URBAN MICRO- CLIMATE MANAGEMENT SYSTEM for Low- Carbon and Eco- City

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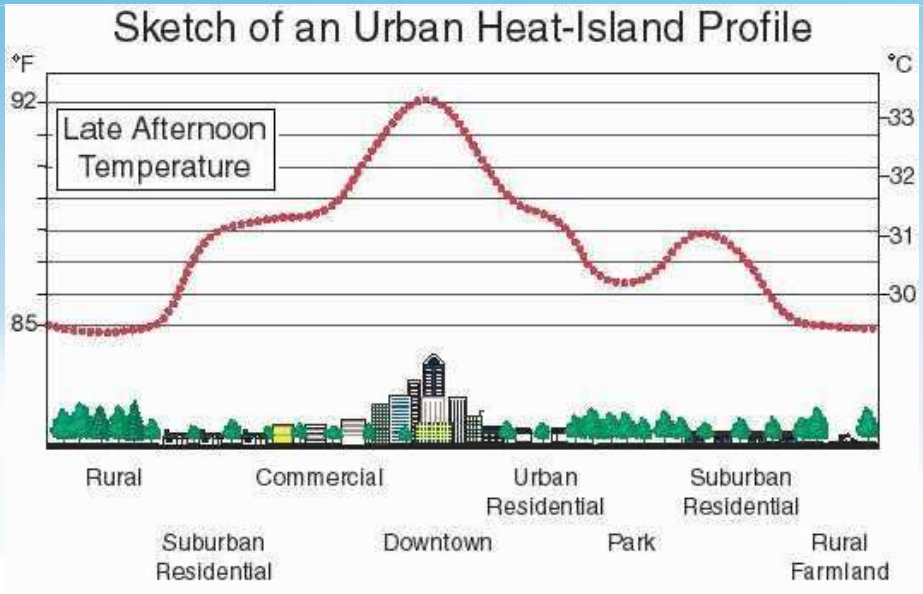
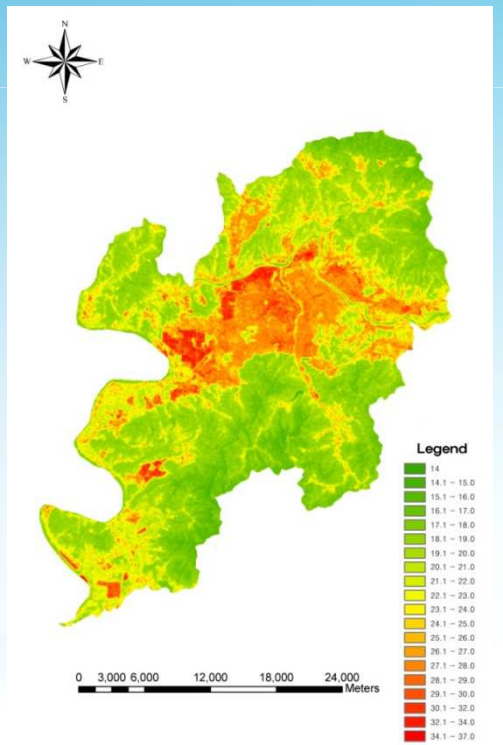
I What is Urban Micro-Climate ?

1. What is Urban Micro-Climate ?

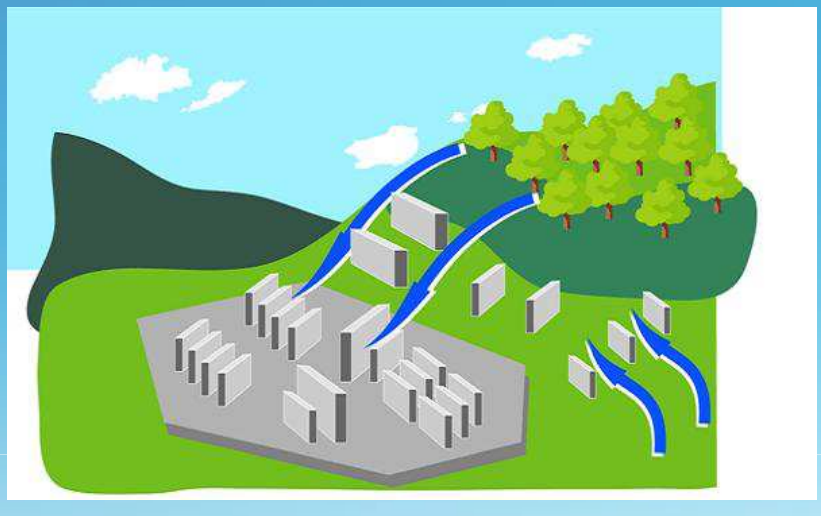
1) Climate near on the Ground → under 60m Height

2) *Temperature*, *Wind Condition* and *Pollutant Diffusion* according to Topography, Land Cover and Local Surroungings





2. Wind Corridor as Urban Micro- Climate

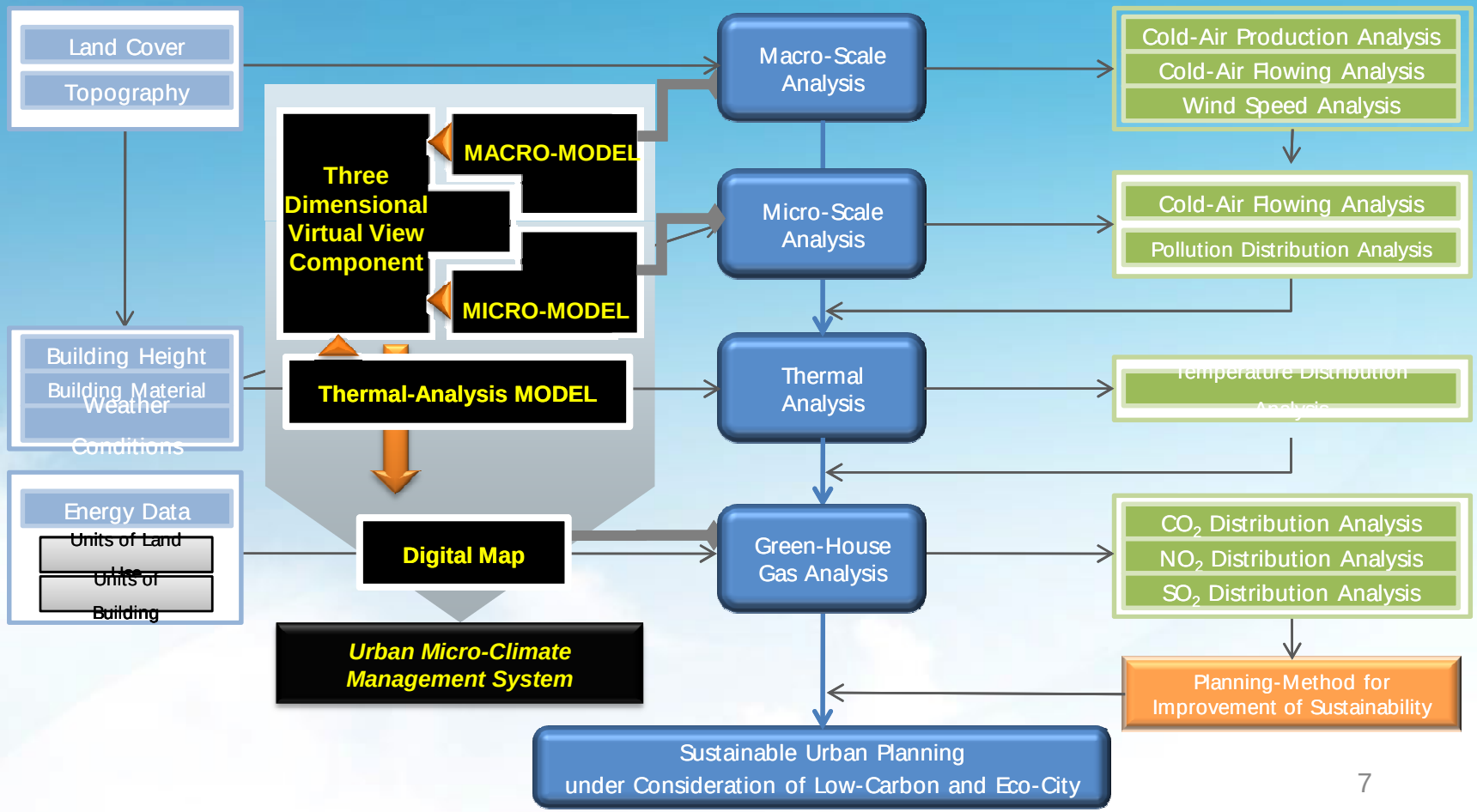


II UMcMS Concept and GUI

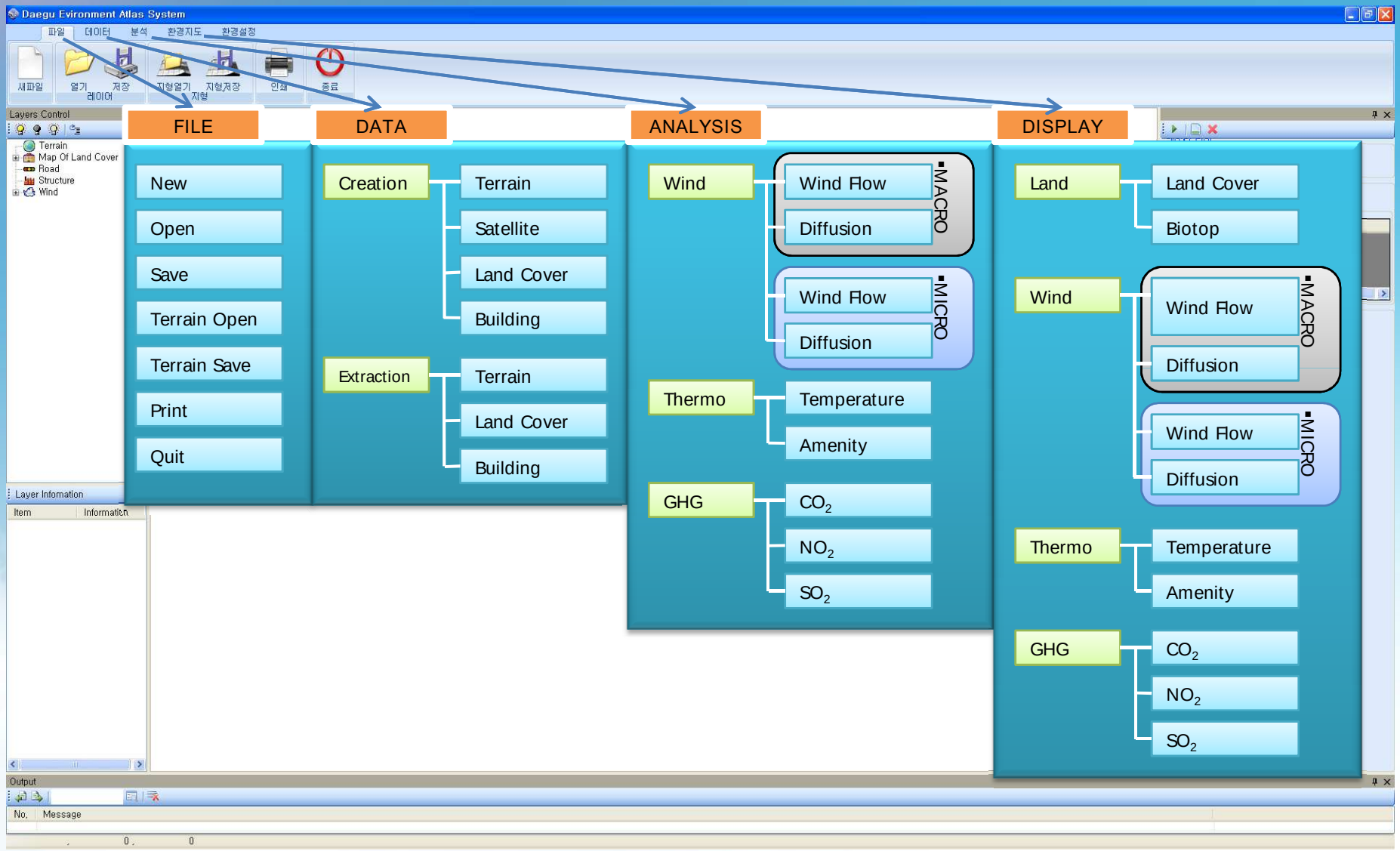
(Urban Micro-Climate Management System)

1. System Concept

1) 3D Virtual View Component with Macro- and Micro scale Analysis Model & Thermal- Analysis Model

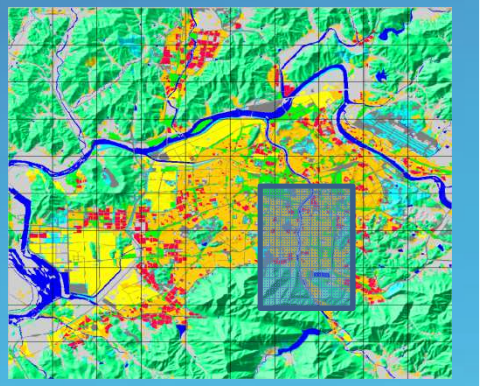


2. System GUI


Daegu Evironment Atlas System
파일
데이터
분석
환경지도
환경설정
새파일
열기
저장
지형열기
지형저장
인쇄
종료
레이어
지형
Layers Control
Terrain
Map Of Land Cover
Road
Structure
Wind
Layer Infomation
Item
Information
Output
No.
Message
FILE
New
Open
Save
Terrain Open
Terrain Save
Print
Quit
DATA
Creation
Terrain
Satellite
Land Cover
Building
Extraction
Terrain
Land Cover
Building
ANALYSIS
Wind
Wind Flow
Diffusion
MACRO
Wind Flow
Diffusion
MICRO
Thermo
Temperature
Amenity
GHG
CO_2
NO_2
SO_2
DISPLAY
Land
Land Cover
Biotop
Wind
Wind Flow
Diffusion
MACRO
Wind Flow
Diffusion
MICRO
Thermo
Temperature
Amenity
GHG
CO_2
NO_2
SO_2

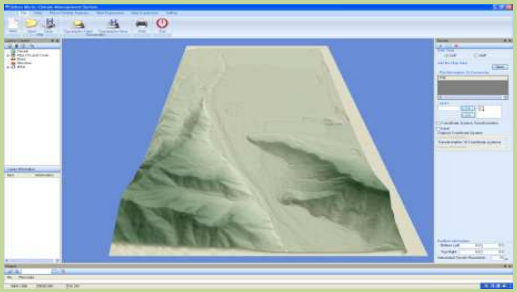
III System Workflow & Pilot Study

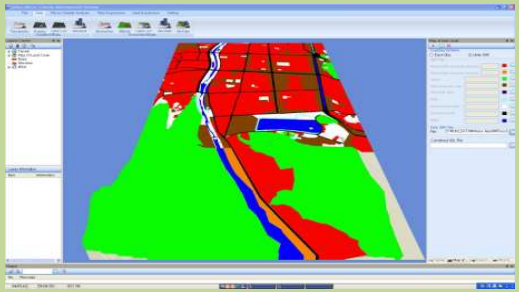
1. System Workflow

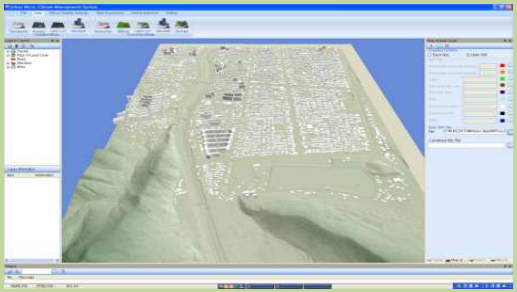


1) Cold Wind Flow Analysis (Macro Scale)

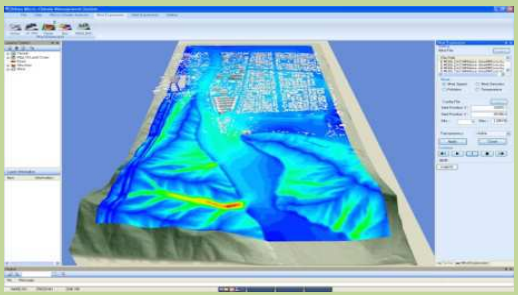
- Case Area : Jung-Gu and Nam-Gu in Daegu

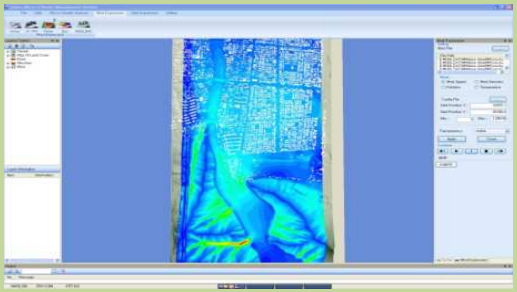






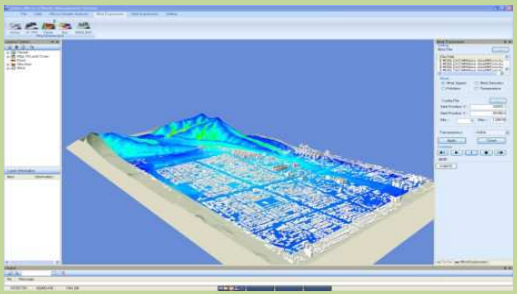
▼ VP-S





▲ Top-View

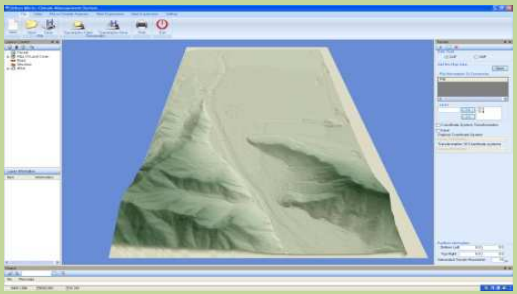
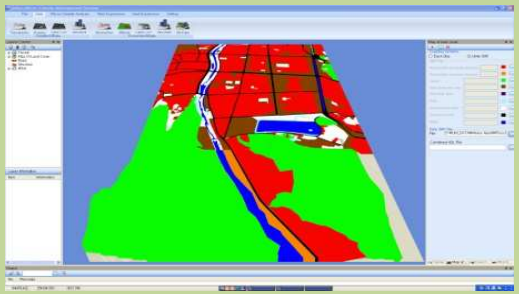
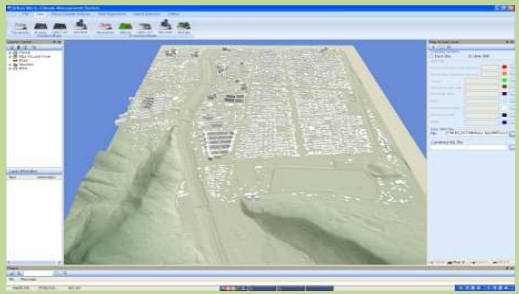
▼ VP-NE



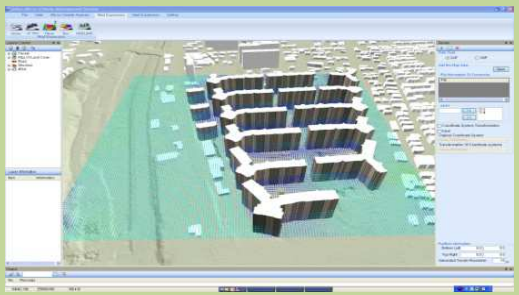
1. System Workflow

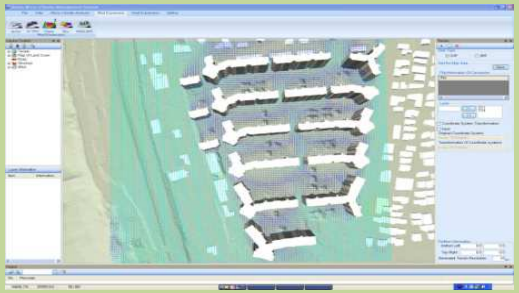
2) Cold Wind Flow Analysis (Micro Scale)

- Case Area : High-rise APT District in Nam-Gu, Daegu

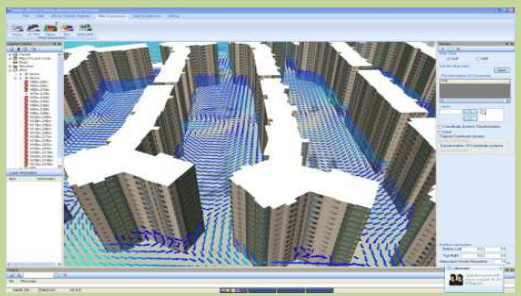
▾ VP-S





▲ Top-View

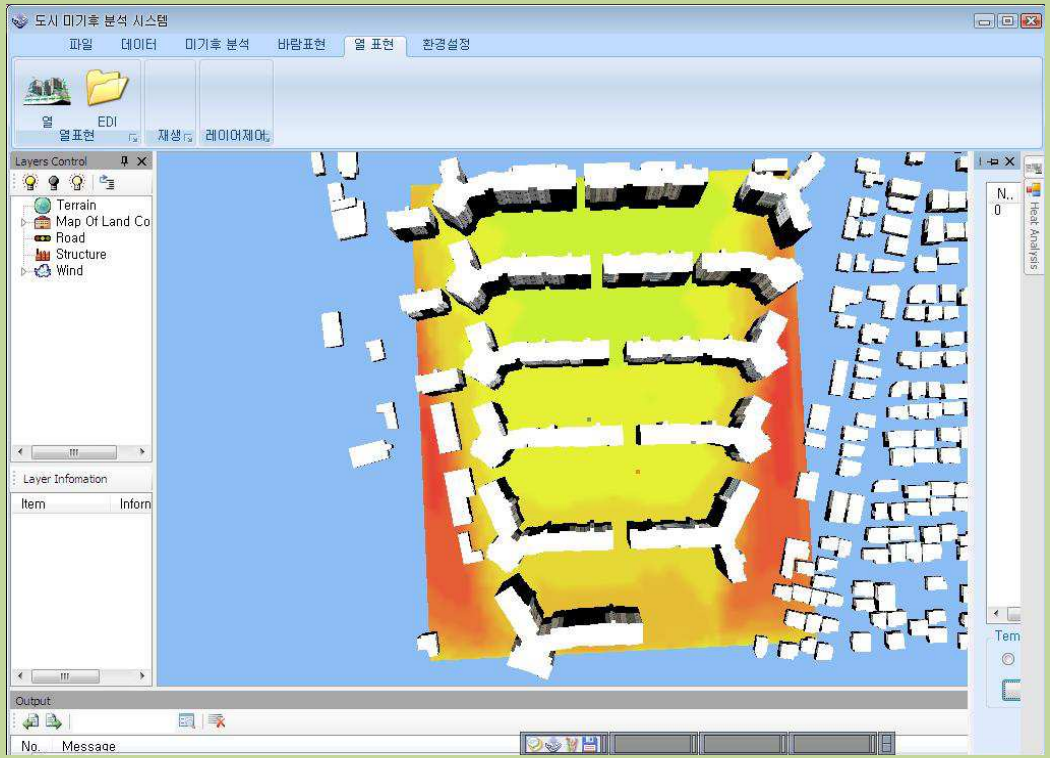
▾ VP-Center



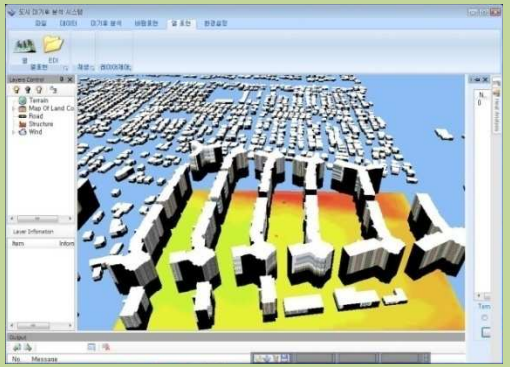
1. System Workflow

3) Thermal Analysis (Micro Scale)

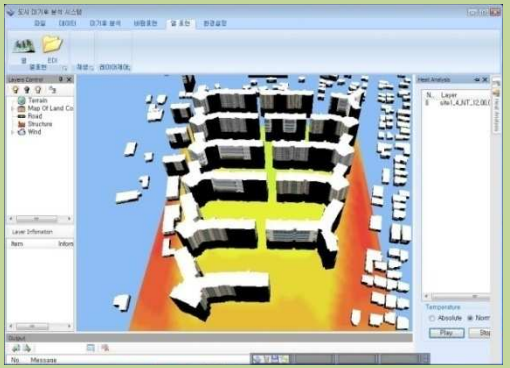
- Case Area : High-rise APT District in Nam-Gu, Daegu



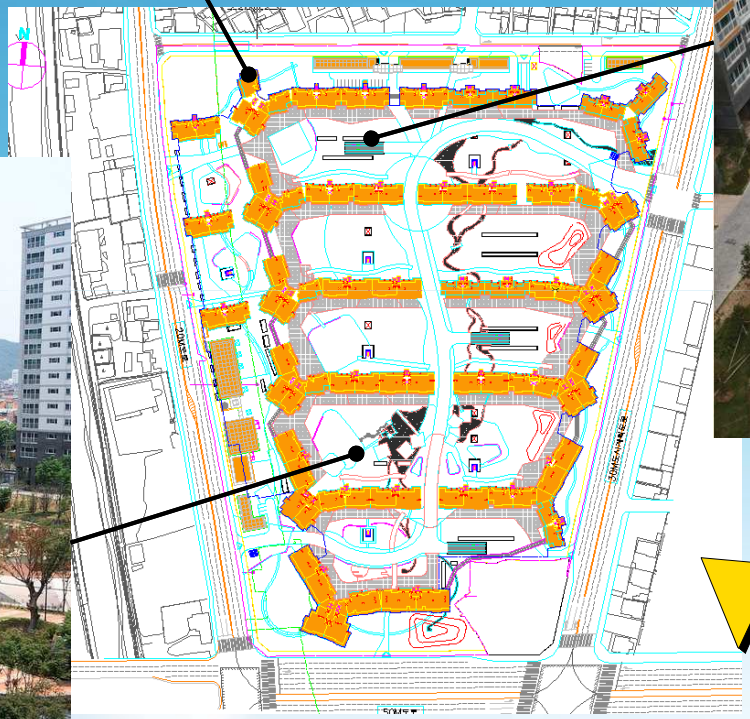
▲ Top-View



▲ VP-Center



▲ VP-S

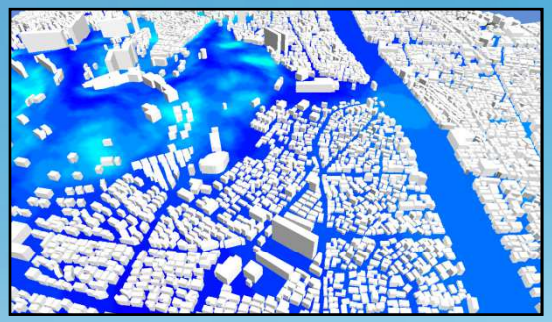


2. Pilot Study with UMcMS

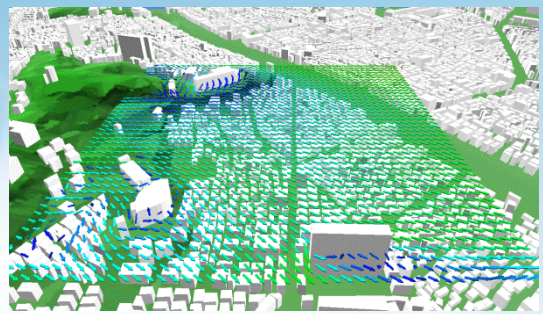
City Area : 501.34 km²
Population : 1,433,640

1) Evaluate Micro-Climate according to Planning Factors

- Study Area : Nam-Gu in Gwangju City, Korea

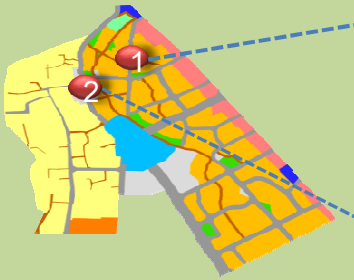


▲ Macro Simulation



▲ Micro Simulation

▼ Micro-Climate Change according to Planning Factors(1)



KEY MAP

1 Traditional Theme-Street

- Ave. Wind 0.6㎧ ↑
- Ave. Temp 0.4℃ ↓

Wind (m/s)

사업전	0.87㎧
사업후	1.47㎧

Temp.(℃)

사업전	26.8℃
사업후	26.4℃

2 Streamlet-Street

- Ave. Wind 0.12㎧ ↑
- Ave. Temp. 0.3℃ ↓

Wind (m/s)

사업전	1.13㎧
사업후	1.25㎧

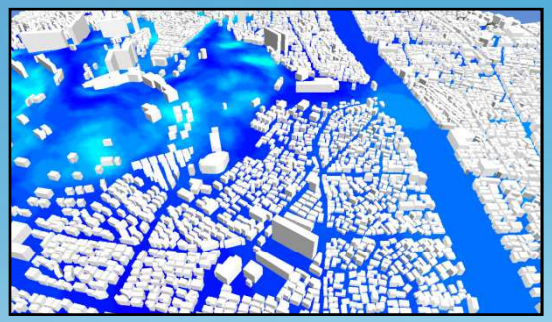
Temp.(℃)

사업전	26.6℃
사업후	26.3℃

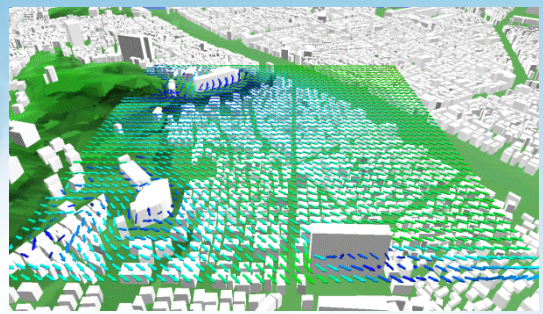
2. Pilot Study with UMcMS

1) Evaluate Micro-Climate according to Planning Factors

- Study Area : Nam-Gu in Gwangju City, Korea

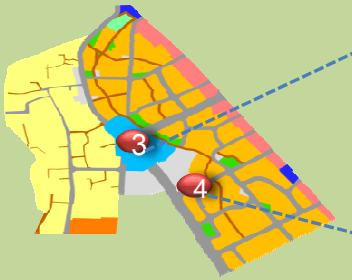


▲ Macro Simulation



▲ Micro Simulation

▼ Micro-Climate Change according to Planning Factors(2)



KEY MAP

3 Central Square

- Ave. Wind 0.26㎧ ↑
- Ave. Temp. 1.0℃ ↓

Wind (m/s)

사업전	1.2㎧
사업후	1.46㎧

Temp.(℃)

사업전	26.8℃
사업후	25.8℃

4 Traditional Parking-lot

- Ave. Wind 0.18㎧ ↑
- Ave. Temp. 0.3℃ ↓

Wind (m/s)

사업전	1.04㎧
사업후	1.22㎧

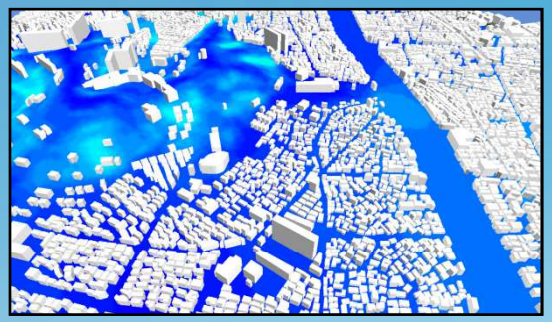
Temp.(℃)

사업전	26.6℃
사업후	26.3℃

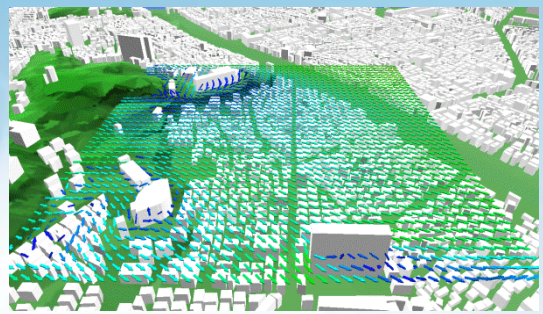
2. Pilot Study with UMcMS

1) Evaluate Micro-Climate according to Planning Factors

- Study Area : Nam-Gu in Gwangju City, Korea

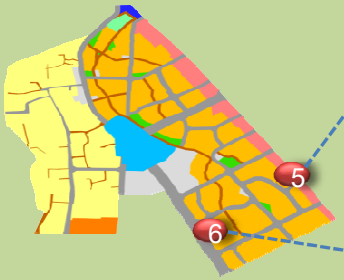


▲ Macro Simulation



▲ Micro Simulation

▼ Micro-Climate Change according to Planning Factors(3)



KEY MAP

5 Waterfront Park

- Ave. Wind 0.99㎧ ↑
- Ave. Temp. 0.7℃ ↓

Wind (m/s)

사업전	0.36㎧
사업 수	1.35㎧

Temp.(℃)

사업전	26.9℃
사업 수	26.2℃

6 Pocket Park

- Ave. Wind 0.77㎧ ↑
- Ave. Temp. 0.7℃ ↓

Wind (m/s)

사업전	0.34
사업 수	1.11

Temp.(℃)

사업전	27.0℃
사업 수	26.3℃

IV Conclusion for Low Carbon and Eco-City

Conclusion

- Urban Micro-Climate Management for Low Carbon and Eco-City
  - Land Cover
    - ① More natural Cover, less artificial Cover
  - Building
    - ① Material
    - ② Type and Allocation
  - Networking
    - ① Green Network
    - ② Blue Network
    - ③ White Network

Conclusion

- Future Planning for System Improvement
  - Functions Supplement
    - ① GHG(CO_2, CH_4) Analysis and Display Function
    - ② Quantitative Comparison Function
  - Reliability Improvement
  - System Stabilization

- System Application
  - For Using for Low-Carbon Green Growth Policy
  - For Creating of Environmental Atlas for Climate Change Adaption
  - For Improvement of Citizens Well-being
  - For Sustainability of Urban Development


Thank you for your attention !