오직 시민행복, 반드시 창조대구

Colorful DAEGU

Case Study of Korea on local climate change adaptation

Adaptation Experience of Daegu

2017. 9. 11. @ JW Merriot Dongdaemun

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DAEGU GYEONGBUK DEVELOPMENT INSTITUTE

Contents

I

Introduction of Daegu

1 About Daegu

Area	885 ㎢
Population	2.5 million
Accessibility	Incheon Int'l Airport to Daegu(50mins by airplane)
Industry Structure	Machinery, Robot, automobiles, textiles and ICT
Emerging Industry	**Water, Medical & Energy**

2 Heart of Korean History

Hub of Politics and Economy

- Hometown of 4 former presidents
- **Birthplace of Samsung Group**
- Driving force behind industrialization

  (cradle of Saemaul Undong)

1st Creative Economy Innovation Center

Creative Economy Belt

Hub of start-up company

3 Upgrading Daegu, Smart City

Vision

Global Smart City with Vitality, Daegu

SPEED DAEGU

Smart Place for your Entertainment, Education & Dream

Future

- Dream Realized Opportunity city
- Relaxed Attractive city with elegance
- Convenient, Good to live Smart City

4 Korea Water Cluster

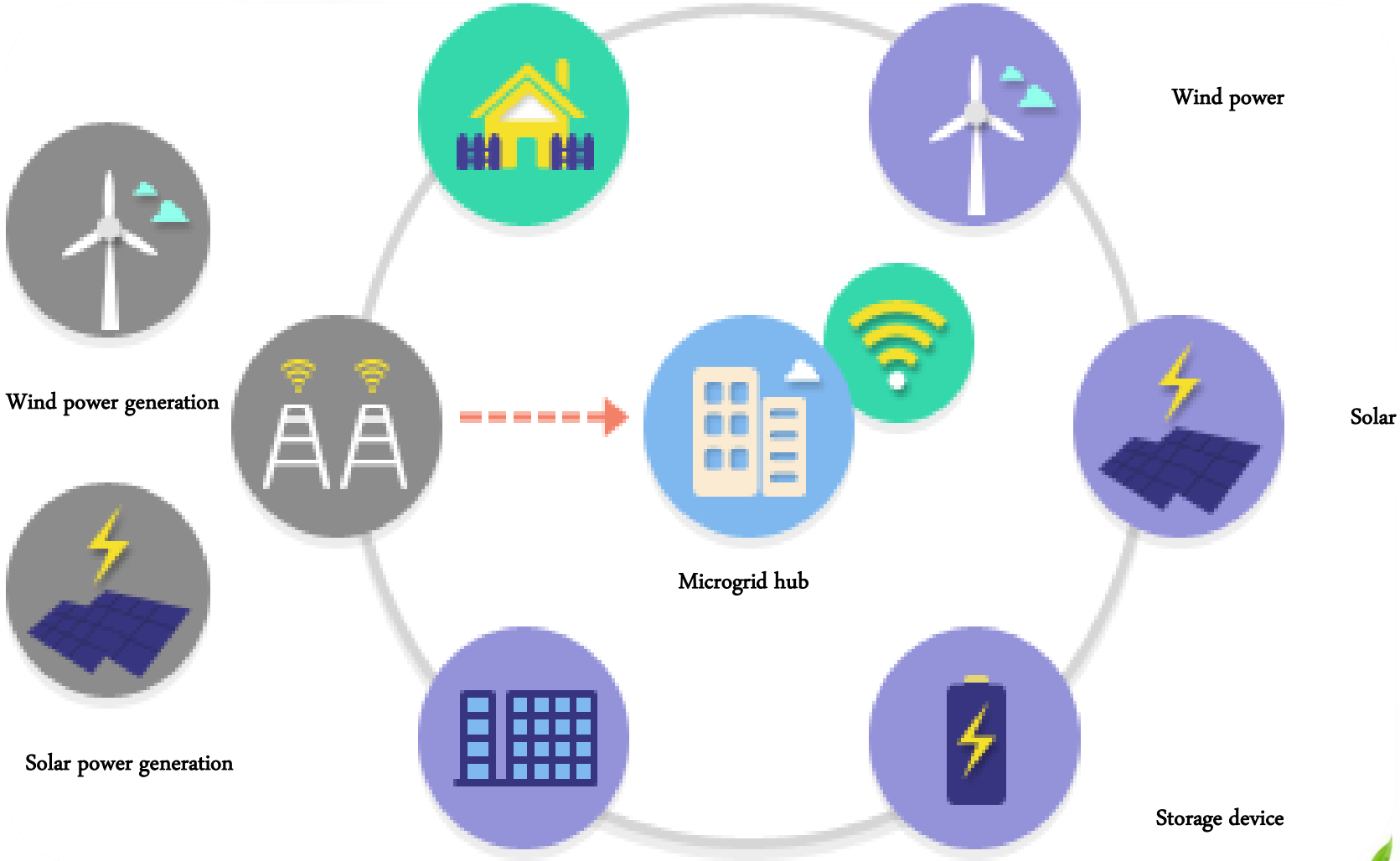
Location : Daegu National Industrial Complex

Area : 149,209m²

Cost : 313.7 billion won($ 277.4 million)

Period : 2016. 4 ~ 2018. 2

5 Smart Grid Energy System



6 Hub of Medical Industry

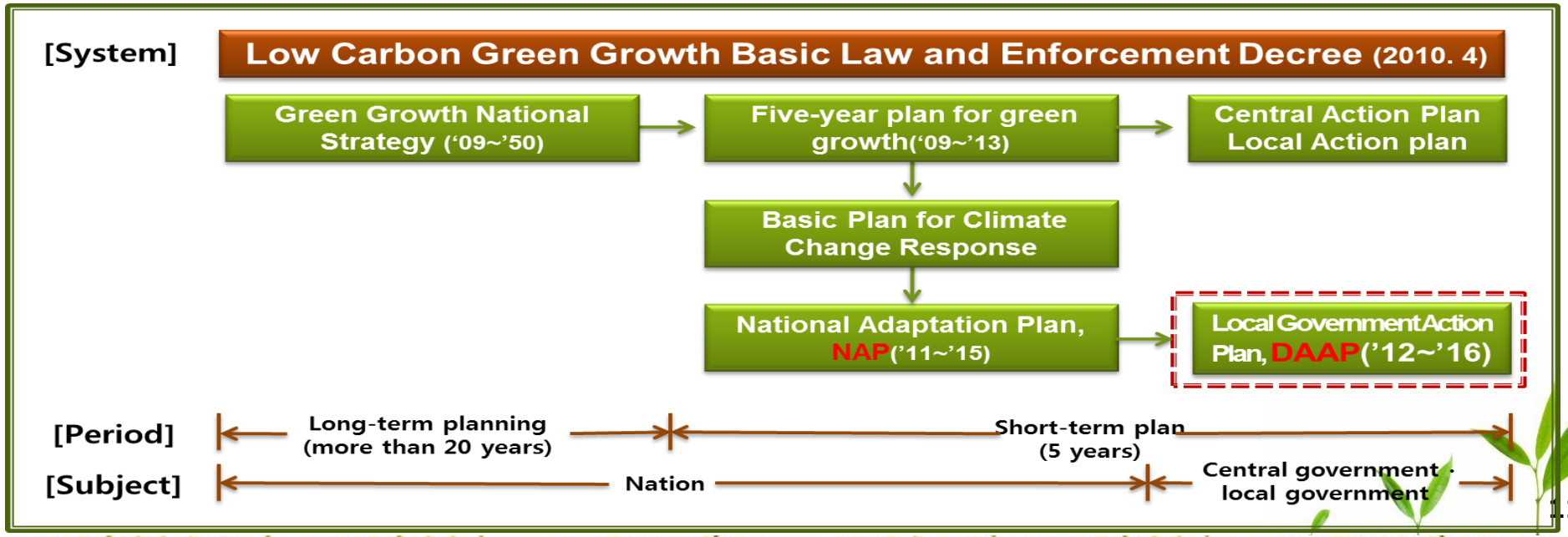
Ⅱ

1st DAAP reflecting NAP

1 Planning System of NAP

Low Carbon Green Growth Basic Law

- Established to raise the quality of people's lives from the adverse impacts of climate change and responsibility in the international community
- Article 48 Enforcement Decree of Law Article 38: The contents of national adaptation plan(NAP) should be reflected in local government-level adaptation plan (Daegu Adaptation Action Plan, DAAP)

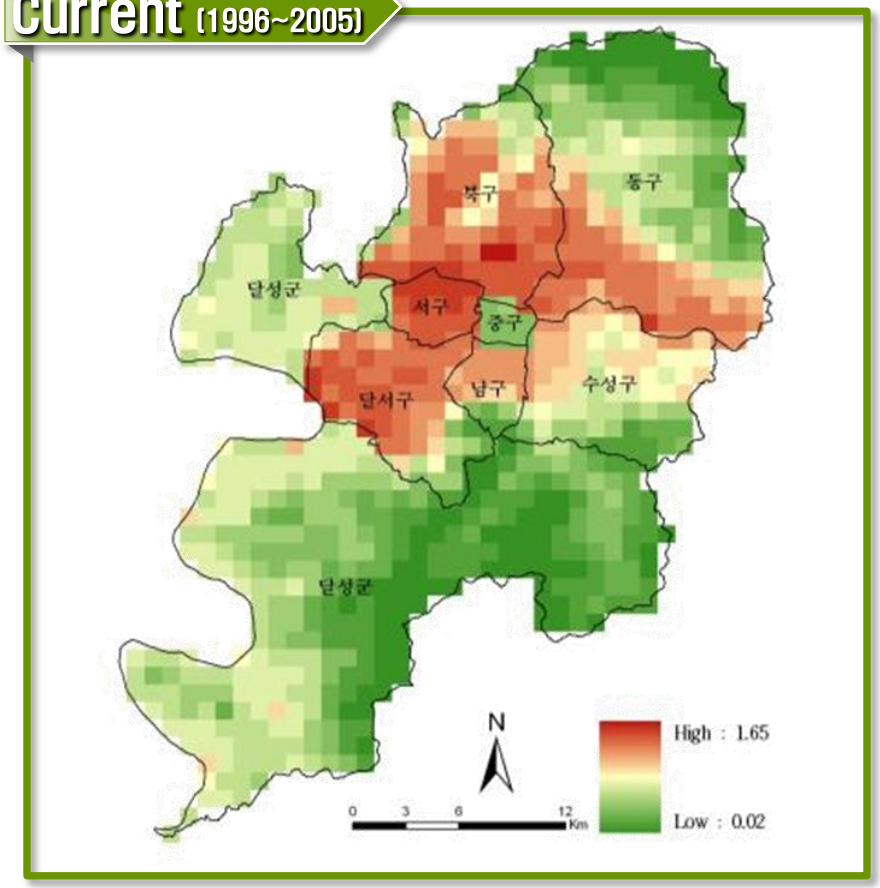


2 History of NAP & DAAP

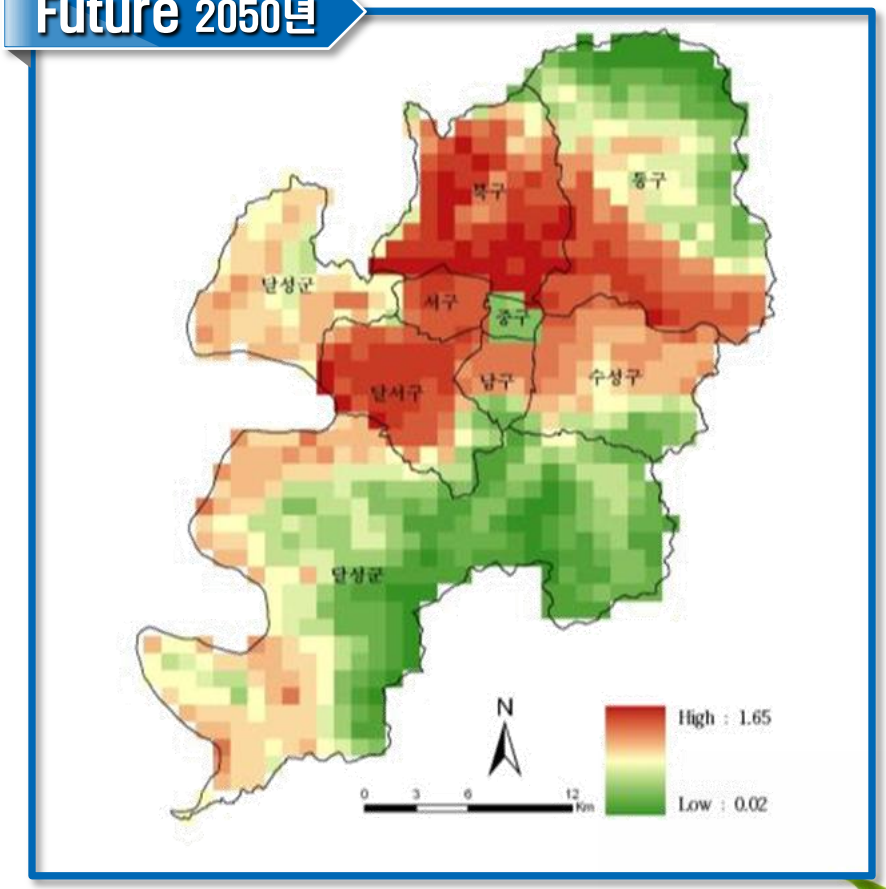
2010. 10	• 1st NAP (2011~2015) Establishment
2012. 2	• 1st DAAP (2012~2016) Establishment
2012. 12	• 「Low carbon green growth basic law」 amended – Mandatory establishment of basic unit local governments AP(2015.1.1)
2015. 1	• Establishment of adaptation measures for 8 districts and counties in Daegu
2015. 12	• 2nd NAP (2016~2020) Establishment
2016. 12	• 2st DAAP (2017~2021) Establishment

3 Vulnerability Assessment@1st DAAP : Heatwave

Current (1996~2005)

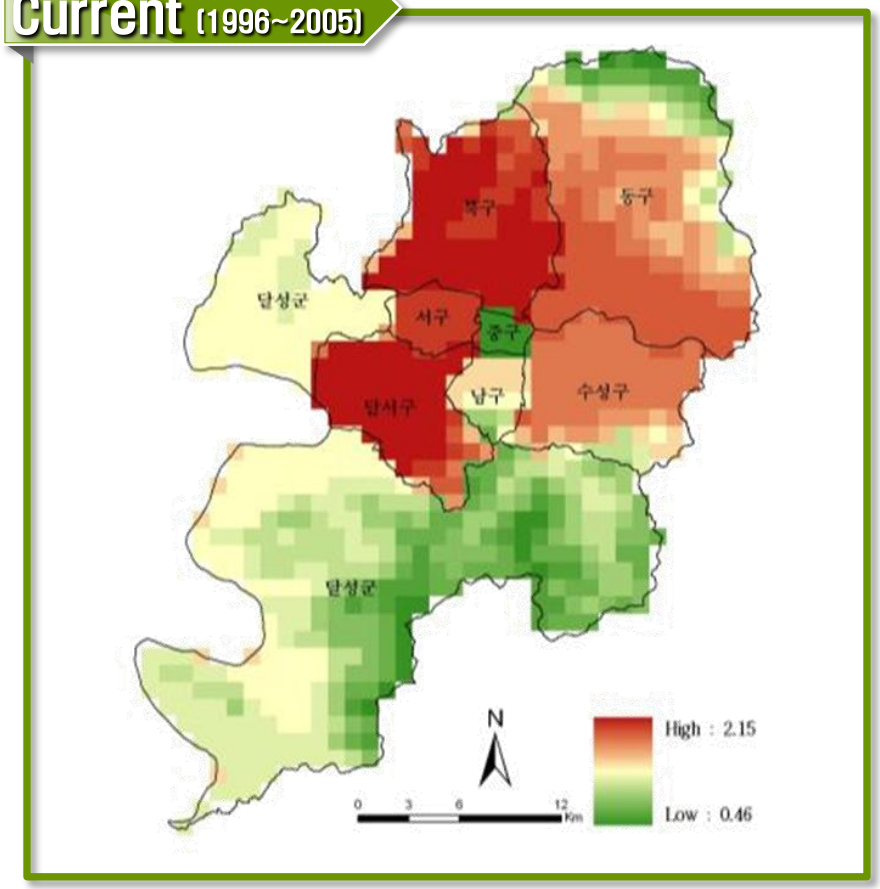


Future 2050년

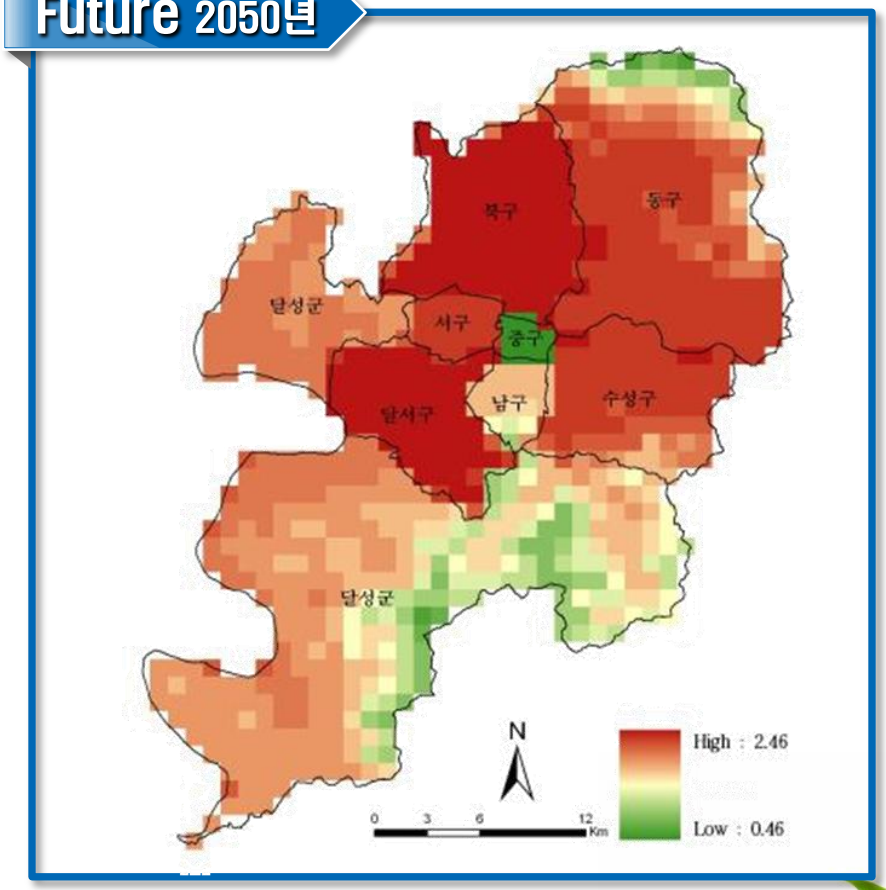


4 Vulnerability Assessment@1st DAAP : Air pollution(O_3)

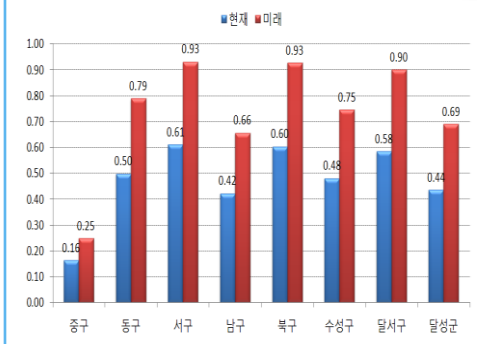
Current (1996~2005)



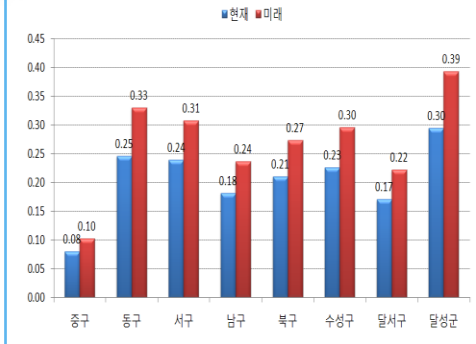
Future 2050년



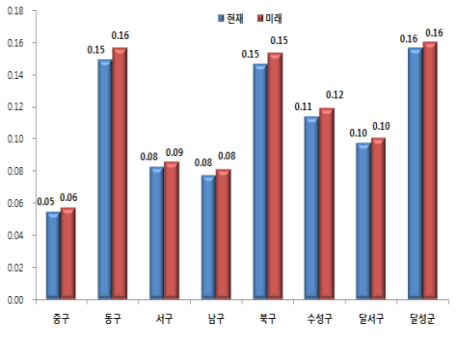
5 Vulnerability by sector and region@1st DAAP



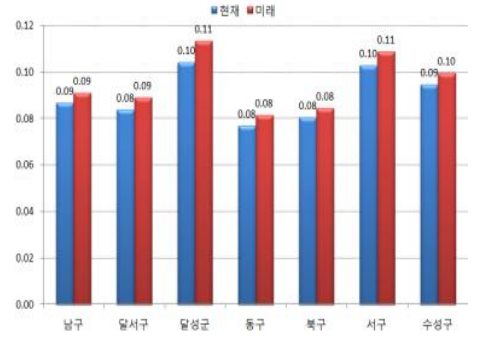
Malaria



Tsutsugamushiosis

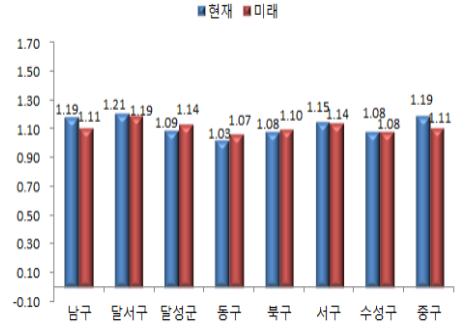


Landslide

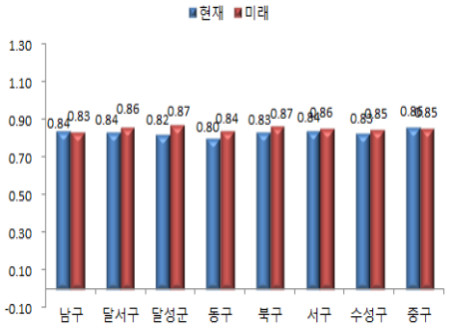


Insect pest

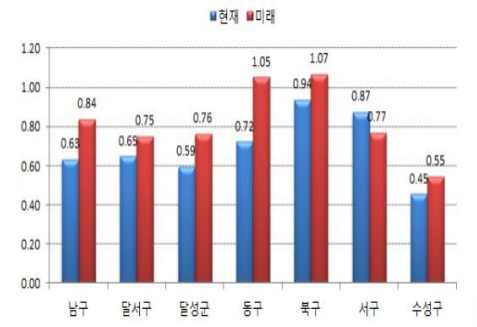
Forestry



Flood



Water resources



Ecosystem

6 Vision, Target & Strategy of 1st DAAP

Vision

Using the crisis of climate change as an opportunity

Leading Cities that Adapt to Global Climate Change

Target

- Long-term: urbanization adaptive hub of CC
- Mid-term: Total adaptation solution for climate change
- Short-term: Introduction of adaptation manual for all areas of CC

Strategy

- Health: Creating an all time health city
- Disaster: Creating a safe city without disaster
- Agriculture: Fostering competitive eco-friendly agriculture
- Forest: Creating a healthy forest city
- Wat. managment: Creating a rich and safe water environment-friendly city
- Ecosystem: Creating ecosystem conservation and service infra.
- Monit. and Forcst. CC: Establish. of customized weather service sys. for local demand
- Adaptive Ind./Energy: CC Adaptive Local Indus. and Energy Supply Foundation
- Educ. and Promt.: Future-oriented Edu., Promt. and Intern. Cooperat.

7 Action Project of 1st DAAP

① Creating an all time health city

- Comprehensive health measures
- Warming adaptation
- Cold wave adaptation
- Air pollution prevention

② Creating a safe city without disaster

- Disaster prevention system
- Disaster prevention infrastructure

③ Fostering competitive eco-friendly agri.

- Foster climate-friendly agriculture
- Prevention of Agricultural and Livestock Industry Damage

④ Creating a healthy forest city

- Promotion of resilience of forest function
- Prevention of forest damage

⑤ Creating a rich and safe wat. Env.-friendly city

- Water management monitoring, • measures against floods and droughts
- Water quality and water ecology management

⑥ Creating ecosystem conservation and service infra.

- Sustainable ecological preservation
- Strengthening resident friendly ecological services

⑦ Establish. of customized weather servi. sys. for loc. demand

⑧ CC Adaptive Local Indus. and Energy Supp. Foundation

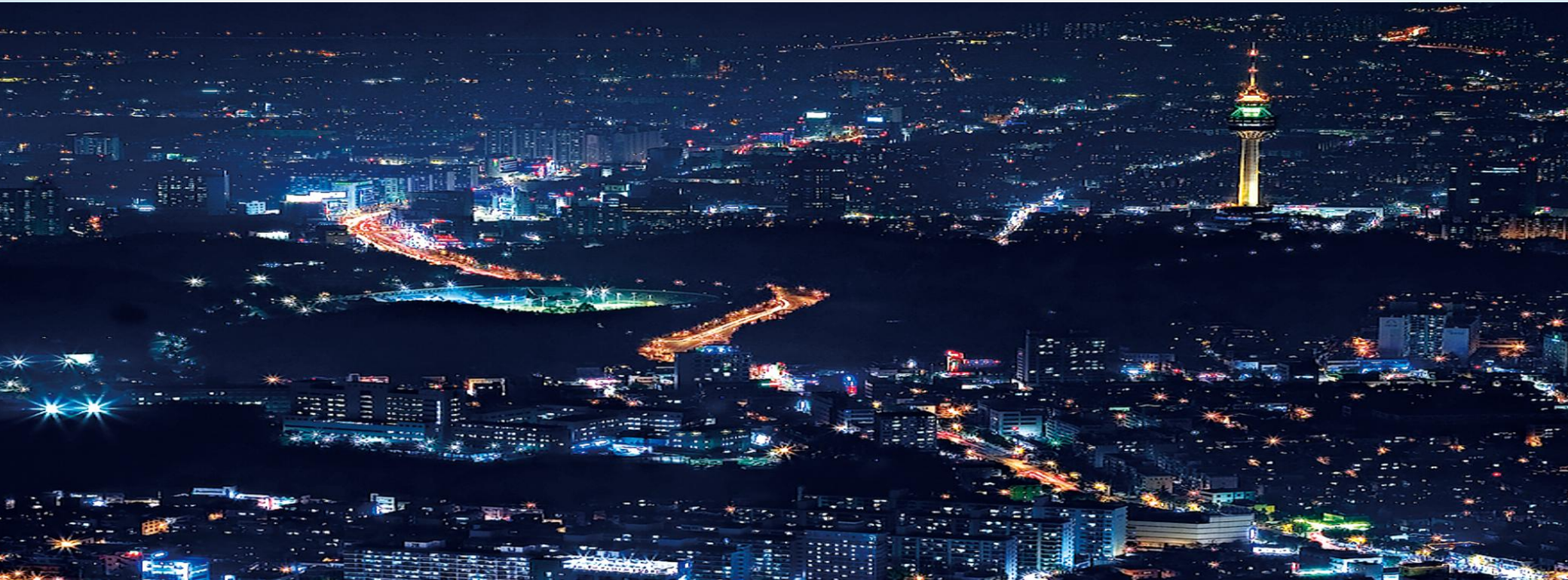
- Impact and Vulnerability Assessment
- Climate Change Crisis Management and Opportunity Utilization

⑨ Future-oriented Edu, Promt. and Intern. Cooperation

- Comprehensive Measures to Promote Local Specialized Education
- Climate Change Crisis Management and Opportunity Utilization
- Responsive Measures • Global International

III

Implementation Evaluation



1 Evaluate performance by sector

96 cases: Excellent 55, Average 13, Insufficient 14, except evaluation 14

9 Division		Case	Excell.	Avg.	Insff.	Excpt.
		96	55	13	14	14
1	Health	19	10	2	7	-
2	Disaster	12	9	2	1	-
3	Agriculture	9	6	2	1	-
4	Forest	6	6	0	-	-
5	Wat. Management	7	6	1	-	-
6	Ecosystem	7	6	1	-	-
7	Monit. and Forcst. CC	13	-	-	1	12
8	Adaptive Ind./Energy	10	2	2	4	2
9	Educ. and Promotion	13	10	3	-	-

Note: As of the end of 2016

2 Detailed project performance by department

Department	Total	Completed	Normally In progress	Modified· Changed	Additional propel	Non-promotion
Total	96	6	67			23
Health	11	5	5			1
Medical Ind.	1					1
Nat. Disaster	8		8			
Res. Eecycle	1		1			
Ariculture	9		9			
Park & Green space	7		7			
Wat. Management	5		5			
Wat. Industry	2		2			
Env. Policy	34		27			7
Energy	2		2			
Water Work Adm.	1	1				
Fire Safety Division	1		1			
Daegu Meteorological Station	14					14

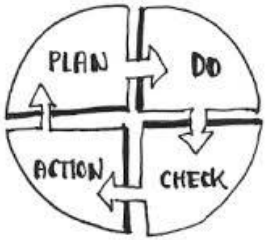
3 Cause Analysis and Improvement

① Effective policy promotion base is weak

- Performance Indicator is not set
- Lack of priority setting and prioritization

② Lack of communication between promotion departments

③ Lack of feedback by PDCA Cycle



PDCA Cycle

④ Lack of project expenses and manpower

Make 2nd DAAP by Complement the limitations of 1st DAAP

Ⅳ

2nd DAAP reflecting IE

1 2nd NAP Propulsion direction

Establishment 2nd NAP(2015.12)

- Compensation and development of performance of 1st NAP
- **Add. Risk Assessment, Establishing Indicators, Yearly Performance Evaluation Legalization**

Direction	1st NAP	2nd NAP
Configuration	• 14 Departments • 9 Division	• 20 Departments • 4 Division, 1 Policy base
Science-based	• Major countermeasures by sector	• 87 Priority-Climate Risk Based (Prepare new measures, such as tourism)
CC Information	• Vuln. Ass. by Sector • Inform. mangmt by depart.	• Integrated Vuln. assessment • CC inform. integration and link
Social Safetynet	• Lack Differentiated AP	• Strengthen management of vulnerable groups and regions
Policy-based	• Annual performance check	• Indicator setting, comprehensive evaluation

2 Future prospects for climate change

Jung-gu of 8 districts and counties has the highest forecast

- Estimated result of RCP 4.5 scenario using VESTAP, rise about 1.5 ℃ in the 2050s

Average temperature

Administrative district	2001~2010(℃)	2041~2050(℃)
Jung Gu	14.5	16.0
Seo Gu	14.4	15.9
Dalseo Gu	14.0	15.5
Nam Gu	13.8	15.3
Buk Gu	13.7	15.3
Suseong Gu	13.6	15.1
Dalseong Gun	13.1	14.6
Dong Gu	12.8	14.3
Average	13.7	15.3

Minimum temperature

Administrative district	2001~2010(℃)	2041~2050(℃)
Jung Gu	9.8	11.3
Seo Gu	9.6	11.1
Dalseo Gu	9.1	10.6
Nam Gu	8.9	10.4
Buk Gu	8.8	10.3
Suseong Gu	8.8	10.3
Dalseong Gun	8.0	9.5
Dong Gu	8.0	9.5
Average	8.9	10.4

Highest temperature

Administrative district	2001~2010(℃)	2041~2050(℃)
Jung Gu	20.0	21.5
Seo Gu	20.0	21.4
Dalseo Gu	19.7	21.2
Nam Gu	19.3	20.8
Buk Gu	19.4	20.9
Suseong Gu	19.2	20.7
Dalseong Gun	18.9	20.4
Dong Gu	18.3	19.9
Average	19.4	20.9

- VESTAP(Vulnerability Assessment tool To Build Climate Change Adaptation Plan)
  - Web-based programs for assessing climate prospects and vulnerabilities supported by the KACCC

3 Selection of vulnerability evaluation items

- VESTAP currently provides 32 evaluation items in 7 areas (Daegu: 29 items in 6 areas, considering regional characteristics)
- Estimation of weighting of vuln. evaluation by expert opinion collection (by sector and item)

Div.	Items
Health(9)	Health vulnerability due to flood
	Health vulnerability due to typhoon
	Health vulnerability due to heat wave
	Health vulnerability by cold wave
	Health vuln. due to increased ozone con.
	Health vulnerability to fine dust
	Health vulnerability to other air pollutants
	Infectious diseases caused by insects and rodents
	Health vuln. of waterborne mediated diseases
Disaster(4)	Infrastructure vulnerability due to flooding
	Infrastructure vulnerability due to heat wave
	Infrastructure vulnerability due to heavy snowfall
	~~Infrastructure vulnerability due to sea level rise~~
Agriculture(5)	Vulnerability of agricultural soil erosion
	Vulnerability of cultivation / breeding facilities...
	Rice plant productivity vulnerability
	Vulnerability of apple production
	Vulnerability of livestock productivity

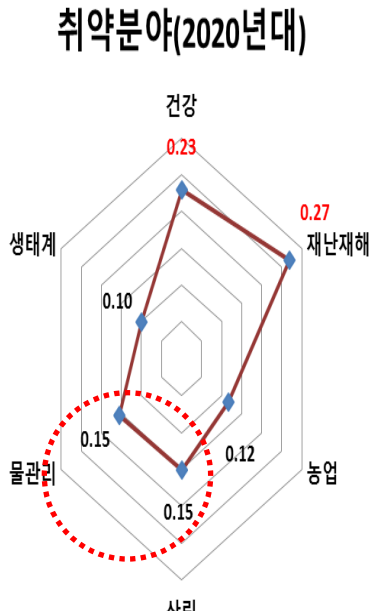
Div.	Items
Forest(7)	Landslide due to heavy rain
	Vulnerability of forests due to landslides
	Vulnerability due to forest fires
	Vulnerability of pine trees by pests
	Vulnerability of pine and pine mushroom
	Vulnerability of forest productivity
	Vulnerability of forest vegetation due to drought
Fishery(1)	~~Fisheries (aquaculture) vulnerability due to changes in water temperature~~
Water management (3)	Vulnerability of flood prevention
	Vulnerability of water use
	Vulnerability of water quality and water ecology
Ecosystem (3)	Softwood vulnerability
	Insect Vulnerability
	~~Vulnerability of National Parks~~

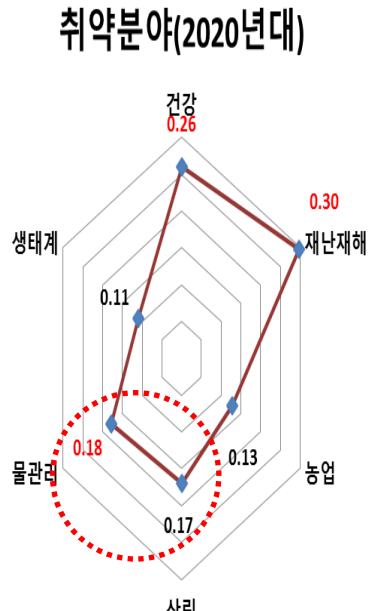
4 Vulnerability assessment result

Vuln. to disaster, health and water management orders

- Vul. Ass. : 1st disaster, 2nd health, 3rd water management, 4th forest,
- 5th agriculture, 6th ecosystem field (by 2020)
- Vul. index by sector: Existing (provided by the nation) VS complemented (reflected by weight) Similar

Nation(VESTAP)	Daegu (VESTAP Readjustment)





5 Selection of risk evaluation items

Selected 52 items in total 6 fields

Brainstorm

87 items selected at the research team meeting (4 times) to select appropriate risk assessment items for Daegu city

최종선정 항목

분야	항목수
건강	9
농수산	6
물관리	13
재난, 재해	8
산림, 생태계	7
산업	9
6개 분야	52개 항목

Expert Feedback

Professor,

DGI Researcher,

Sector expert

Conducted 30 questionnaires

- Perform assessment for experts and public officials on the urgency and possibility of risk items
- A total of 40 surveys were conducted (80% collection rate)

6 Health sector risk assessment result

1st Order

1. Increased impacts on vulnerable populations due to intense urban heat island phenomenon
2. Increased warmth and cardiovascular disease due to heat
3. Increased mortality due to heat
4. Increase in summer diseases and infectious diseases due to rising temperature and humidity (increase of building mold, fungi)

2nd Order

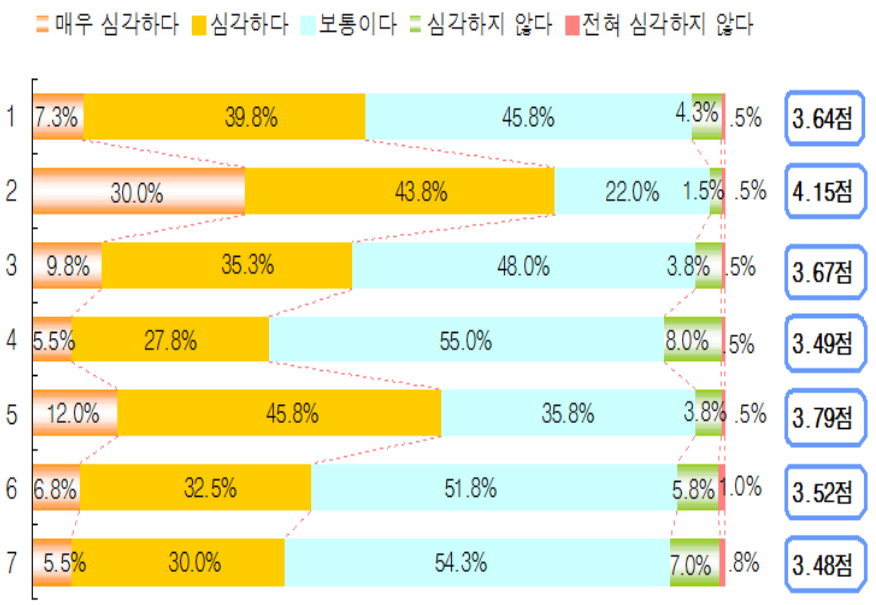
1. Increase in water-borne and food-borne infectious diseases caused by heat

Hold

1. Allergen increase due to rising temperature (atopy etc.)
2. Increased disease due to short-term sudden weather changes
3. Increased mortality rate due to exposure to hazardous substances and air pollution
4. Disease caused by yellow dust

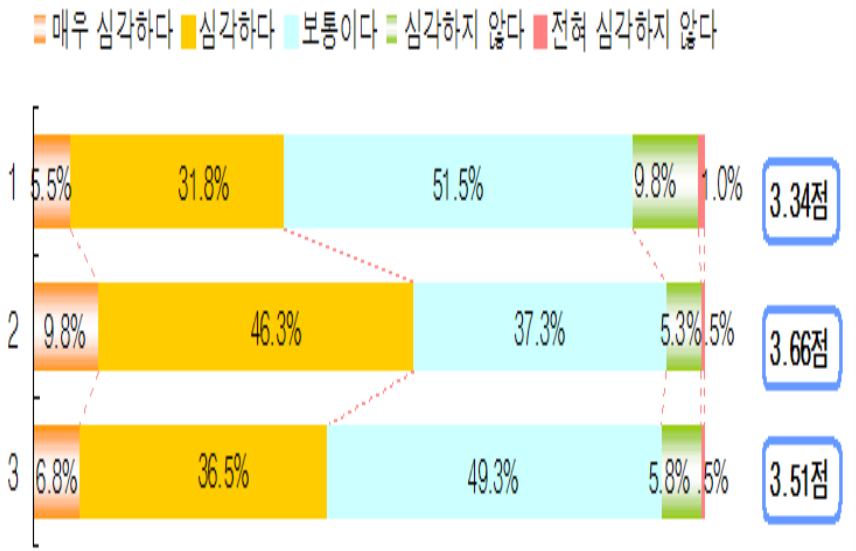
7 Citizen Awareness Survey for CC adaptation

Health



1) Increase in infectious diseases
2) Fine dust, ozone , air pollution increase
3) Waterborne mediated disease outbreak
4) Health damage caused by typhoon
5) Health damage caused by heat
6) Health damage by cold wave
7) Health damage caused by flood

Disaster



1) Infrastructure damage to heavy snowfal
2) Infrastructure damage to heat
3) Infrastructure damage to floods

8 Selection of priority fields

Quantitative and Qualitative Vuln. Assessment

- Identifying the most vul. areas: Vul. Ass. (VESTAP), Public Awareness Survey, Expert Awareness Survey
- Selected as a focus area for health, disaster disaster and water management
- Establish detailed AP considering priority of risk in key areas!!

Div.	Vul. Ass. (VESTAP)	Pub. Awar. Survey	Expt. Awar. Survey	Final Score	Final Vul. Order
Health	2 order	1 order	2 order	16	1
Disaster	1	5	1	14	2
Agric.	5	6	5	5	6
Forest	4	4	6	7	5
W Mang.	3	2	3	13	3
Eco. Sys.	6	3	4	8	4

9 Vision, Target & Strategy of 2nd DAAP

Vision

Ensure citizen safety by CC adaptation

Climate Happiness City, Daegu

Strategy

Achieved 100% implementation plan!!

Health: Establishment of foundation for healthy life of citizen's life

Agriculture: Building sustainable urban agriculture infrastructure

Wat. Managmnt: Creating a coexisting healthy wat. Env. city infrast.

Disaster: Building a city adaptive climate that is safe from CC

Forest eco.: Establish. of the found. for securing the forest ecosystem health that adapts to C

Impl. base: Estab.of civic participation adaptive network foundation

10 How to derive detailed action plan

Sustainable Prj.	Select as sustainable Prj. since 2016
1st DAAP Non-promotion Prj.	Review whether it is possible to promote
National linkage Prj.	Review as Prj. that can be linked to 2nd NAP Prj.
New proposal Prj.	Proj. reflecting local characteristics (vulnerability, risk assessment result) : Minimize damage, maximize opportunity

Develop practical and adaptable DAAP!

11 Action Project of 2nd DAAP : Item selection

Selected 35 Prj. items in total 6 fields

Brainstorming

◆ Research Team Meeting for Item Evaluation (4th)

→ Draw 87 items

Final selection item

Division	Item
Health	11
Disaster	8
Water management	4
Forest / ecosystem	4
Agriculture	4
Implementation Base	4
6 Division	35 Item

Expert Feedback

◆ professor

◆ DGI Researcher

◆ 30 experts from each division

12 Action Project of 2nd DAAP : Detailed Project 1

Div.	Measures	Measures
Health (11)	Warming adaptation	1. Emergency Medical Life
		2. Residential environ. improvement project against heat
		3. Health management in vuln. classes of climate change
		4. Strengthening common convenience facilities against heat
		5. Establish. of dot green network for reduction of temp.
		6. Establish. of line green network to reduce temperature
		7. Establish. of area green network to reduce temperature
	Infection adaptation	1. Establish. of zero infectious disease city due to CC
		2. Establish safety net for new infectious diseases
		3. Infectious disease vaccination support
	Air pollution and chemical adaptation	1. Promotion of air quality improvement measures
Disaster (8)	Establishment of disaster prevention system	1. Strengthening safety with citizens
		2. Establish disaster safety system for prompt response
		3. Strengthen disaster prevention system against CC
	Strengthening disaster prevention infrastructure	1. Establish infrastructure for disaster response
		2. Improving hazardous area for disaster prevention
		3. Creating safe rivers in response to climate change
		4. Reinforced response capabilities for disaster recovery
		5. Safe road environment preparation for floods

12 Action Project of 2nd DAAP : Detailed Project 2

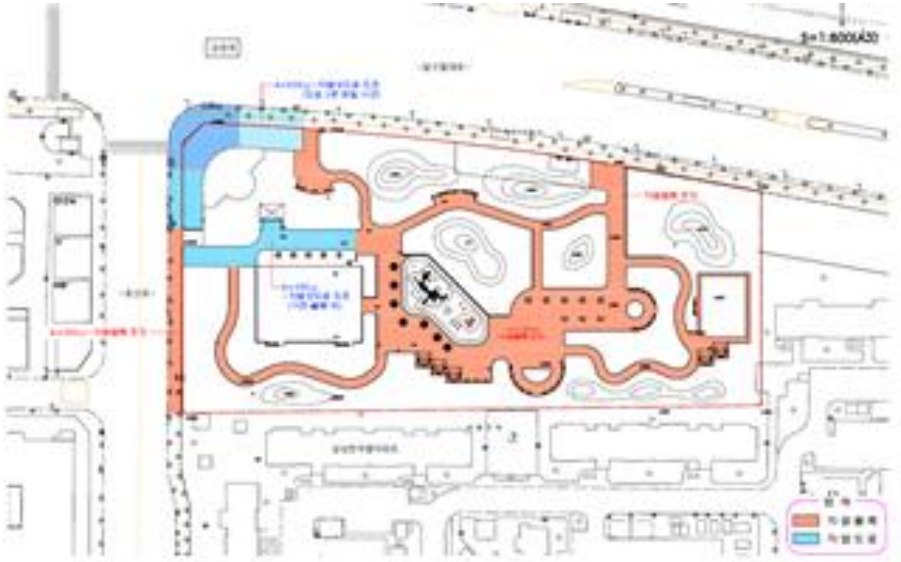
Div.	Counter Measure	Detailed Project
Wat. Manag. (4)	Impact and Vulnerability Assessment	1. Strengthen monitoring of water quality in tributaries
	Measures against flood and drought	1. Rainwater utilization facility installation support
	Water quality and water ecological control measures	1. Enhancement of comprehensive planning management of water demand management
		2. Maintenance and management of nonpoint pollution abatement facility
Forestry Ecosys. (4)	Maint. and improv. of resilience of forest function	1. CC Response Systematic Forest Resource Management
	Prevention of forest ecosystem damage	1. Minimize vulnerable forest disasters
		2. Establishment of emergency response system for pests
		3. Sustainable biodiversity conservation and restoration
Agricult ure (4)	Cultivating Eco-Friendly Agriculture	1. Nurturing and supporting experts in CC agriculture
	Prevention of damage to the enrichment industry	1. Strengthen preemptive Disaster prevention in agriculture
		2. Imprv. of agri. and livestock inds. Envi. in response to CC
		3. Study on Mitigation of Meteorological Disaster
Implem. Base (4)	Education and PR	1. Activation of climate change experience training
		2. Operate Climate Change Education Center
		3. Supporting and Promoting Climate Change Policy

V

Good Case of Daegu

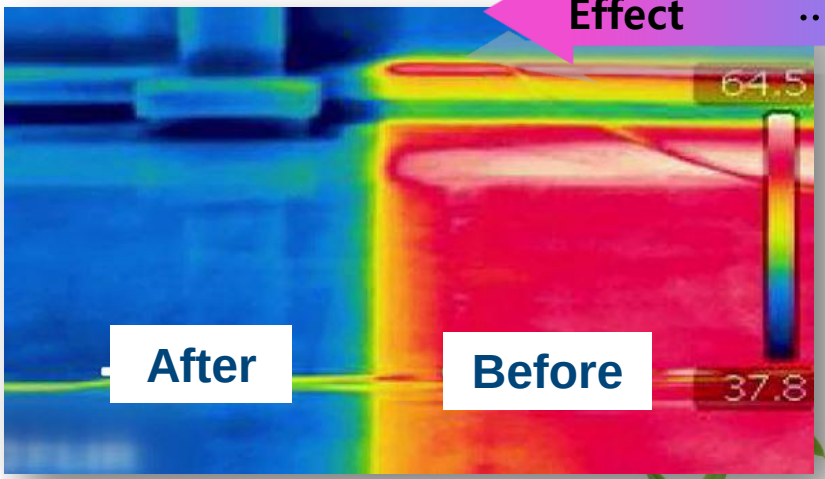
1 Heat and cold weather response project

Cool Pavement



Cool loop

Effect



Daegu National Leading Project

- Reduces surface temperature in the park, relieves heat, provides cool shelter
- Location : Gangchang Park, Area : 4,050㎡
- Cost: 400 million won (50% Nation, 50% Daegu)

2 Green roofing / Gardening

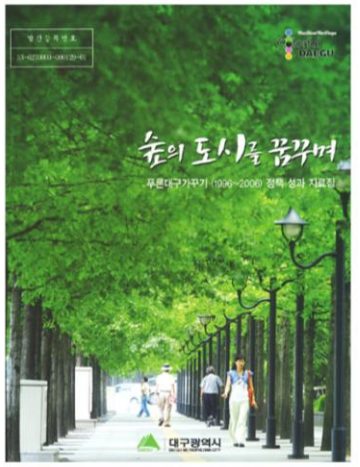
Rooftop of DYETEC

Wolsung Village Sky Garden

2017 Open competition

3 Planting ten million trees again

Arboretum monument



Dreaming of a forest city

Proud Arboretum of Daegu

Urban forest using ex-railroad

Noise cushioning +Urban forest

4 Heatwave Shelter / Cooling Fog

A heatwave shelter

Crosswalk shade

Cooling Fog

5 Air quality improvement project

Odor monitoring system

Clean Road System

Electric excavator

Low pollution vehicle

6 Heat Wave Forum /flood/drought/cold _Natural disaster adaptation

Civic Consensus formation

☞ 대프리카의 이색 더위사냥 '물선풍기'

▲... 연일 무더운 날씨가 이어지면서 7일 오후 대구도시철도 3호선 서문시장역 승강장에 설치된 물선풍기가 승객들의 더위를 식혀주고 있다. 물선풍기는 서문시장역에 2대, 팔거역과 범물역에 각 1대가 설치돼 있다. 황인무기자

7 Citizen Participation Experience Program

Narrow-Mouth Frog festival

Think Global Act Local

Earth Day

Earth Day Festival

VI

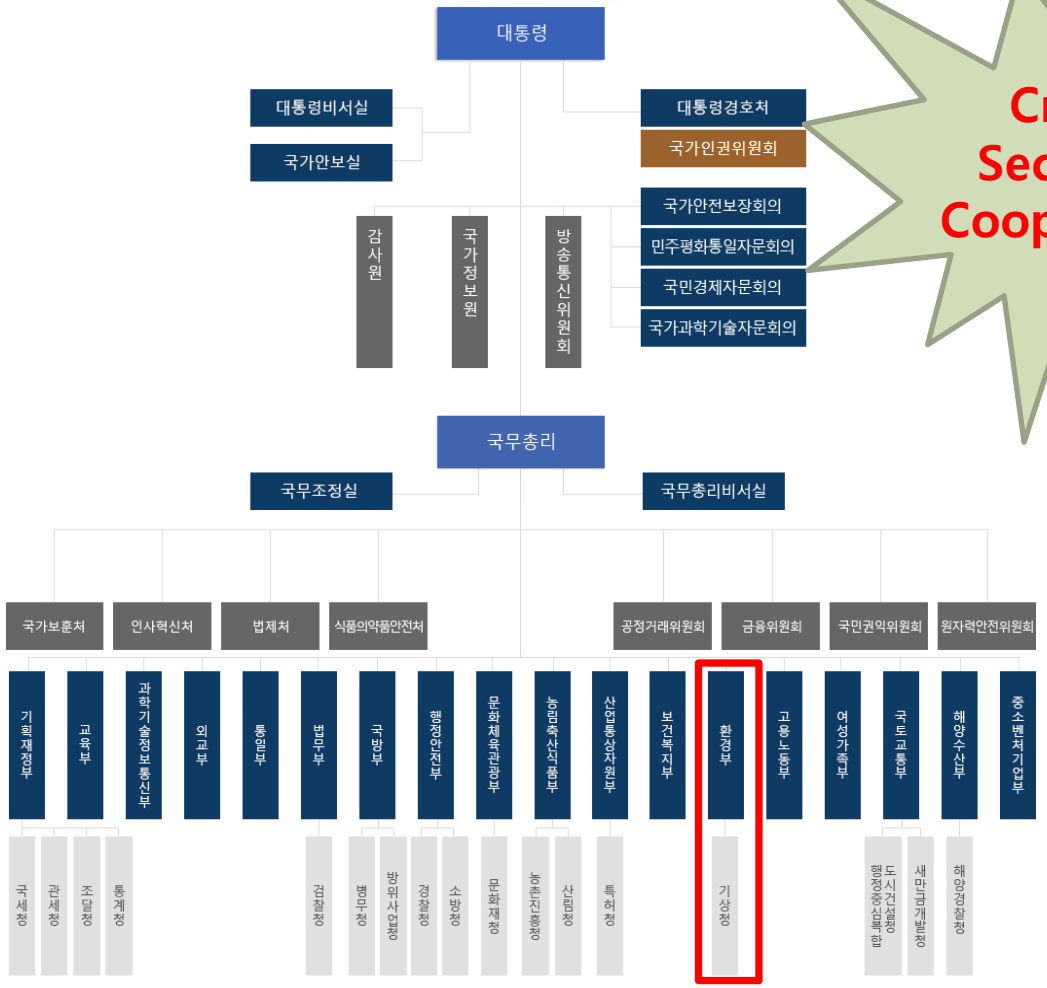
Requests for Central Government

1 Strengthening KACCC's support for Loc. Gov.

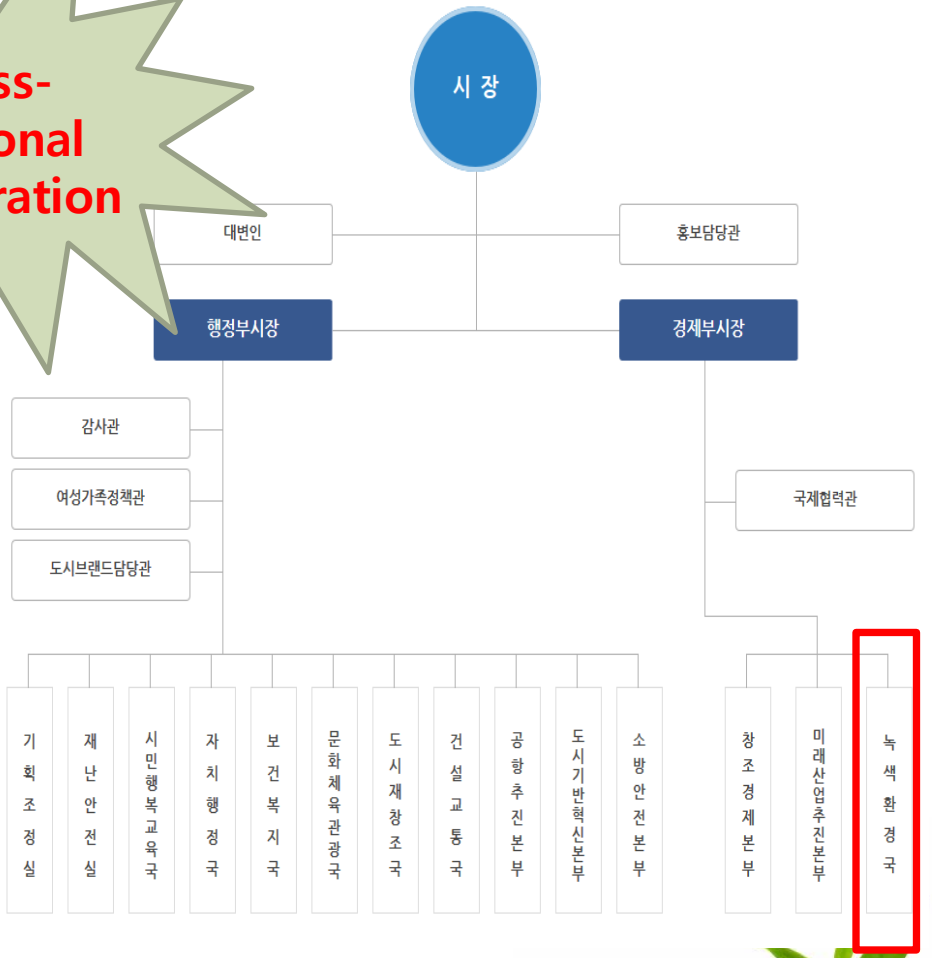
KACCC's Vulnerability Assessment System

2 Cooperation between Cen. Gov. & Loc. Gov.

Cross-Sectional Cooperation



Central Government Organization in Korea



Government Organization of Daegu

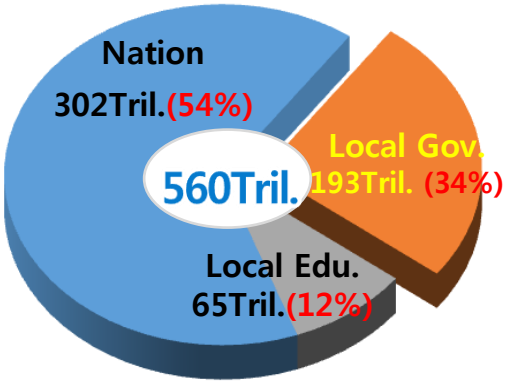
3 Expansion of national financial support and introduction of Local Environmental Tax

① Transferring some environmental taxes to local govern.

- Independently form climate change adaptation-oriented civil society in the provinces

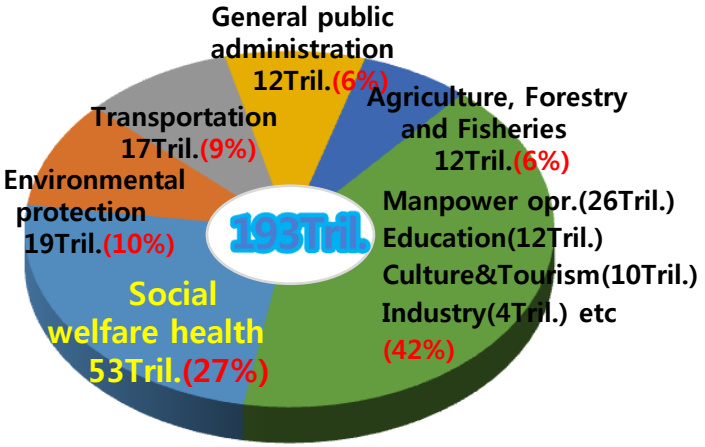
② Introduction of Local Environmental Tax

< General revenues >



2017

<Local expenditure >



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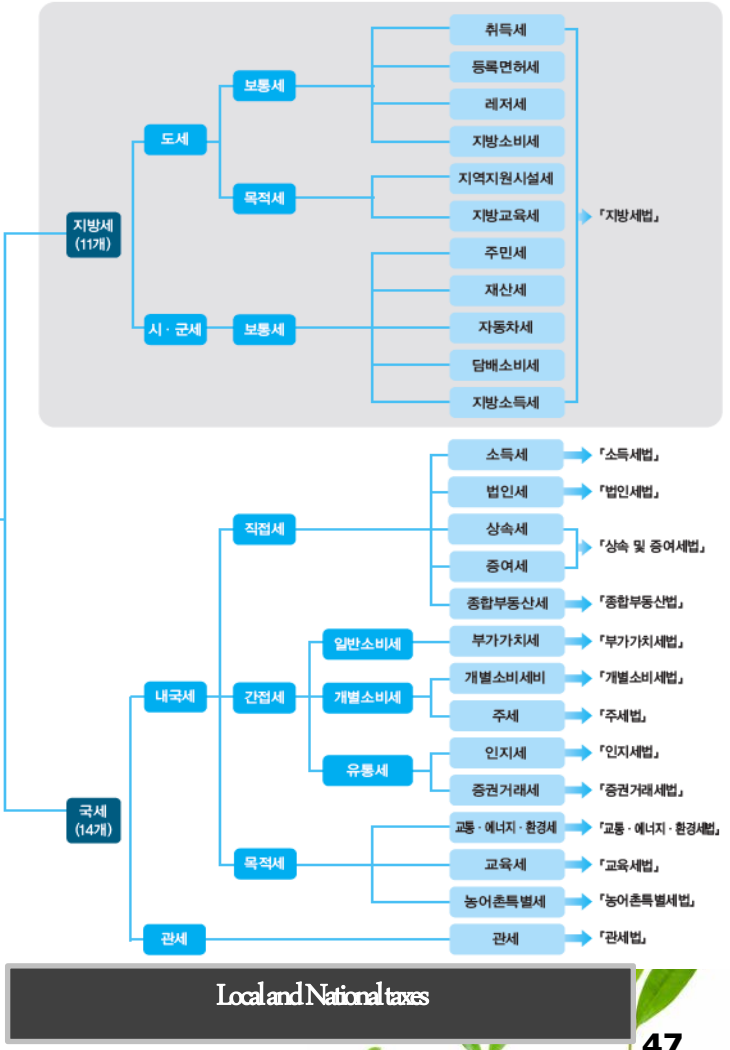
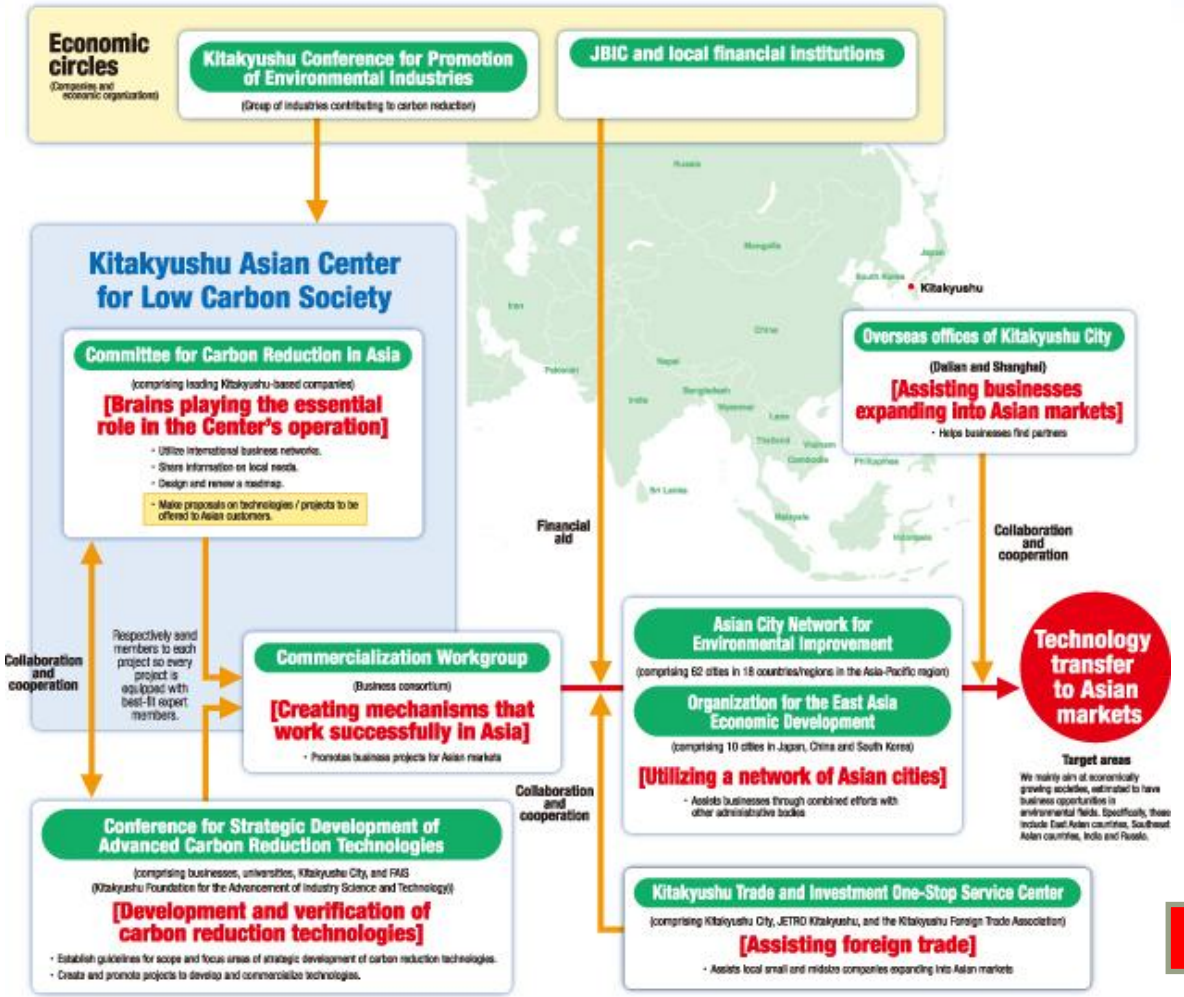


4 Global Green Business Center pilot project support



Kitakyushu Asian Center for Low Carbon Society Case

① Supp. local gov. in resp. to CC

- Mid-to-long term mitigation & adaptation Roadmap

② Proj. for global CC contribution

- Securing overseas reductions(activate JCM Proj.)

③ Daegu success case modeling

④ CC Industry Overseas Support

- Establish. of overseas advancement governance platform
- Promoting global cooperation projects between local governments

Adaptation Technologies

THANK YOU