에 관한 조례 (건설과, 2008.10)
자원재용 촉완 조례	-환경수도 으뜸마을 만들기 조례 (환경수도과, 2011.07) -송송차 없는 날 운영 및 지원조례 (생태교통과, 2010.12) -신스비회원 거래계 시범사업 운영지침 (환경수도과, 2011.12)	-	환경오염행위 신고포상조례 (맑은환경과, 2007.02)	-



- Even though, several local governments carry out eco-friendly policy in respond to low-carbon green growth policy of the central government, seem to concentrate on short-term businesses
- The condition of housing areas and land-use are unsatisfactory
- Not planning measures with reducing domestic waste but businesses with disposing of discharged waste are mainly carried out
- The result of analysis result can be understood that awareness of residents have improved, and it is the result of local government policy by improving cognition of green growth

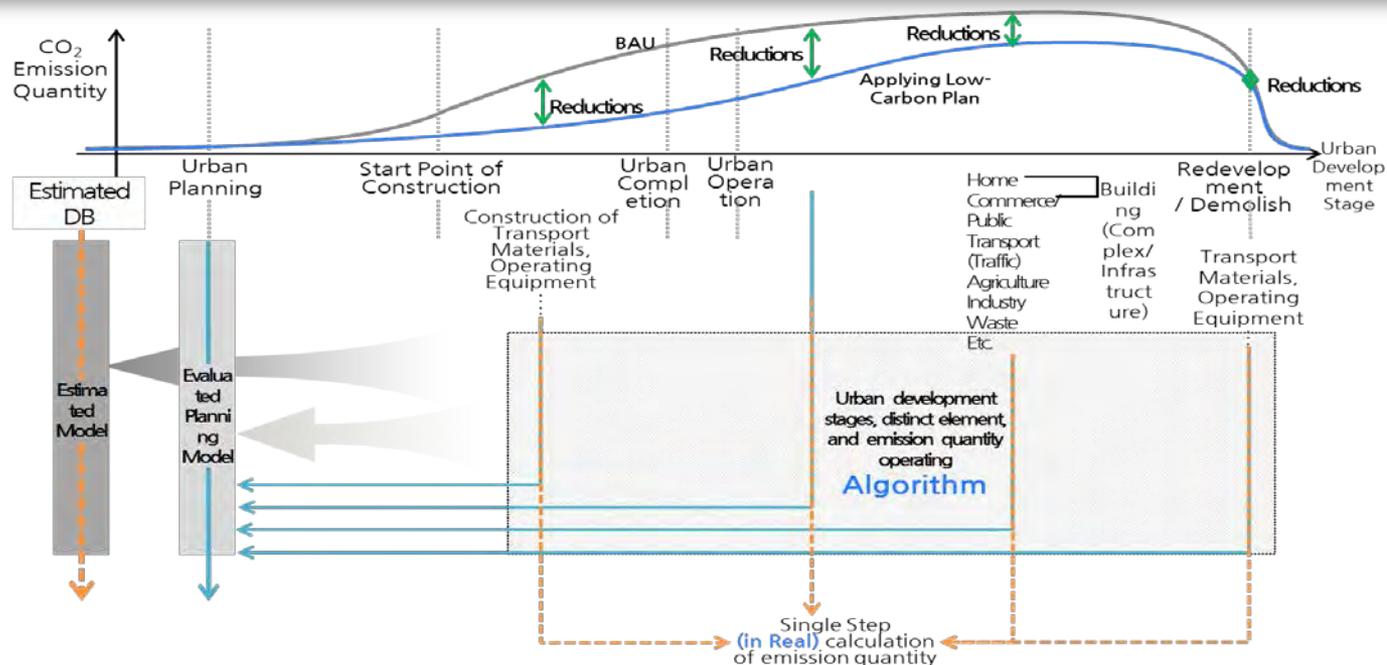
4 Major Research Result

1-2 Model Development for Low-Carbon City Construction

Representative research result

Main Research Method

- Purpose : Conception of Carbon Emission Model for Carbon-reductive Urban Construction Model
- Method of study
 - Review Model and DB Dual system considering Urban Construction Process
 - Setting Carbon Emission Model plan through Planning Model and Planning DB



4 Major Research Result

1-2 Model Development for Low-Carbon City Construction

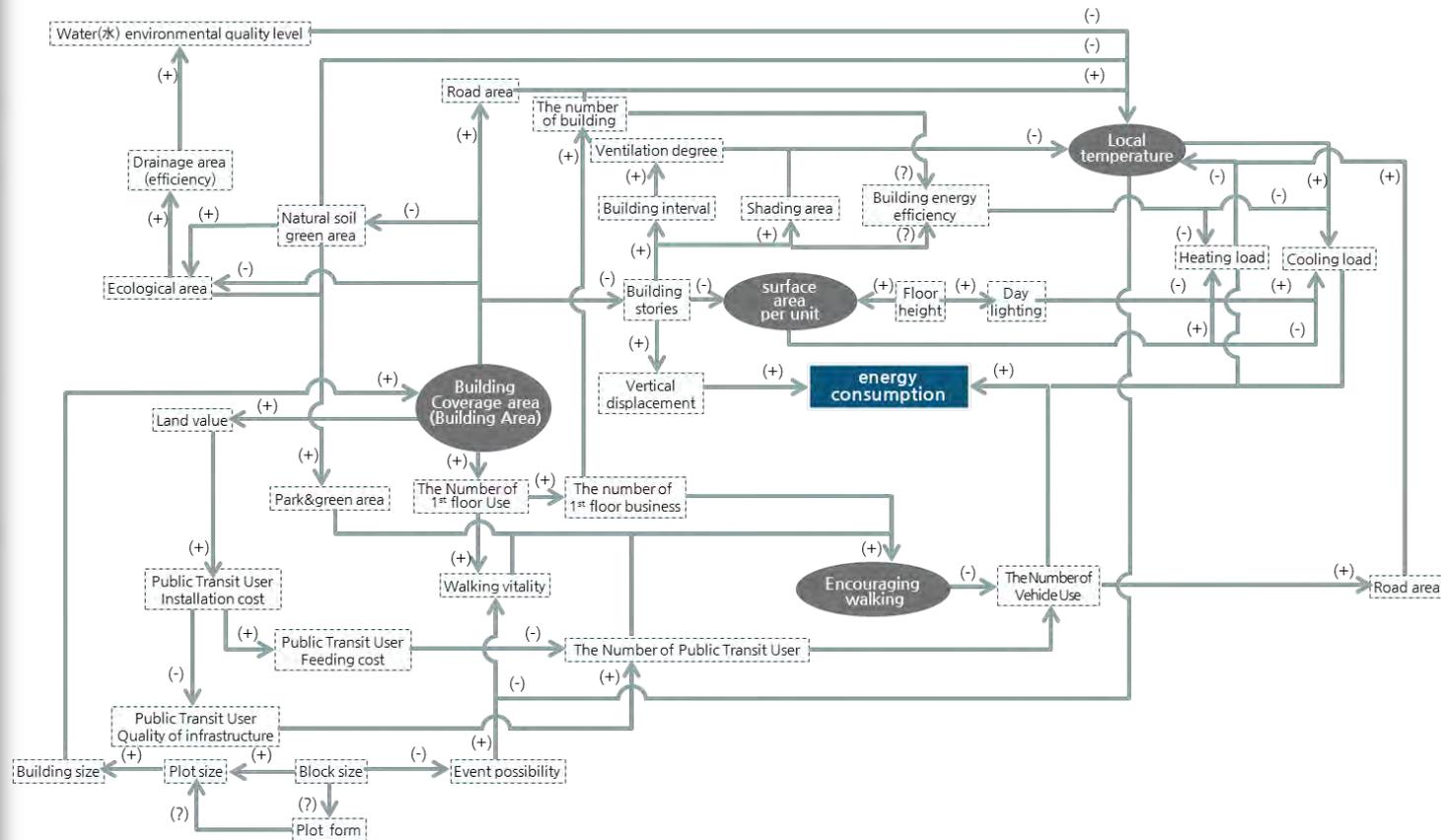
Representative research result

Microscopic Scale Carbon Emission Variable Relation

Deduction Carbon Emission Variable Relation by Previous Researches

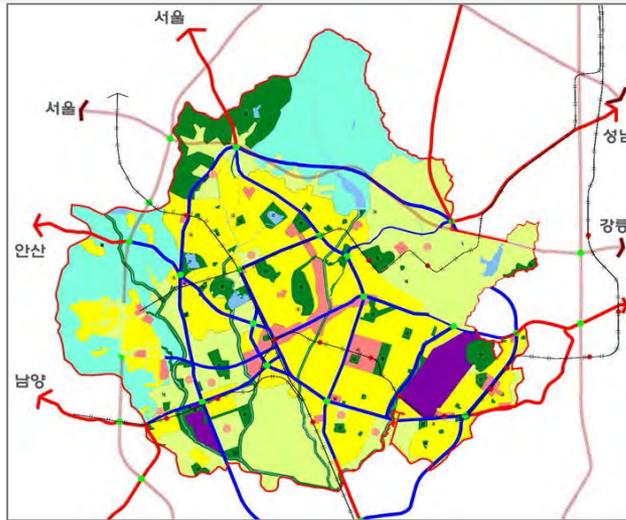
The Variable have relation directly is Group of rchitecture/ Coverage Ratio Area by street (Architecture/Deck), Architecture Unit Surface Area, Regional Temperature, Pedestrian Potential (Using Transportation) etc

Relation Management Factor is architecture Density, form, Energy Function, Size of Plot·Block etc



5 Prospective Results and Practical Use of Study

5-1 Study system and Content of Urban Level

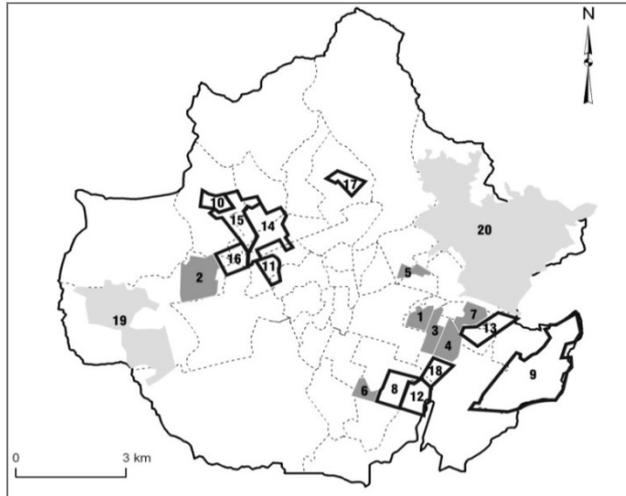


[Urban Master Plan]

2030 Year Aim, Long-term CO₂ Emission Estimation

[Urban Master Plan Conception per Section]

Urban Master Plan Level, Proposal CO₂ Emission reductive Plan
(Land Use, Traffic, Energy, Waste, Green Space, etc.)



[Conception of Urban Management Scenario]

Conception of Carbon-reductive City Management Scenario
(Low-Carbon Planning Factor – Urban Planning Factor – Urban Characteristic – Integration of Future Scenario)

[Administrative District/Dong, Development Unit]

Estimation of CO₂ Emission and CO₂ Emission Aim Proposal according to reductive Plan per Administrative District/Dong,

Urban
Planning
Support

S/W

Develop
ment

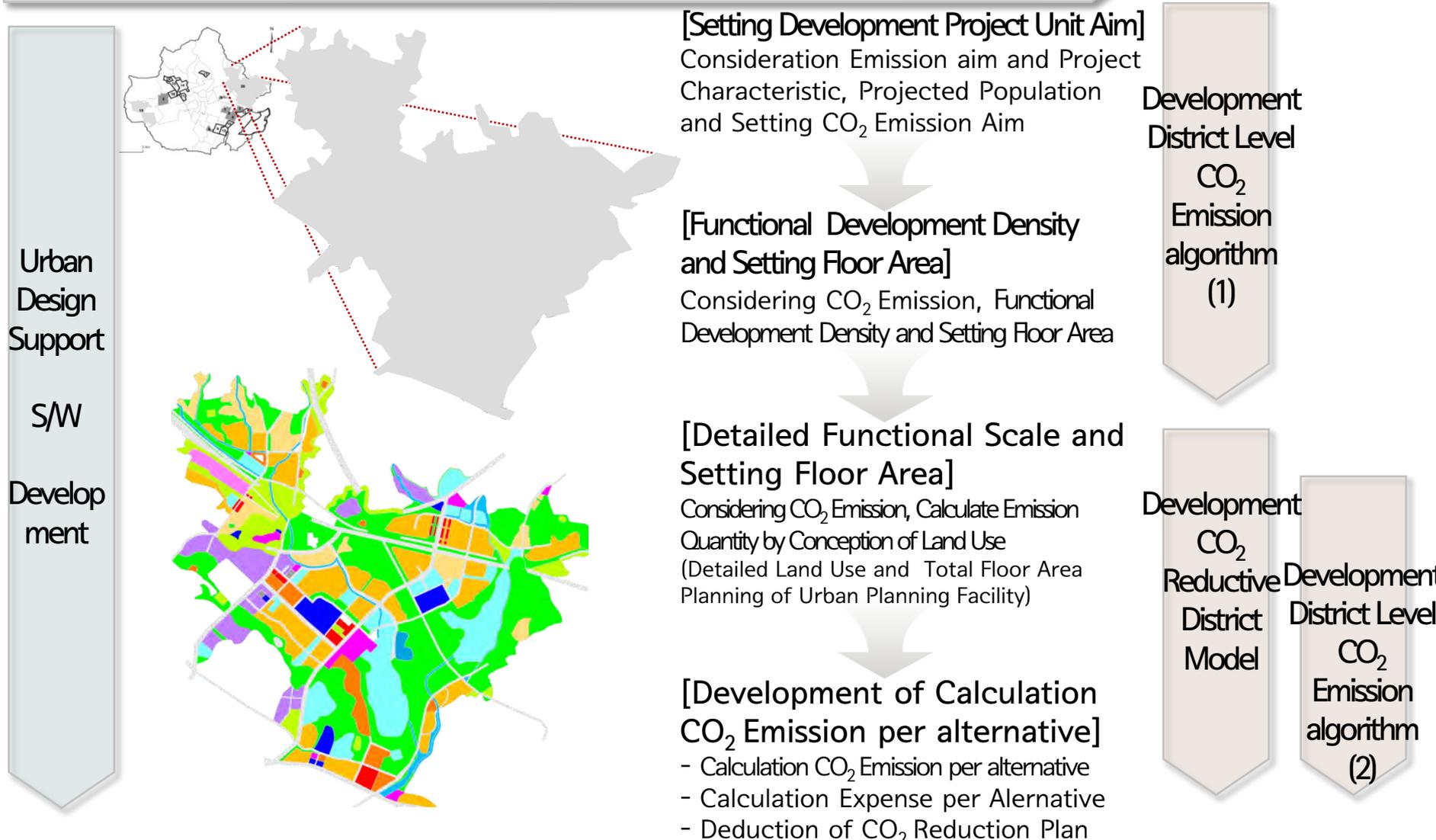
Development
Urban
Section
CO₂
Emission
Estimation
Algorithm

Other Task
Integrative
support

Development
Urban Model
/
Development
Urban
Management
Scenario

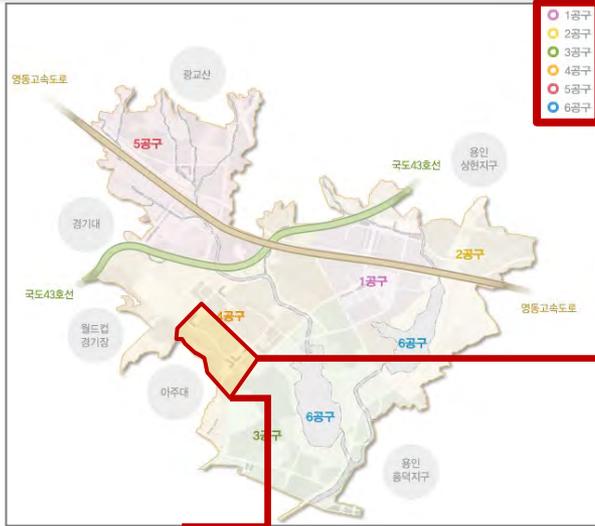
5 Prospective Results and Practical Use of Study

5-2 Study system and Contents of Development Project Level



5 Prospective Results and Practical Use of Study

5-3 Study system and Contents of District and Complex Level



[Setting of CO₂ Emission per District]
Setting of CO₂ Emission per District [District Unit Plan/Complex]

[CO₂ Reduction Design / Construction Guideline Development]
Consideration of CO₂ Emission plan per District [District Unit Plan/Complex], Complex/Architecture Detailed Design

Development of Urban Design Guideline

Development of CO₂ reductive Construction Guideline

Complex Level CO₂ Reductive technical Factor Development



Urban Design Stage, Reflection of CO₂ reductive Guideline

((Temporarily Named) Carbon-reductive District Unit Plan Guideline)

