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Challenge for Cool City Tokyo, Osaka

Short introduction of there estimated goal and the achievements of demonstration projects

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Topics

- Policies & programs to promote Cool cities
- Heat Island effect simulations(before/after counter measure)
- How Tokyo and Osaka planed and promoting demonstration projects

• Policies & strategy to promote Cool cities

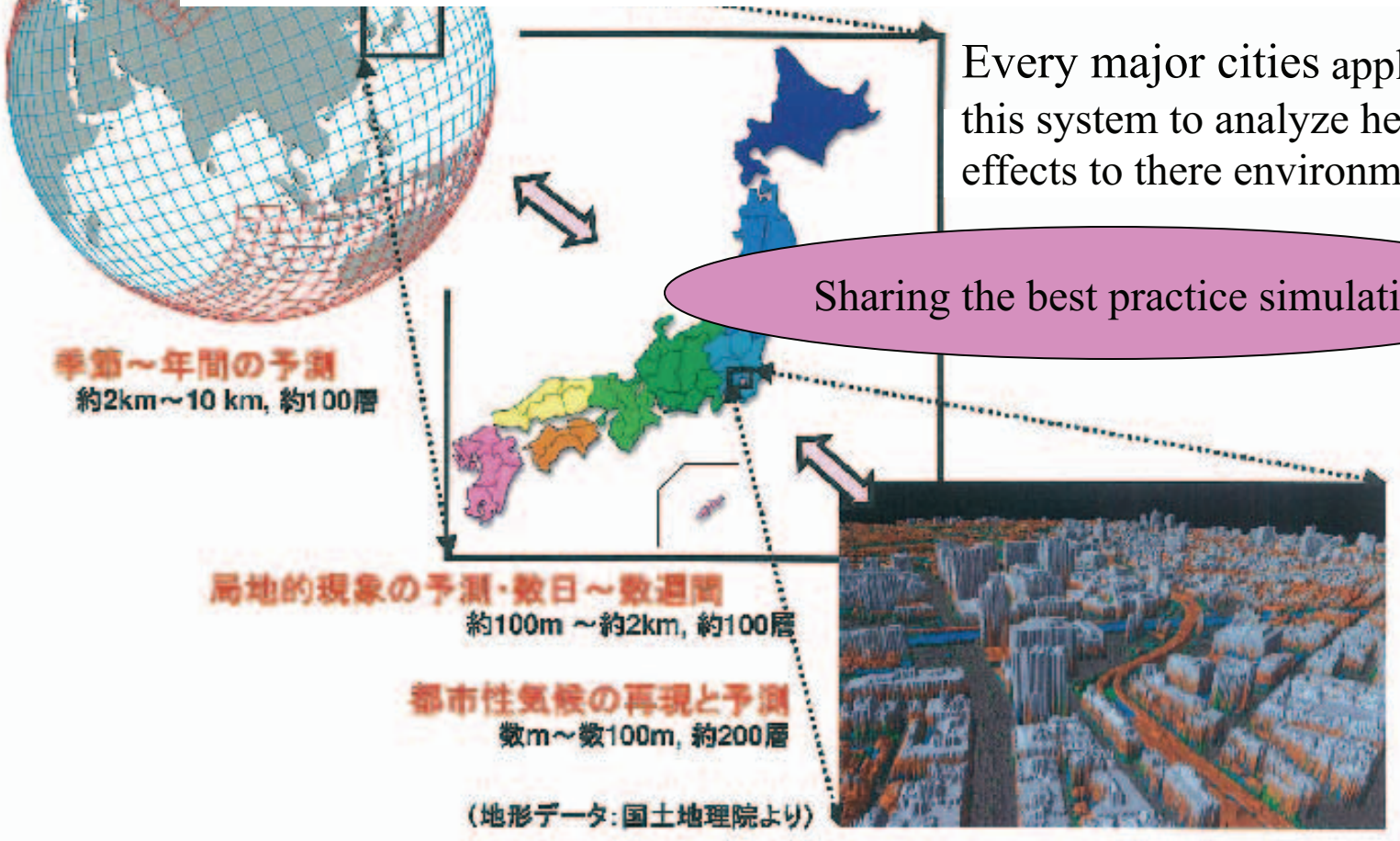
•Heat-island effect was defined as a kind of Heat pollution by Ministry of environment in 2001 in Japan.

•General policy council has been organized for Anti-Heat island effect by 3 major ministries in 2003. (METI,MLIT,MOE)

•Preservation national low of urban green area: 2004
City code are widely introduced
Thanks to the Kyoto protocol ,Japanese people like green roof gardens

•Tax privileges
Related city regulations and agreements were proclaimed to encourage the individual land owners and building owners

Earth Simulator and Landsat data can tell us environmental changes from large area to a very small area even in building by building.

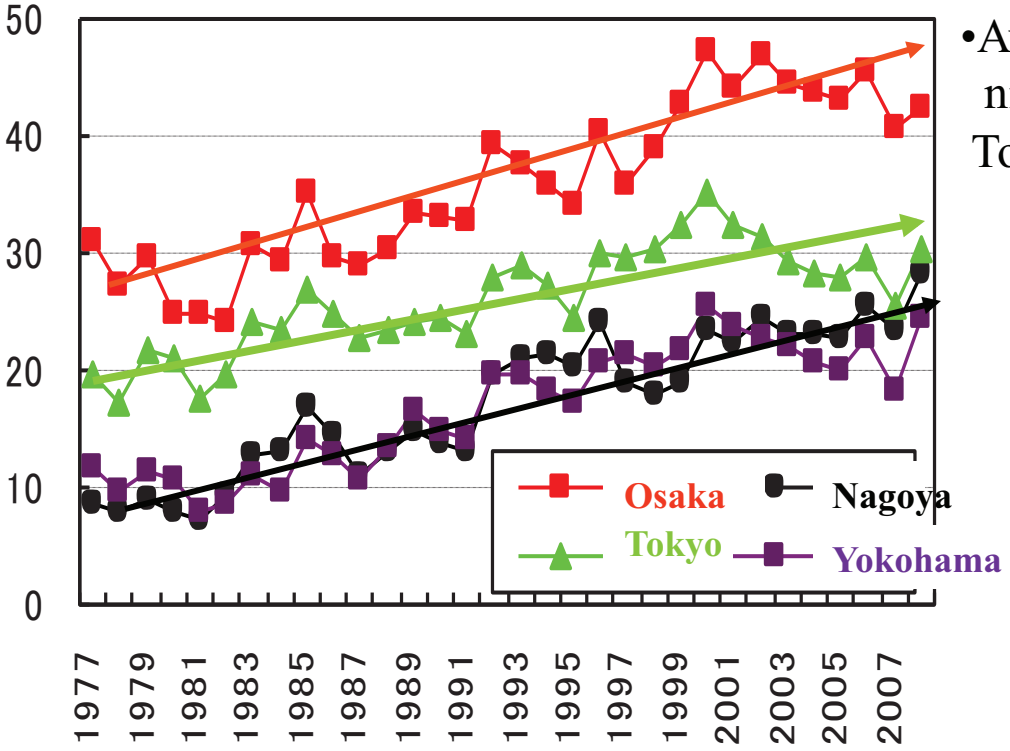


Every major cities applying this system to analyze heat-island effects to there environment.

Sharing the best practice simulation model

Landscape data from agency of Land & geography

Total Hot-air nights over 25℃ and there transition in major cities in Japan



- Osaka shows steep increase than other cities.
- Average Temperature of mid-summer night in Osaka is much higher than Tokyo(~2℃)

Data from Meteorological Agency

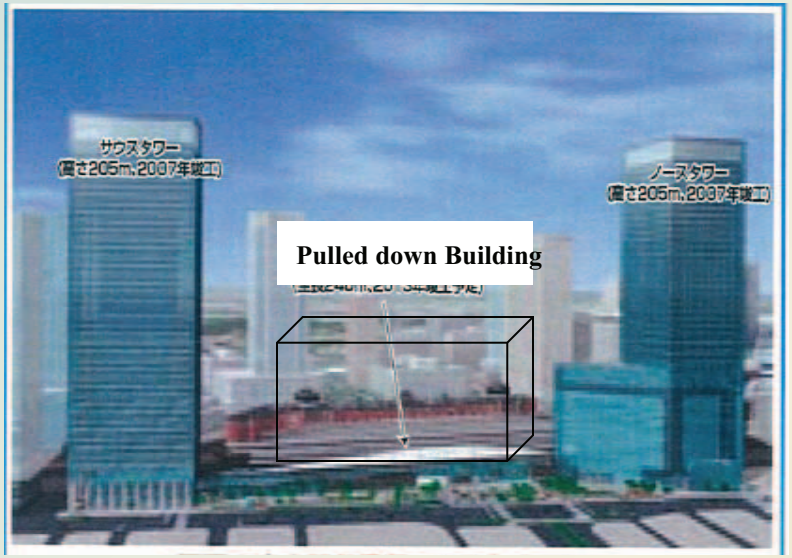
- Heat island measures area in Tokyo

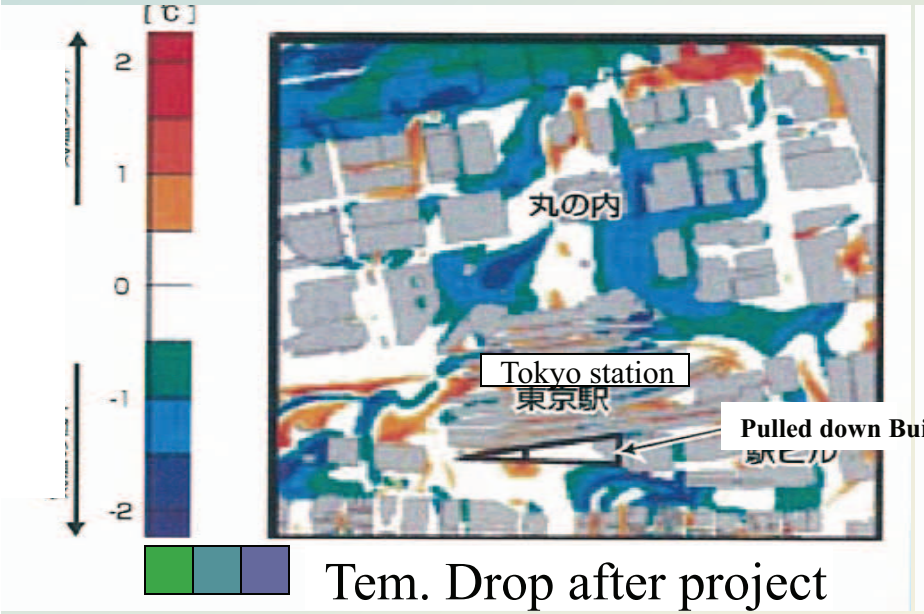
- 7wards for H-I effect countermeasures project area
- promotion area
- 23wards (Urban area of Tokyo city)

Data from 2008 Tokyo pref. Environmental agency report

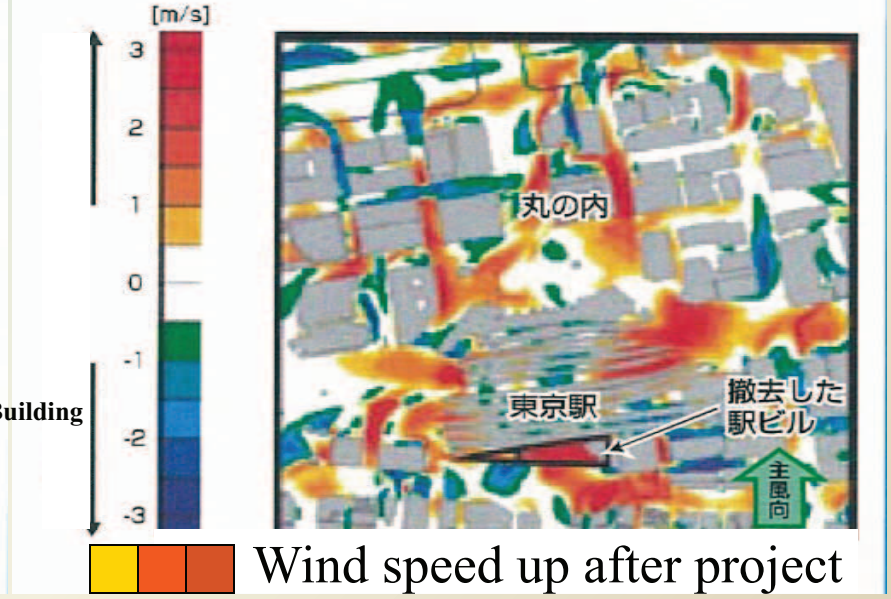
Wind-passage project in Tokyo station

- Pulled down the old building which blocked cool wind from Tokyo bay
- Build new 2 buildings like a gate pillars



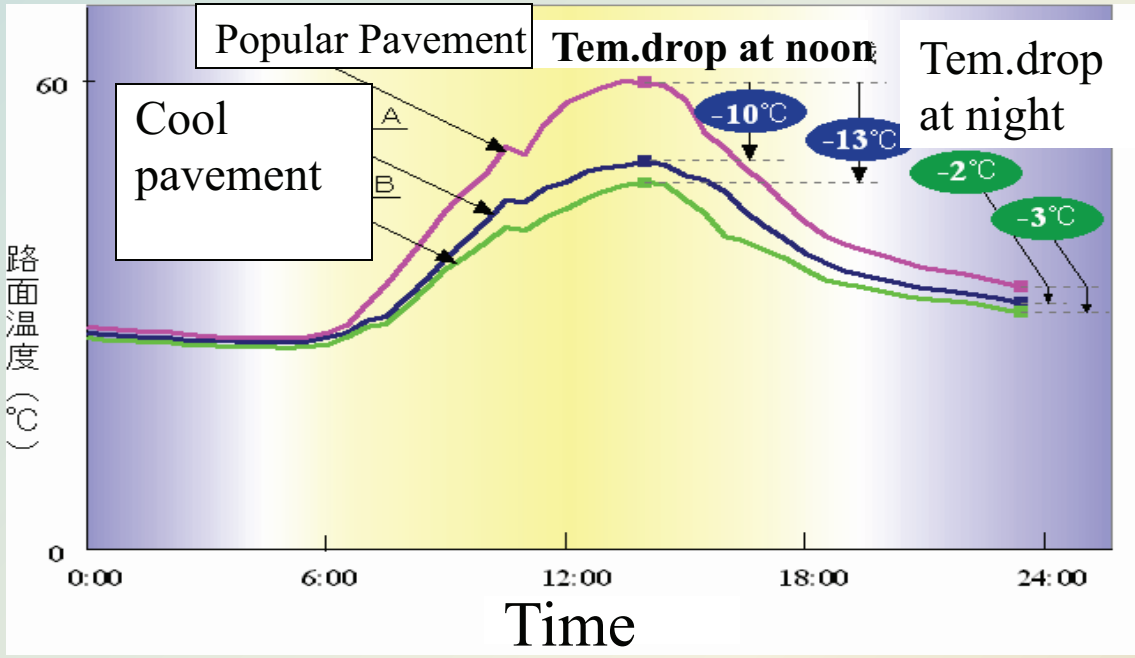


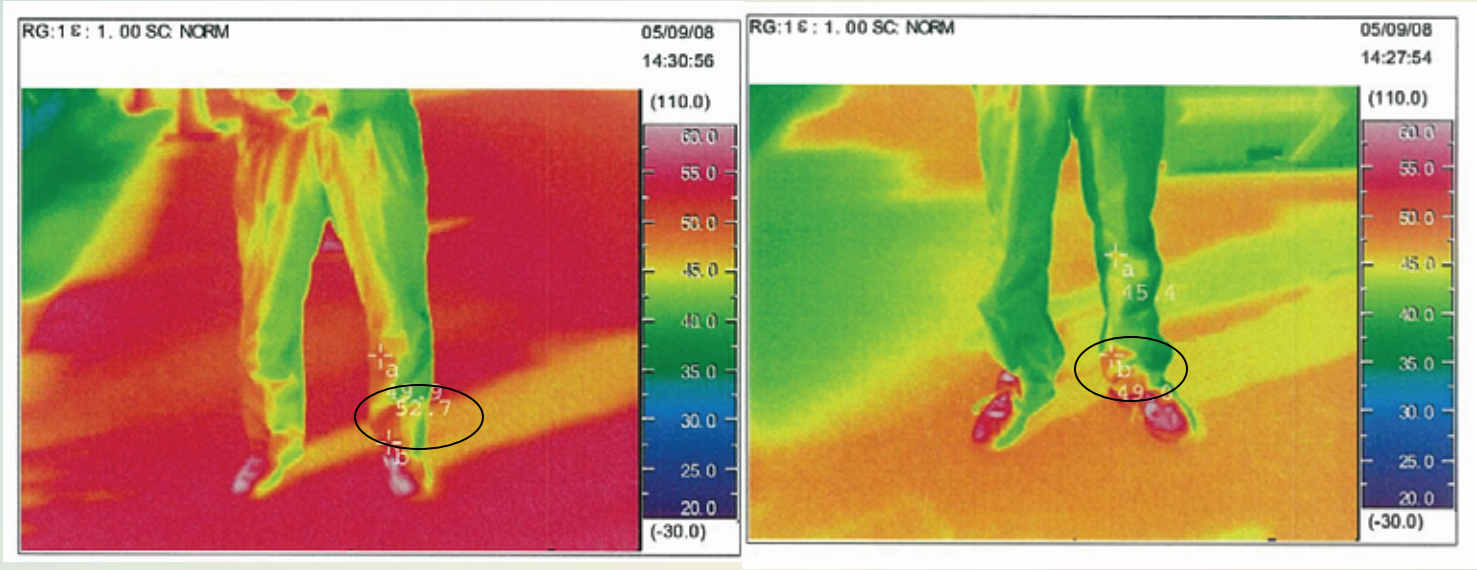
Tem. Drop after project



Wind speed up after project

• Cool pavement effect



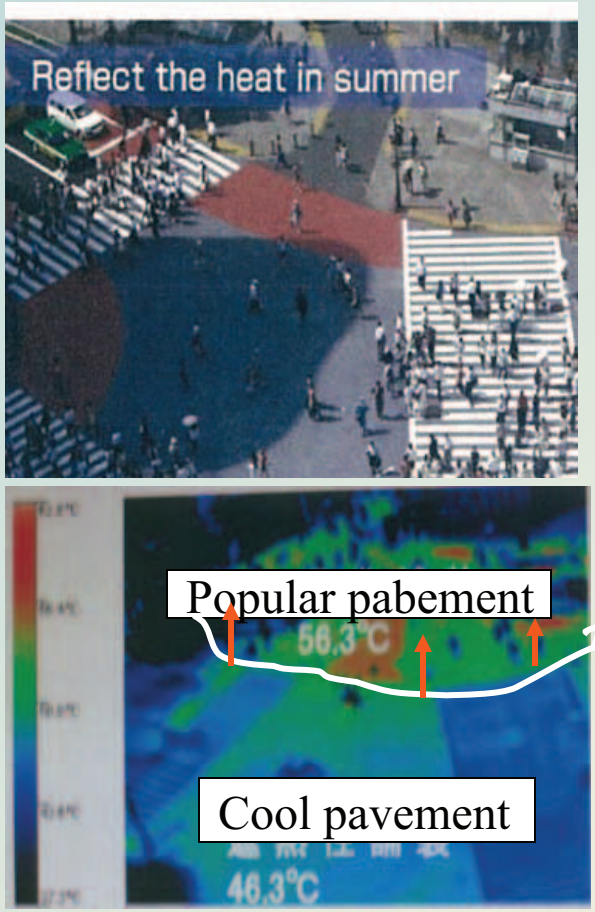


Porous asphalt pavement : 52.7℃) Cool pavement : 49.0℃)

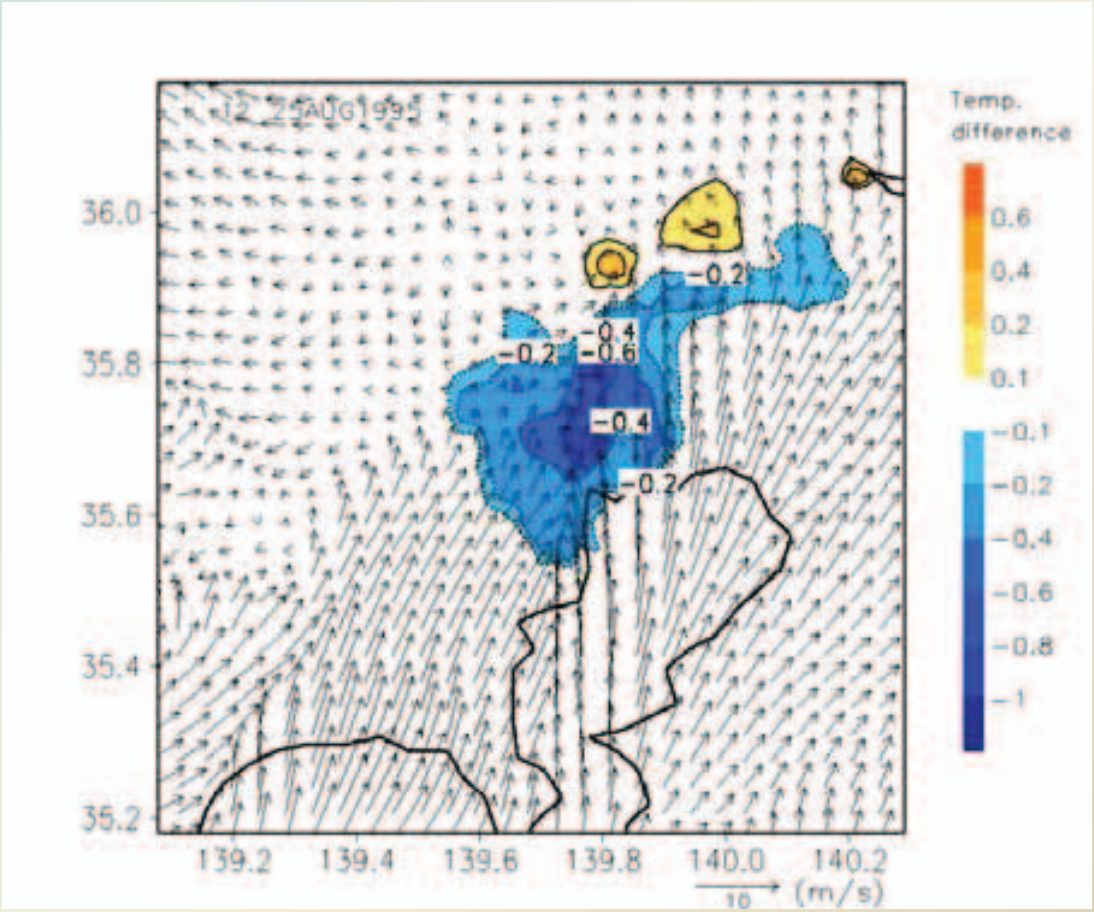
Tem. rise of pants surface after 10min. (-4℃)

Simulation result for targeted area in Tokyo

If we apply Cool pavement 100% for 23wards

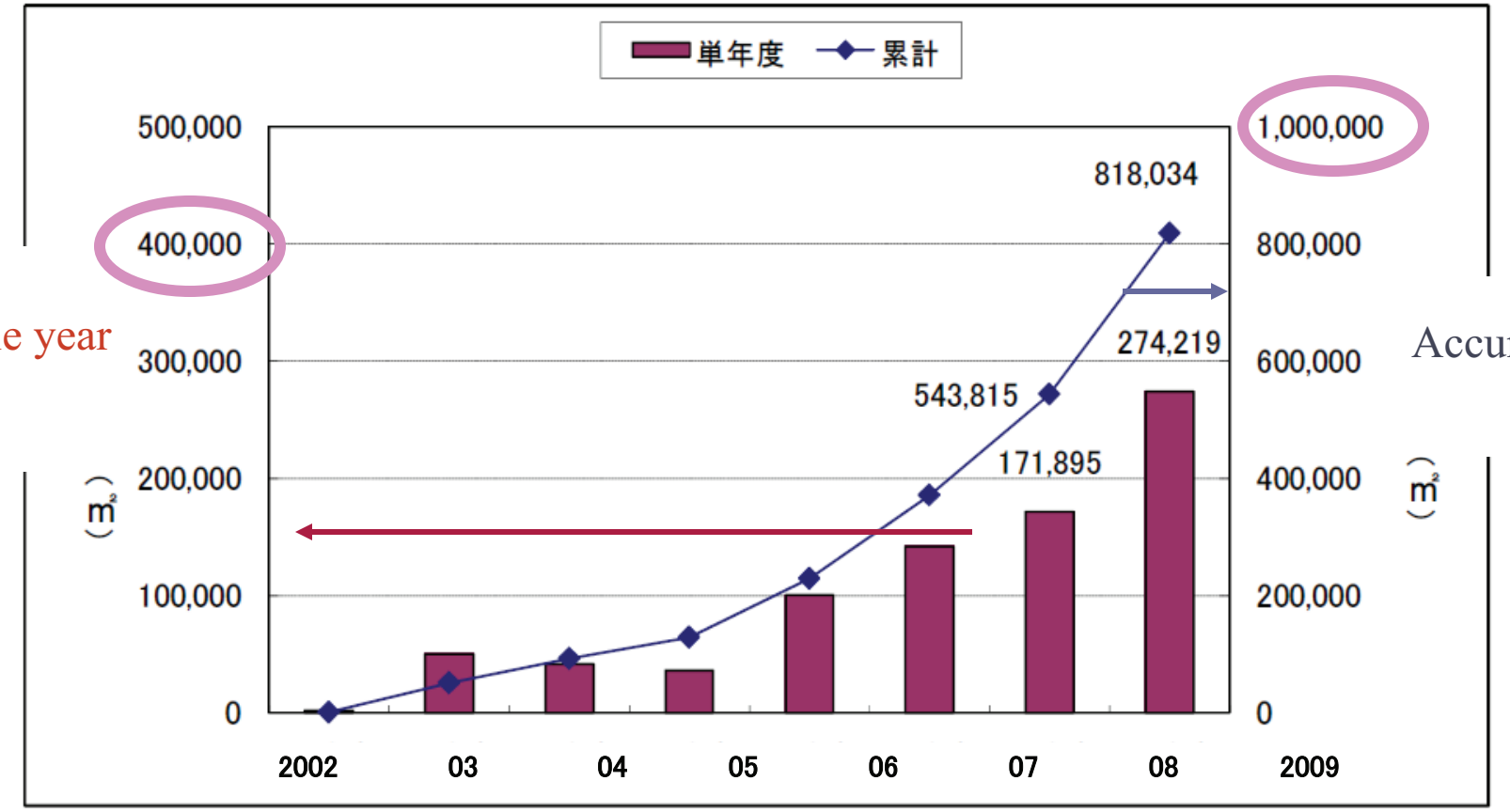


Pilot project at Shibuya
cross section -10℃



Data from 2010 Japan Cool pavement technical research council

Cool pavement application statistics in Japan

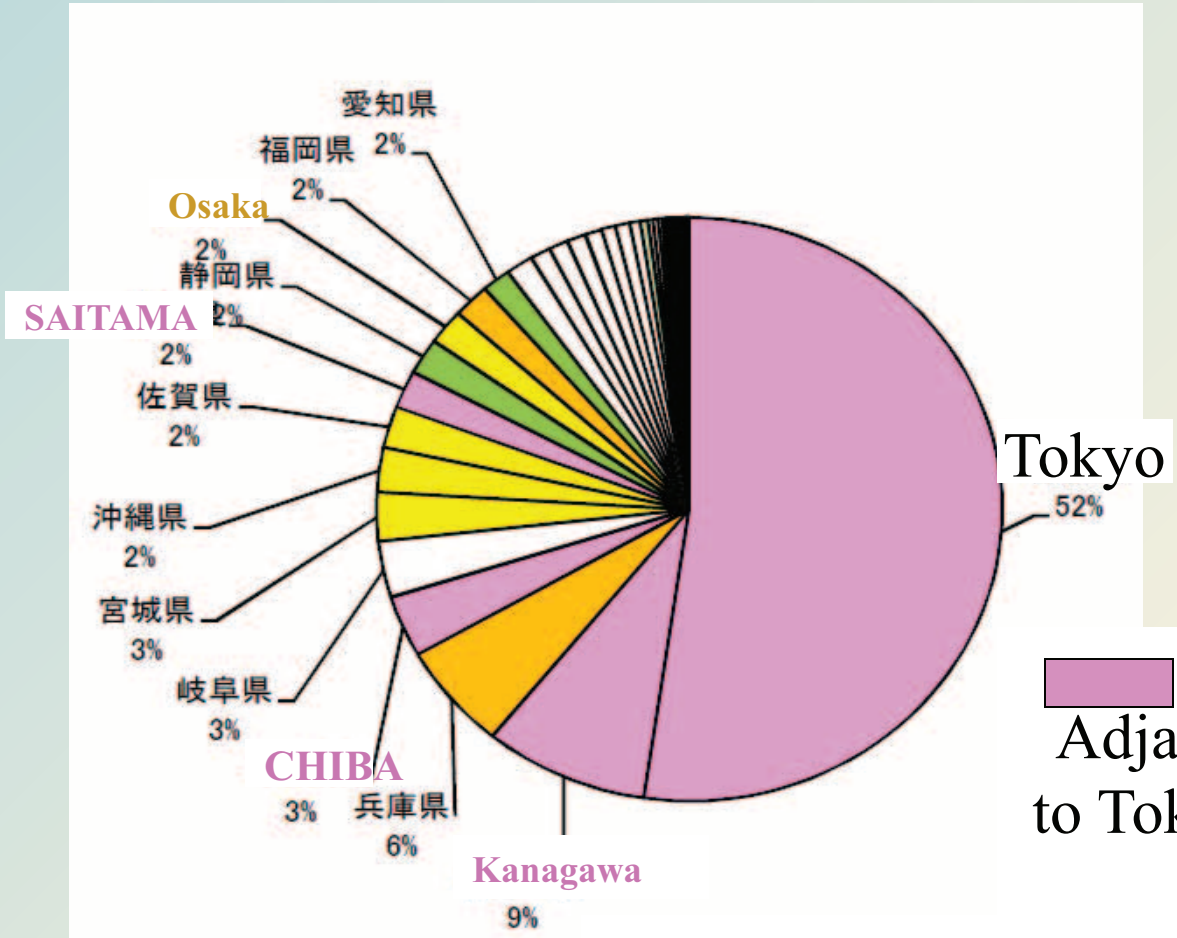


Single year

Accumlated

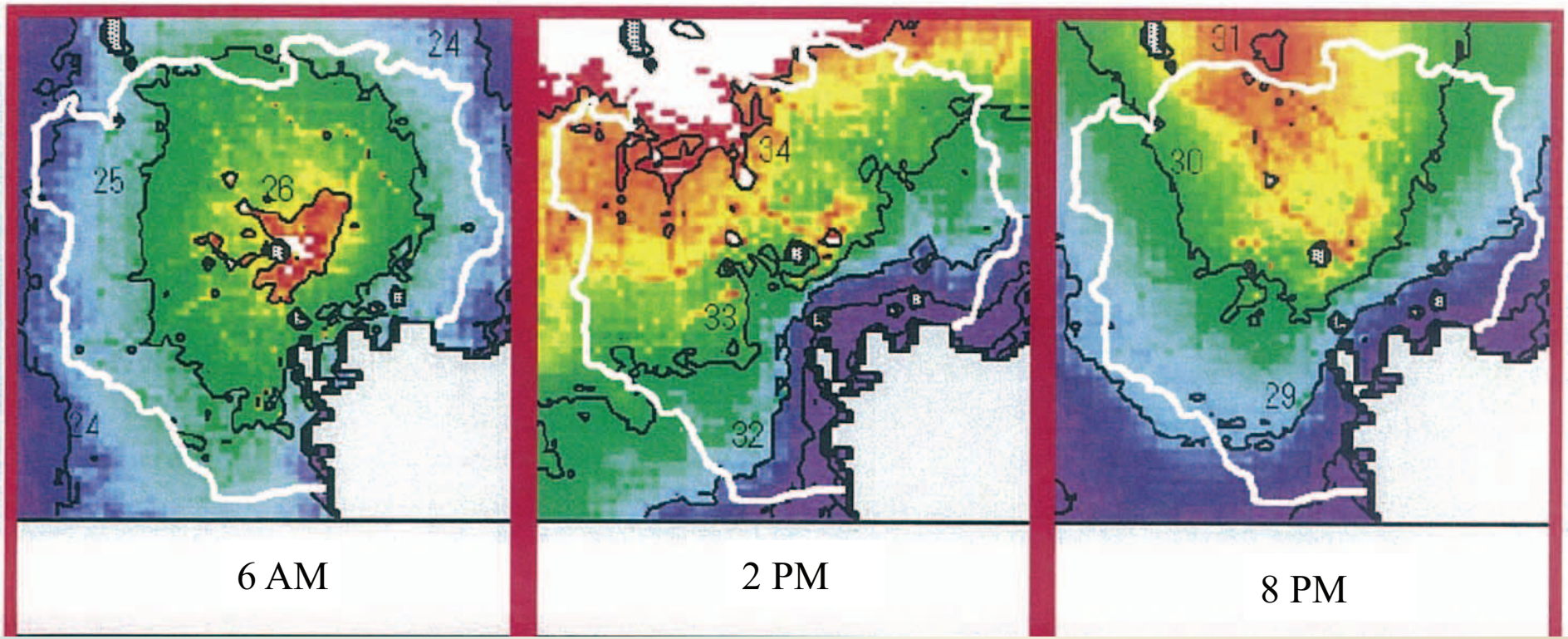
Data from 2010 Japan Cool pavement technical research council

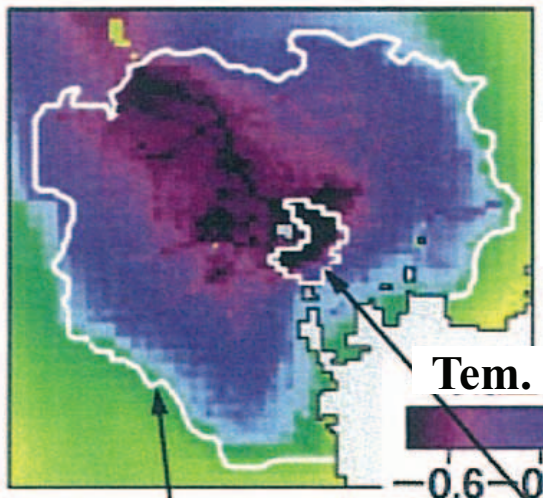
- Application area analysis in Japan (2003~2010 accumulated)



Data from 2010 Japan Cool pavement technical research council

• Heat accumulation in Tokyo city from 6am~ 8pm in mid summer





Tem.drop distributions in central Tokyo

Tem. drop

−0.6 −0.4 −0.2 0

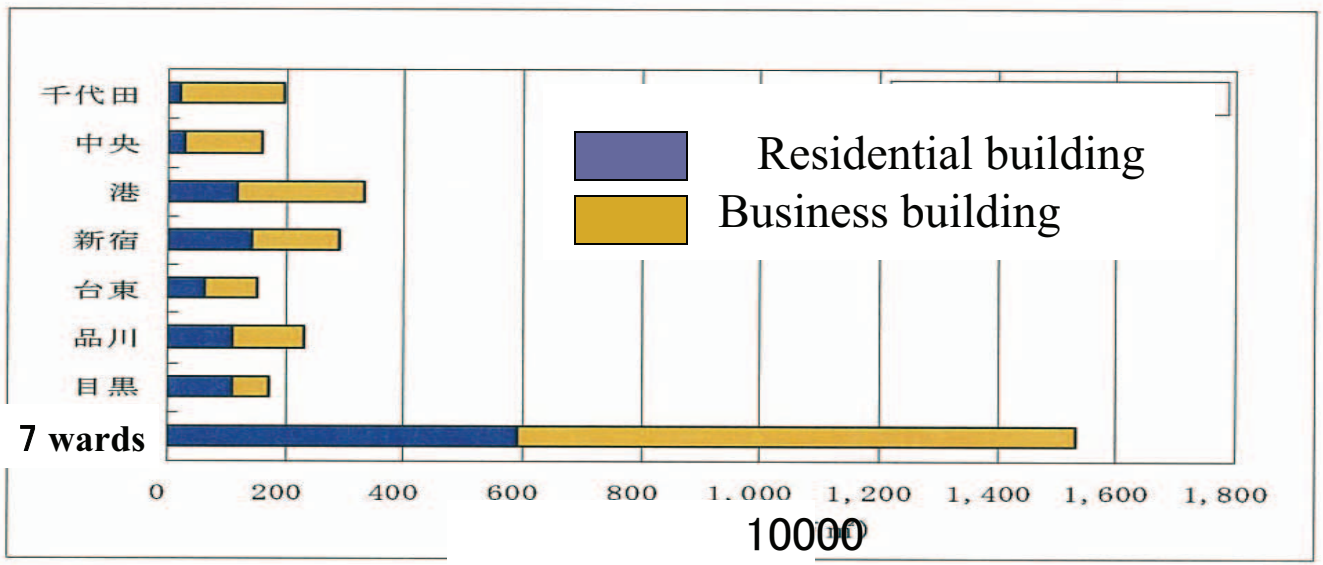
24wards area (620km²)

Core Area (16km²)

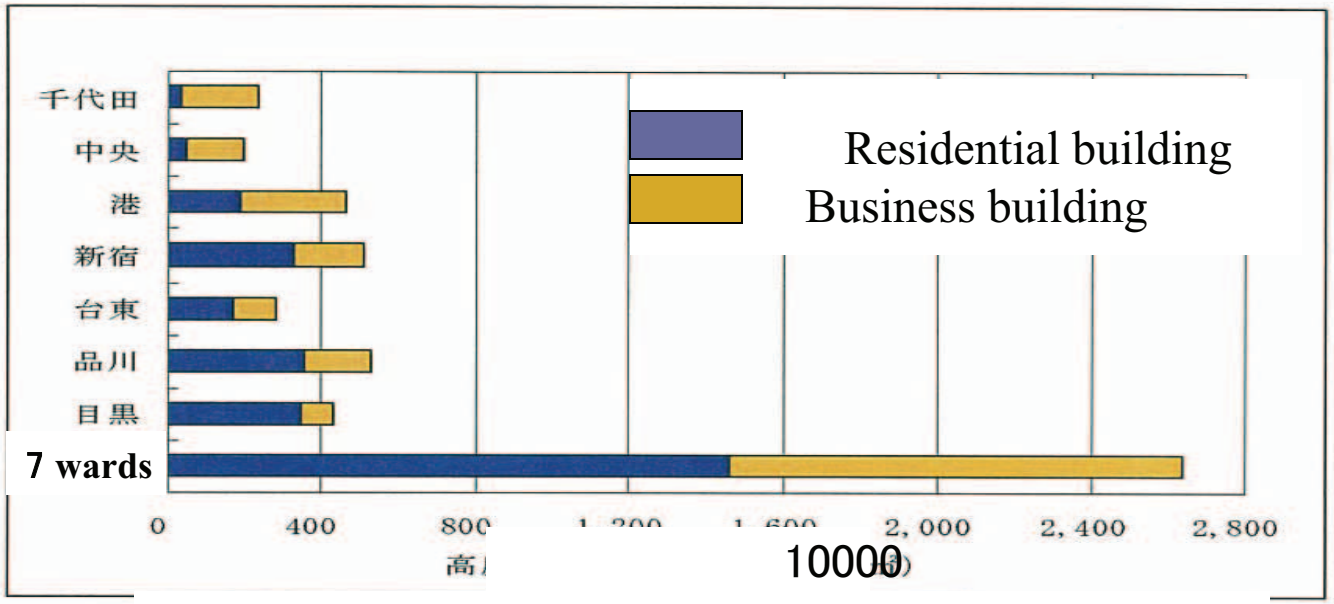
				Contribution %	
1)	Green planting	−0.20℃	−0.24℃	45.5	31.2
2)	Cool pavements	−0.01℃	−0.15℃	2.3	19.5
3)	Cool roof paint	−0.09℃	−0.09℃	20.4	11.7
4)	Cut Car Exhaust gas	−0.08℃	−0.15℃	18.2	19.5
5)	Cut building Heat	−0.06℃	−0.14℃	13.6	18.1
1)～5)	Total effects	−0.46℃	−0.78℃		

Simulation result after the total H-I countermeasures completion in 2040.

Data from 2008 Tokyo pref. Environmental agency report



Green plant applicable Building roof(estimated)



Cool roof applicable Building roof(estimated)

Data from 2008 Tokyo pref. Environmental agency report

- CO_2 Gas reduction (T/year) VS Two measures induction rate

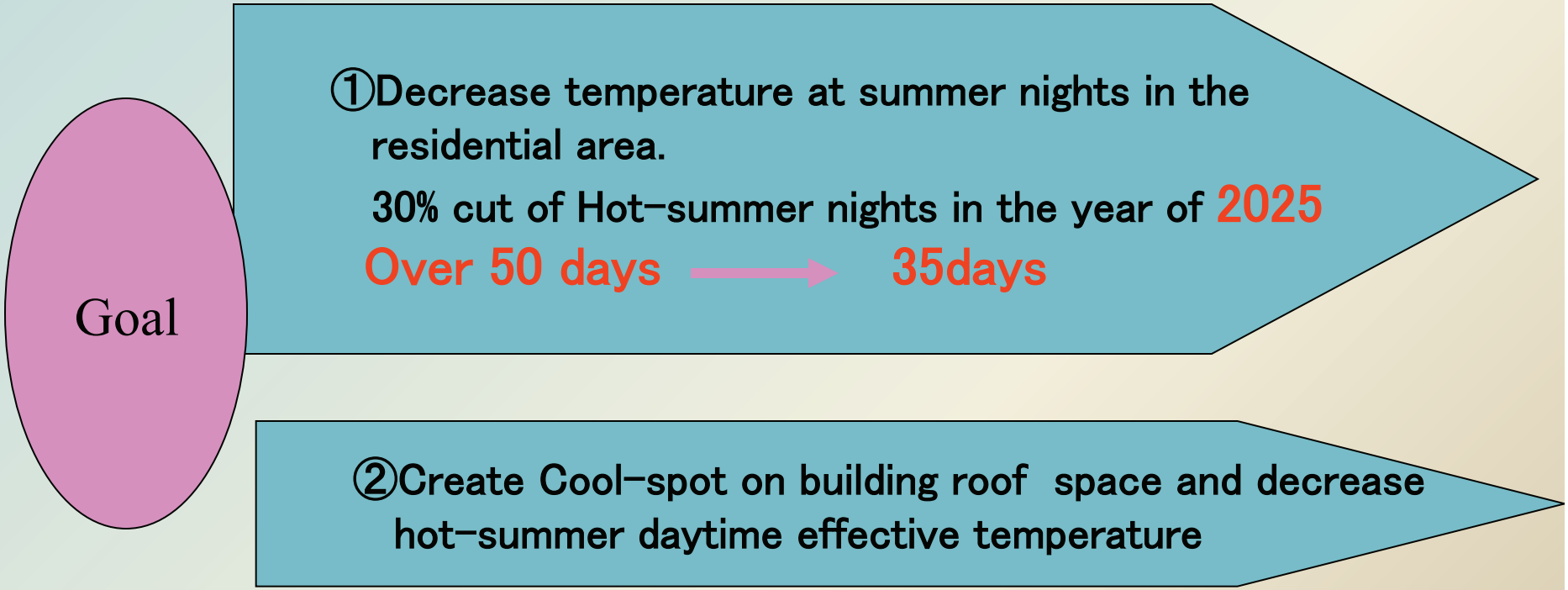
Spread rate / Method	Trial period (%) 0.04 0.11	3%	10%	30%	50%
Green planting Roof	33.7	2,395	7,983	23,948	39,913
Cool roof paint	56.0	1,518	5,061	1,5184	25,307

t / year (-CO_2)

Data from 2008 Tokyo pref. Environmental agency report

- Heat-island countermeasures in Osaka City

・ Heat-island promotion plan :2004 proclaimed



Source data: presentation of Osaka pref. Earth environment section

•Promotion of the countermeasures based on the regulations

Related regulations for large enterprise and building : 2006

1) Cut the exhaust heat from the factories

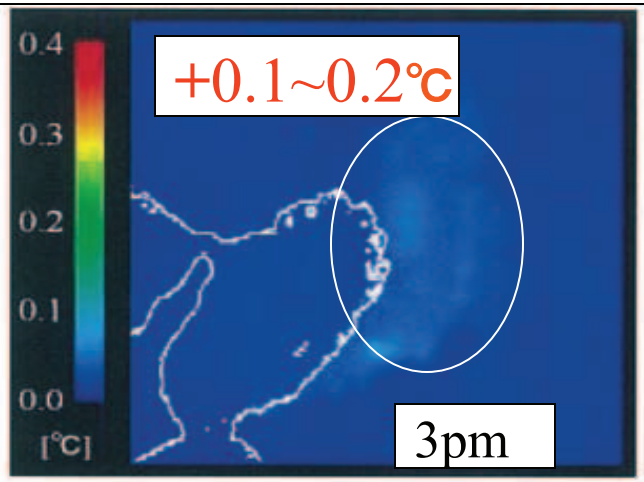
→ submit planning and result report

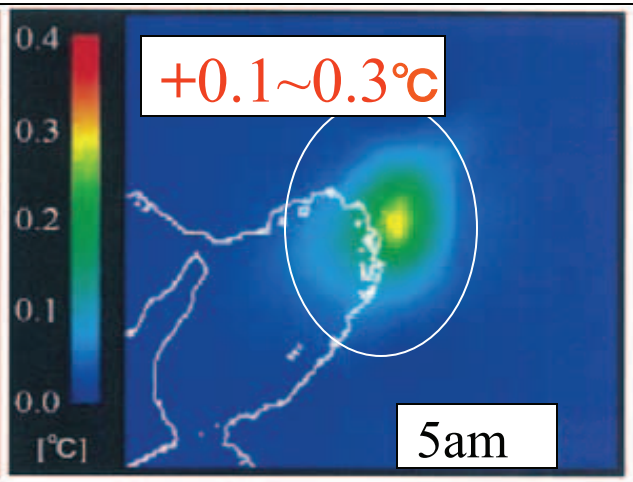
2) A preventive measure for heat accumulation from the building → submit planning report

3) Green planting for the building roof and its surroundings → submit planning report

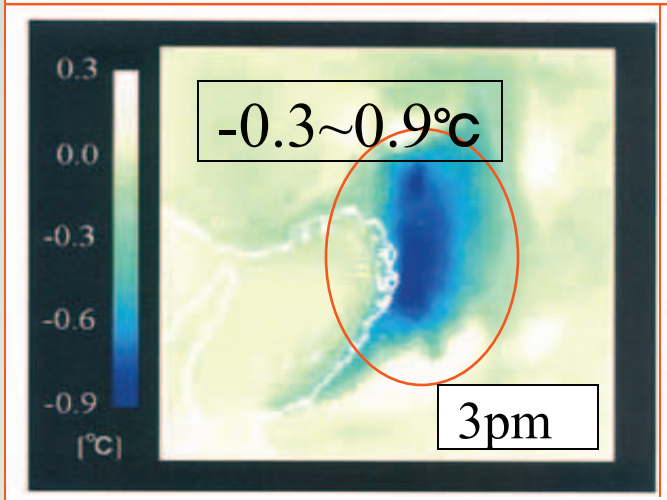
Source data: presentation of Osaka pref. Earth environment section

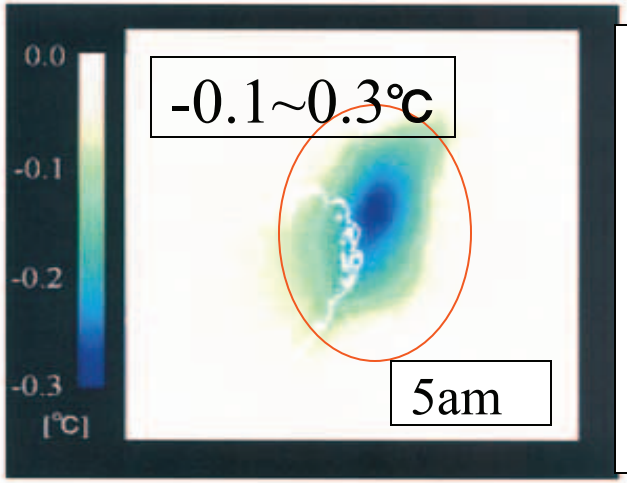
- Osaka H-I simulation results (2025 - 2010)





With out measure





After introduce mixed countermeasures

Building energy cut	−15%
Exhaust heat cut from Car & factory	−10%
Green planting for Land	+ 15%
for Building roof	+20%
Cool roof	**+60%**
Cool pavement 1	**+30%**
Cool pavement 2 (water penetration)	+20%

Source data: presentation of Osaka pref. Earth environment section