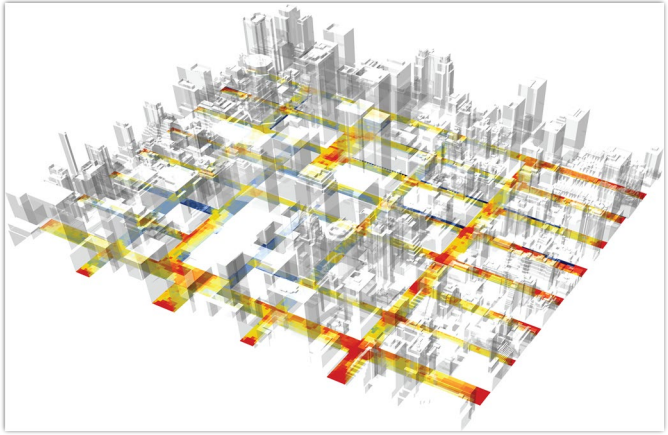
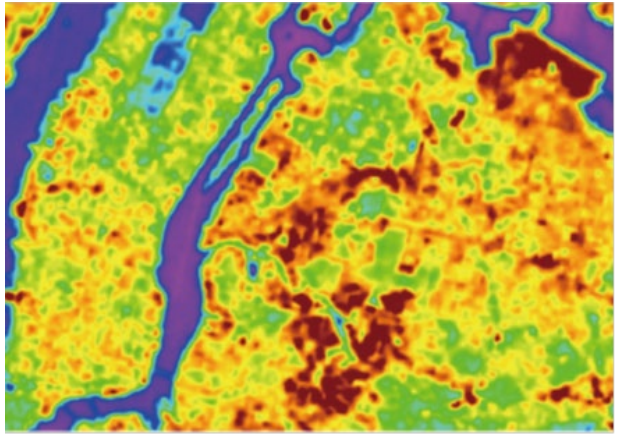
Cool District Hot City





From Climate Research to Climate Action

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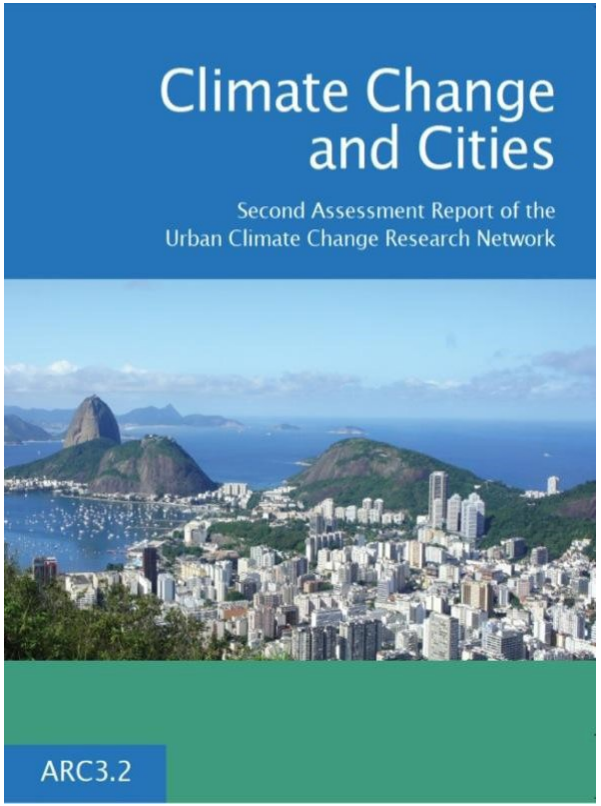
Climate Research to Climate Action

Integration Climate Adaptation (UHI) & Climate Mitigation (GHG)

The Urban Climate Change Research Network Second Assessment Report on Climate Change in Cities (ARC3.2)



Chapter 5: Urban Planning & Urban Design

This scholarship provides a blueprint for how to configure sustainable and climate-resilient urban districts.

Download publication:

www.UCCRN.org

Raven, J., Stone, B., Mills, G., Towers, J., Katzschner, L., Leone, M., Gaborit, P., Georgescu, M., and Hariri, M. (2018). Urban planning and urban design. In C. Rosenzweig, W. Solecki, P. Romero-Lankao, S. Mehrotra, S. Dhakal, and S. Ali Ibrahim (eds.), *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*, Cambridge University Press. New York. p.139-172.

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Climate Change, Global Urbanization, Equity

High Density Cities: Poor Local Climates

Cities: Our Challenge, Our Solution

Compact settlements reduce GHG emissions

Compact urban form contributes to GHG reduction

Low density areas contribute disproportionately to climate change

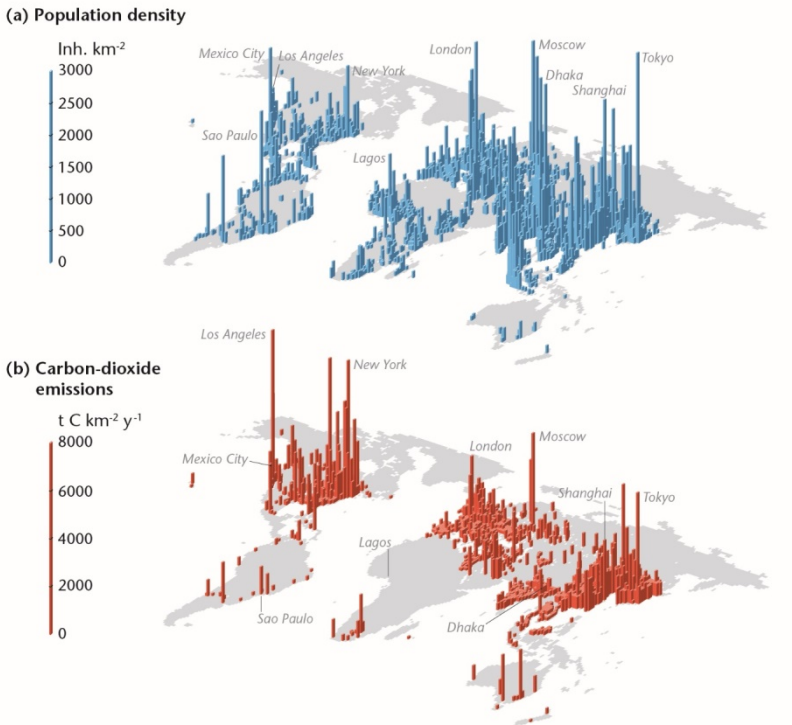
Urbanization amplifies climate change impacts

Global climate risk accumulates in urban areas due to increased concentration of people, private/public assets, and economic activities

→ Flood Risks

→ Urban Heat

Source: Mehrotraetal., 2011; Revietal., 2014



Each panel represents an entire metropolitan area (i.e., the city and the continuous urban footprint surrounding it), including often much lower-density suburbs.

Source: A. L. Brenkert, Oak Ridge National Laboratory (maps created by Andreas Christen, UBC)

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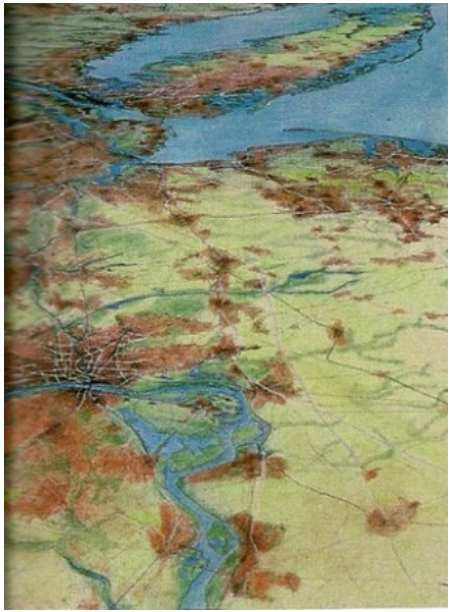
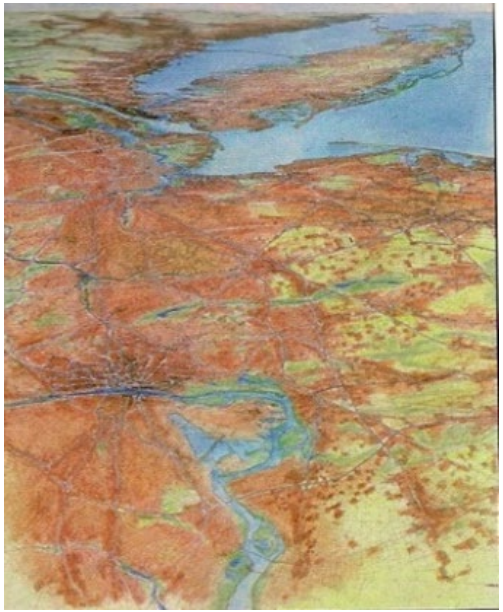
Regional vs Local Climate Impacts
The Case Against Sprawl

“Adaptive Mitigation” = Climate Change Adaptation + Climate Change Mitigation





Regional Plan Association

Reduce the global greenhouse gas effect, while increasing climate resilience to urban heat and flooding

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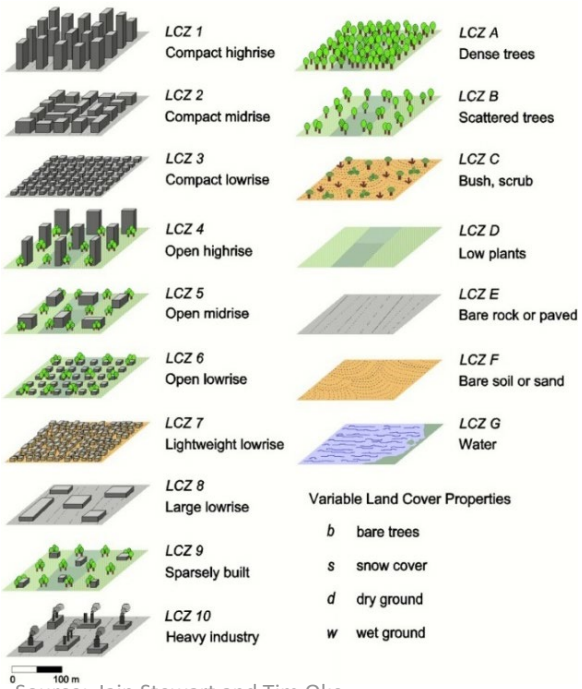
Land Cover, Form, and Spatial Scales

Human Comfort at Street Level

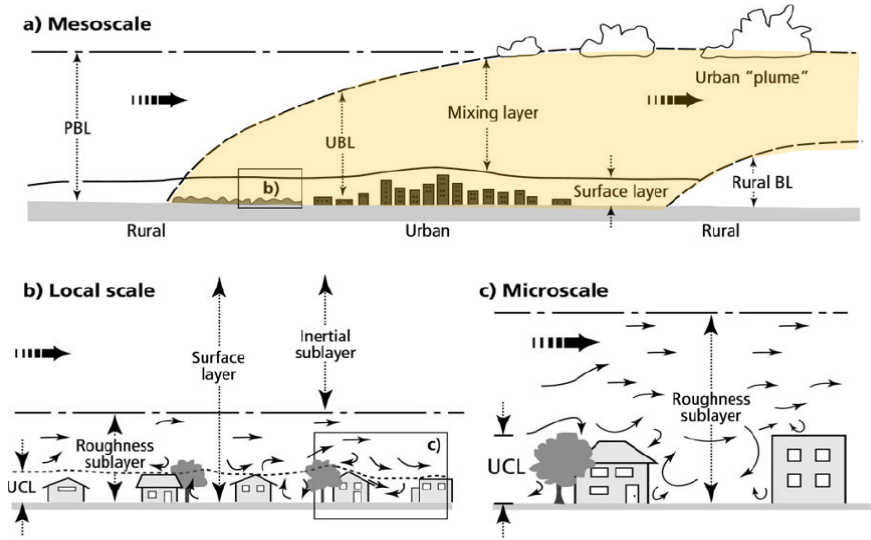
Local Climate Zones



Source: Iain Stewart and Tim Oke

- Building height
- Street width
- Vegetative cover
- Paved area

Atmospheric Layers



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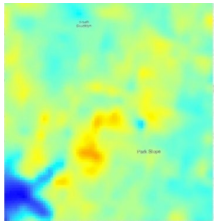
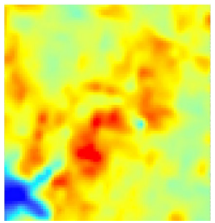
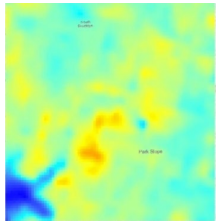
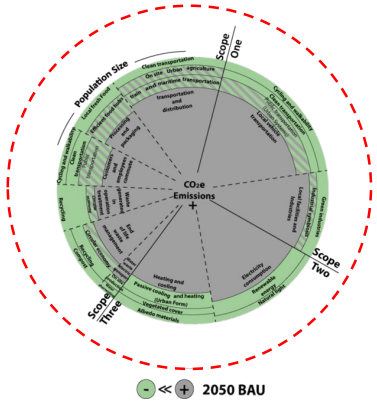
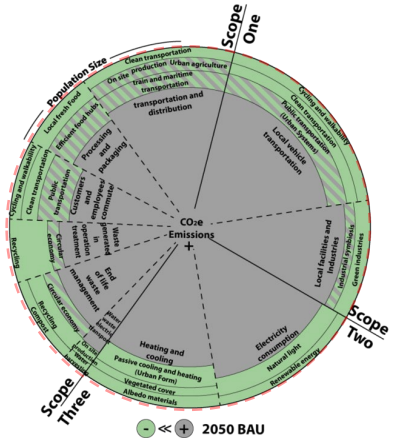
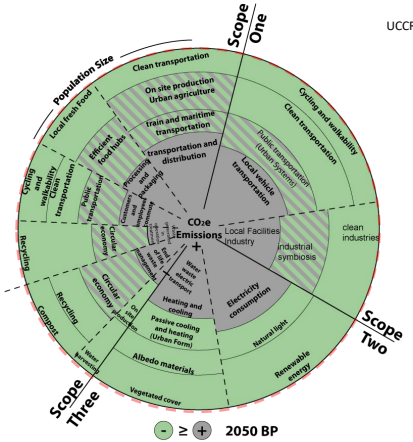
Integrating Climate Adaptation (UHI) & Climate Mitigation (GHG)

Prioritizing Adaptive Mitigation

Low — High

	2019 Present	2050 Business-As-Usual	2050 Zero carbon
Urban Heat Island NYIT – GISS- Urban Land Institute			
Carbon Footprint Net-Zero Carbon (NYIT-AIANY-In Source)			
	- ≪ + 2050 BAU	- ≪ + 2050 BAU	- ≥ + 2050 BP
	23,320 Residents	**65,804 Residents**	Net-Zero **65,804 Residents**

UCCRN – GISS 2019

Y. Eynath, Urban Climate Lab NYIT 2019

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Dialogue: Heat in the City
Global Heat Health Information Network
July 2020

Decision-Making Framework

Urban Climate Factors: Form & Function

Urban Function

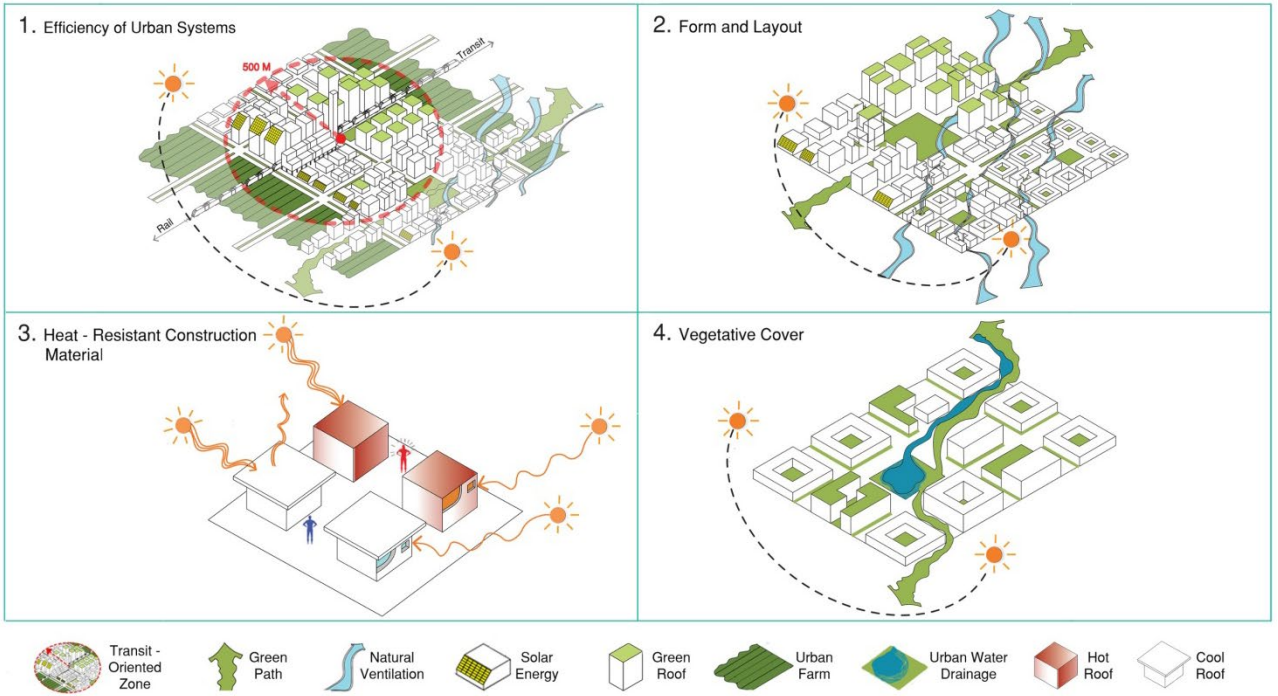
1. Efficiency of urban systems: reducing waste heat and GHG emissions through energy efficiency, transit access, and walkability

Urban Form

2. Modifying form and layout of buildings and districts

3. Heat-resistant construction materials and reflective surface coatings

4. Increasing vegetative cover



Jeffrey Raven, 2016

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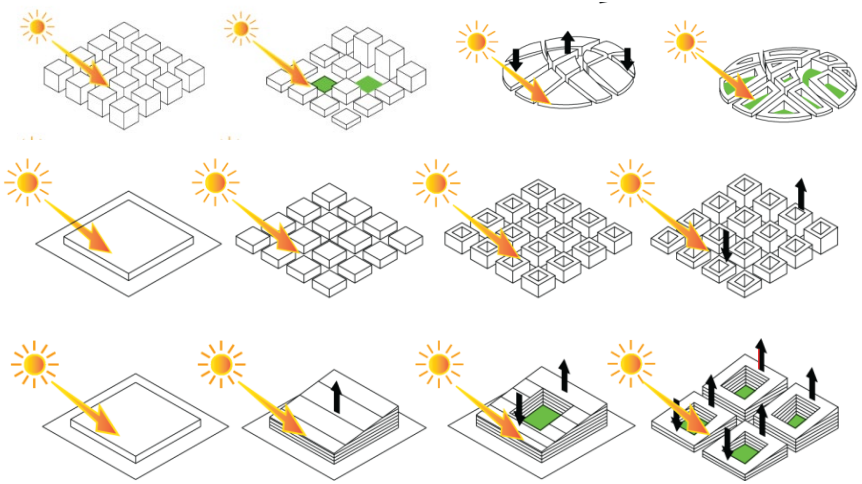
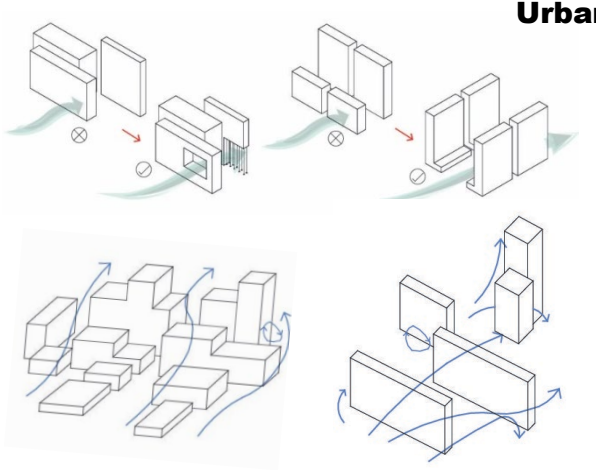
Morphological Catalogue: Archetypal Urban Forms

Solar and Ventilation Impact



Urban Retrofitting



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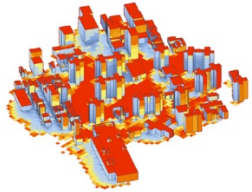
Global Heat Health Information Network
July 2020

Climate-Resilient Urban Design

Design Intervention Process

Climate Analysis Mapping

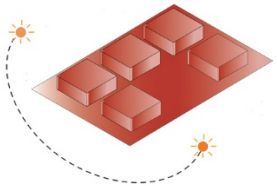
Urban Scale



Local Scale

1

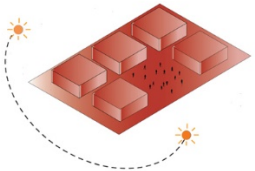
Planning and Design Intervention



3

Public Space Evaluation

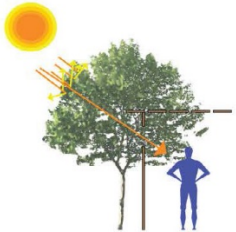
Level of Comfort



2

User Groups/Climate Intensities

Post Intervention Evaluation



4

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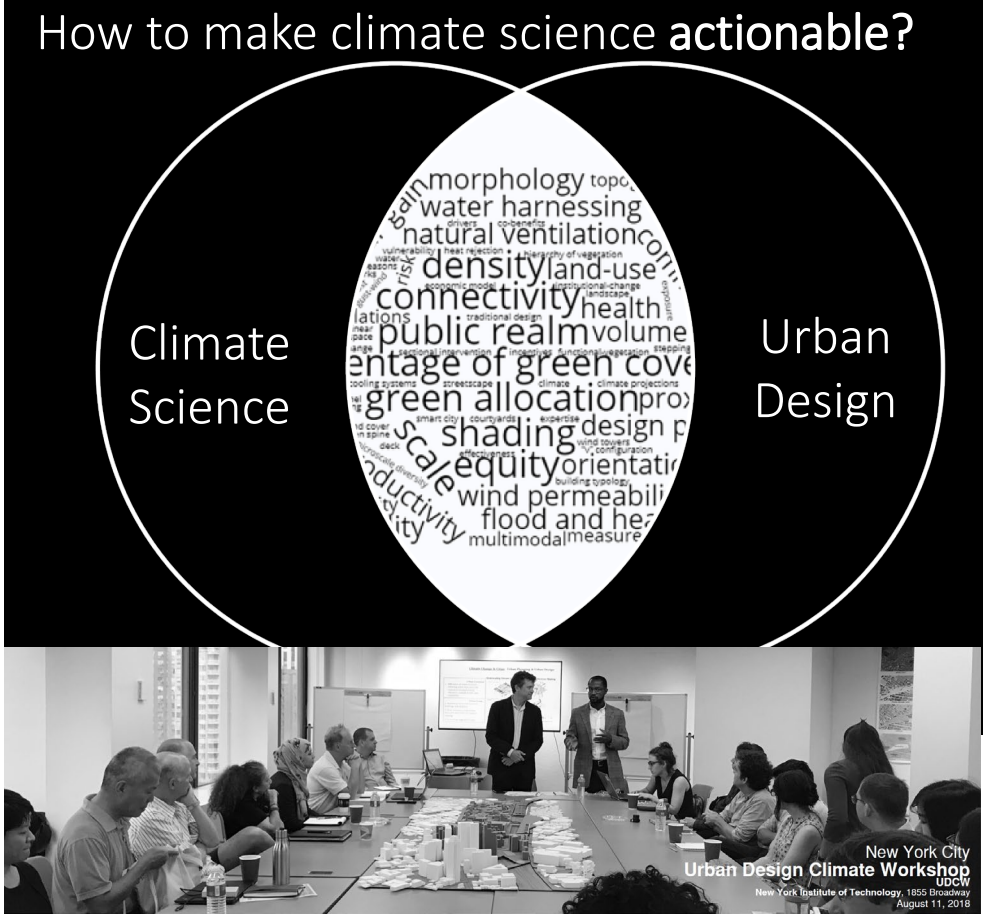
Urban Climate Lab, NYIT



Urban Design Climate Workshops

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From Climate Science to Climate Action

URBAN DESIGN CLIMATE DESIGN WORKSHOPS 2015 - 2020





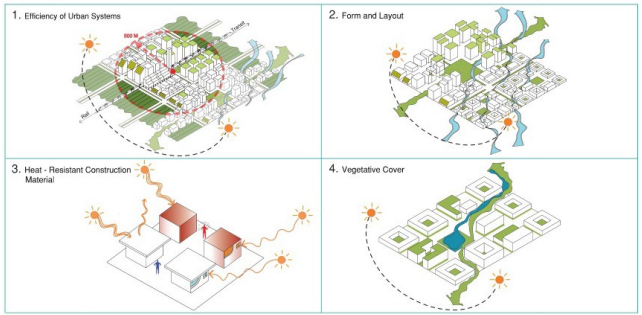

City / Year	Type / Duration	A 1-2 days	B 3-5 days	C 7-10 days
Paris 2015				X
New York 2016				X
Agadir 2017		X		
Paris 2017		X		
New York 2018				X
Napoli 2018				X
Durban 2019			X	
Bonn 2019		X		
New York 2019 & 2020				X

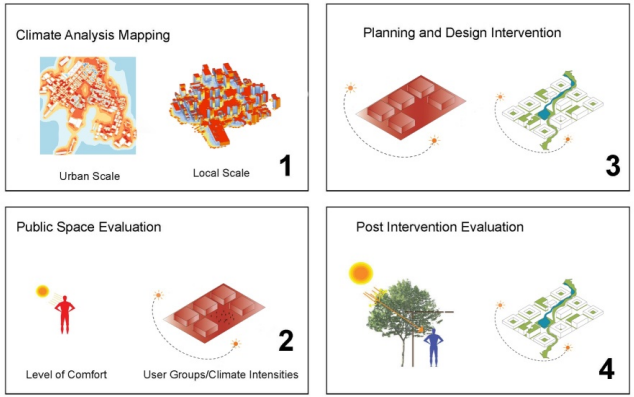


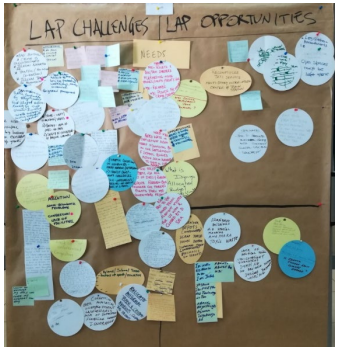


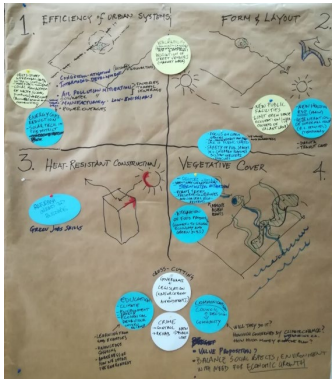



Bridging Science, Stakeholders & Practice









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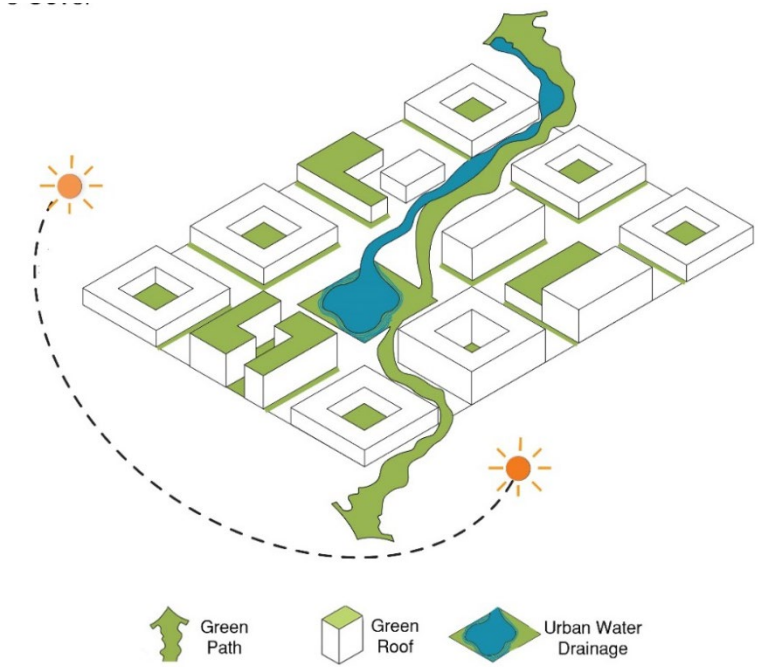
Vegetative Coverage Value Proposition



Urban Climate Lab, NYIT

STAR Communities: Green Infrastructure Co-Benefits (J. Raven)

Ecological functions within high-density urban districts

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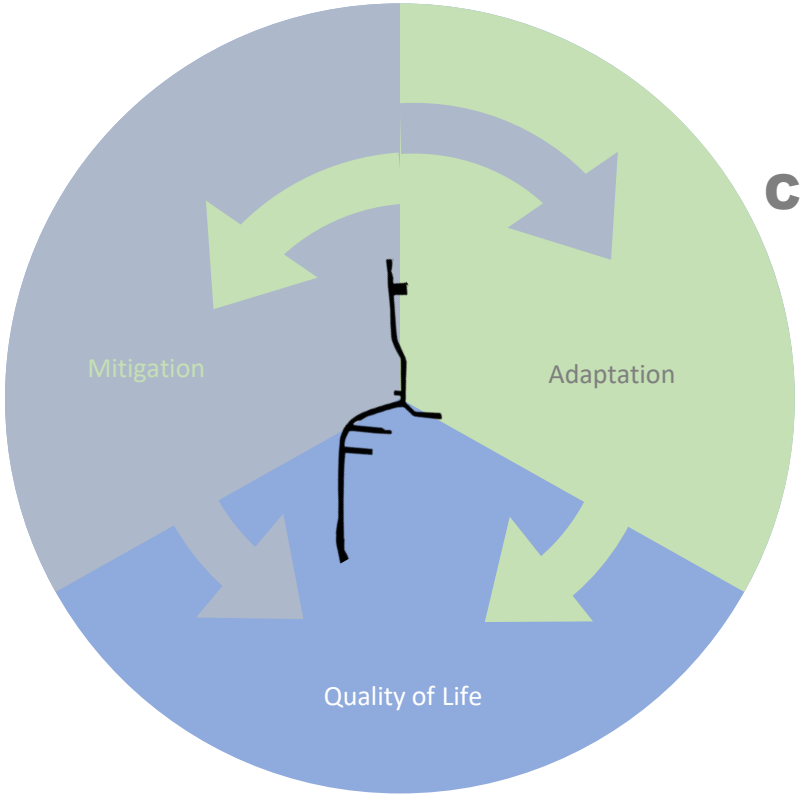
Integrated Climate Adaptation & Climate Mitigation

Participants + Stakeholders



Climate Mitigation

Net-Zero Districts

AIA New York

INSOURCE CONSORTIUM
New York | Vienna | Ludwigsburg Region
Sustainable Urbanisation Global Initiative (SUGI)
FOOD-WATER-ENERGY NEXUS

BELMONT FORUM

URBAN EUROPE

European Commission

This material is based upon work supported by the **National Science Foundation** under Grant No. 1830718

THE CITY UNIVERSITY OF NEW YORK

URBAN CLIMATE CHANGE RESEARCH NETWORK

SWISS TOUCH ETH zürich Switzerland.

Climate Adaptation

Urban Heat Island

Urban Land Institute

URBAN CLIMATE CHANGE RESEARCH NETWORK

Fifth Avenue Committee
Our Community. Our Future.

Gowanus Canal CONSERVANCY

gowanus by design

GOWANUS NEIGHBORHOOD COALITION FOR JUSTICE

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Scenario Modeling

Current Condition
Baseline

Site as it is today

District's populatio 17,462 (28 ppl/acre)

2050 Baseline
Business as Usual

Hypothetical scenario based on NYC DCP Rezoning Plan and "market driven full build-out assumptions

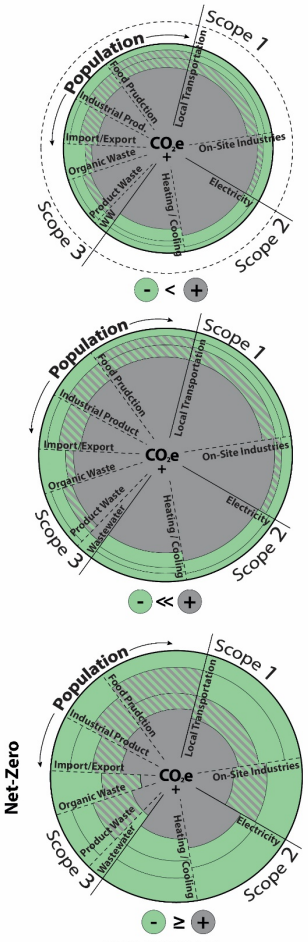
District's population 65,804 (105 ppl/acre)

2050 Prototype
Best Practice

Based on climate adaptive develpment considering evidence-based"best-practice" urban climate factors

District's population 65,804 (105 ppl/acre)

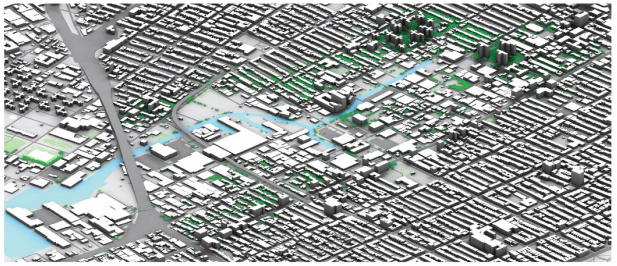
Carbon Footprint



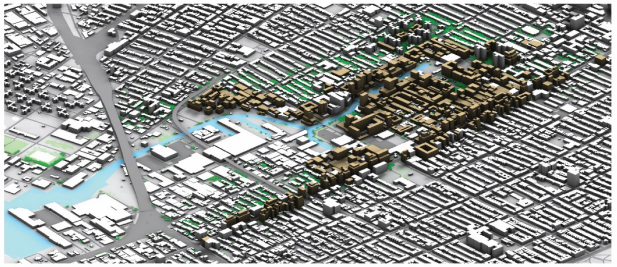
NYIT-AIANY-InSource

Scenarios

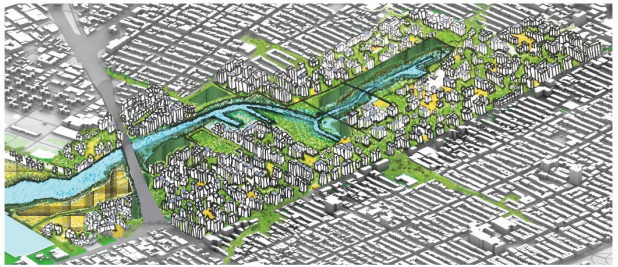
2019 - Current



2050 - Business as Usual (BAU)

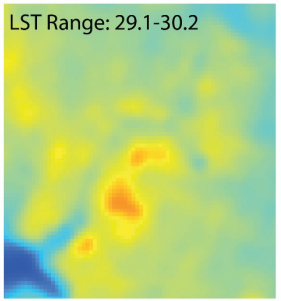


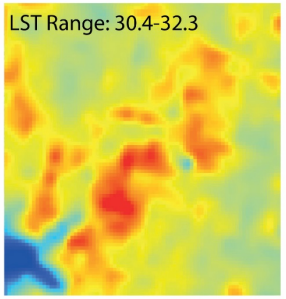
2050 - Best Practice (BP)

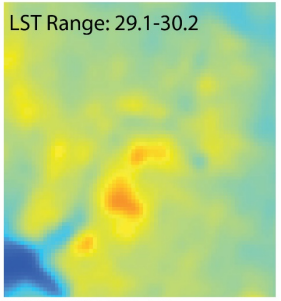


Urban Design Climate Lab - NYIT (2019-2020)

Urban Heat Island



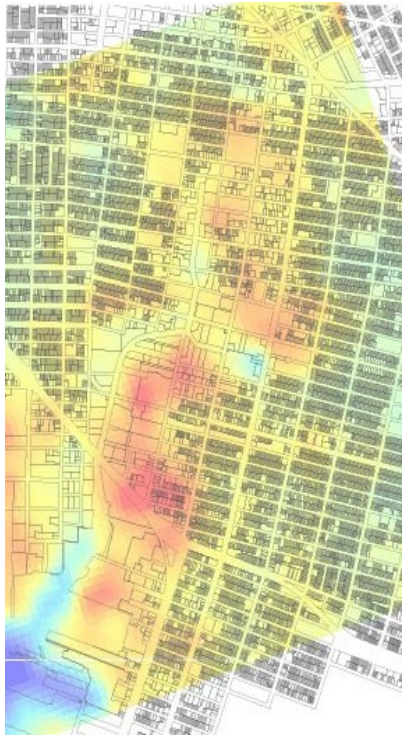




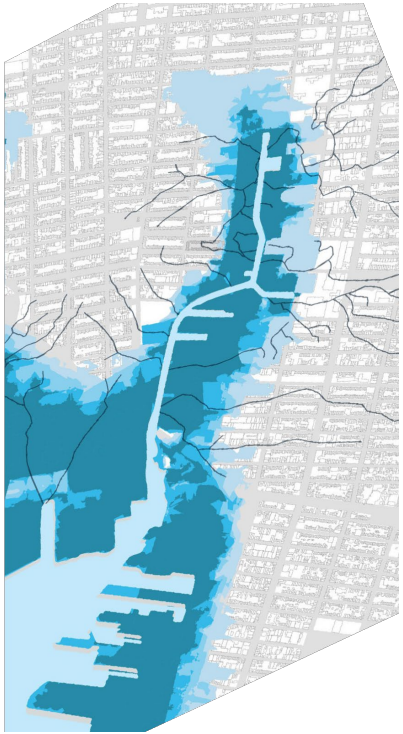
NYIT-UCCRN / GISS - ULI

Layers – Heat & Flood

Land Surface Temperature - 2019



Land Surface Temperature - 2050



Flood Map & Underwater Streams

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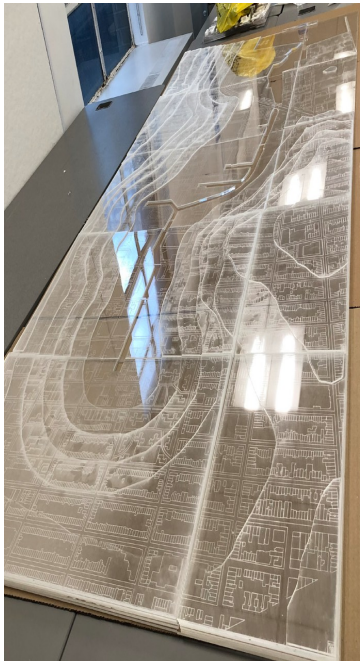
Layers – Density Scenarios



Base Contours

2019 Present

2050 Business As Usual

2050 Best Practice Mock-up

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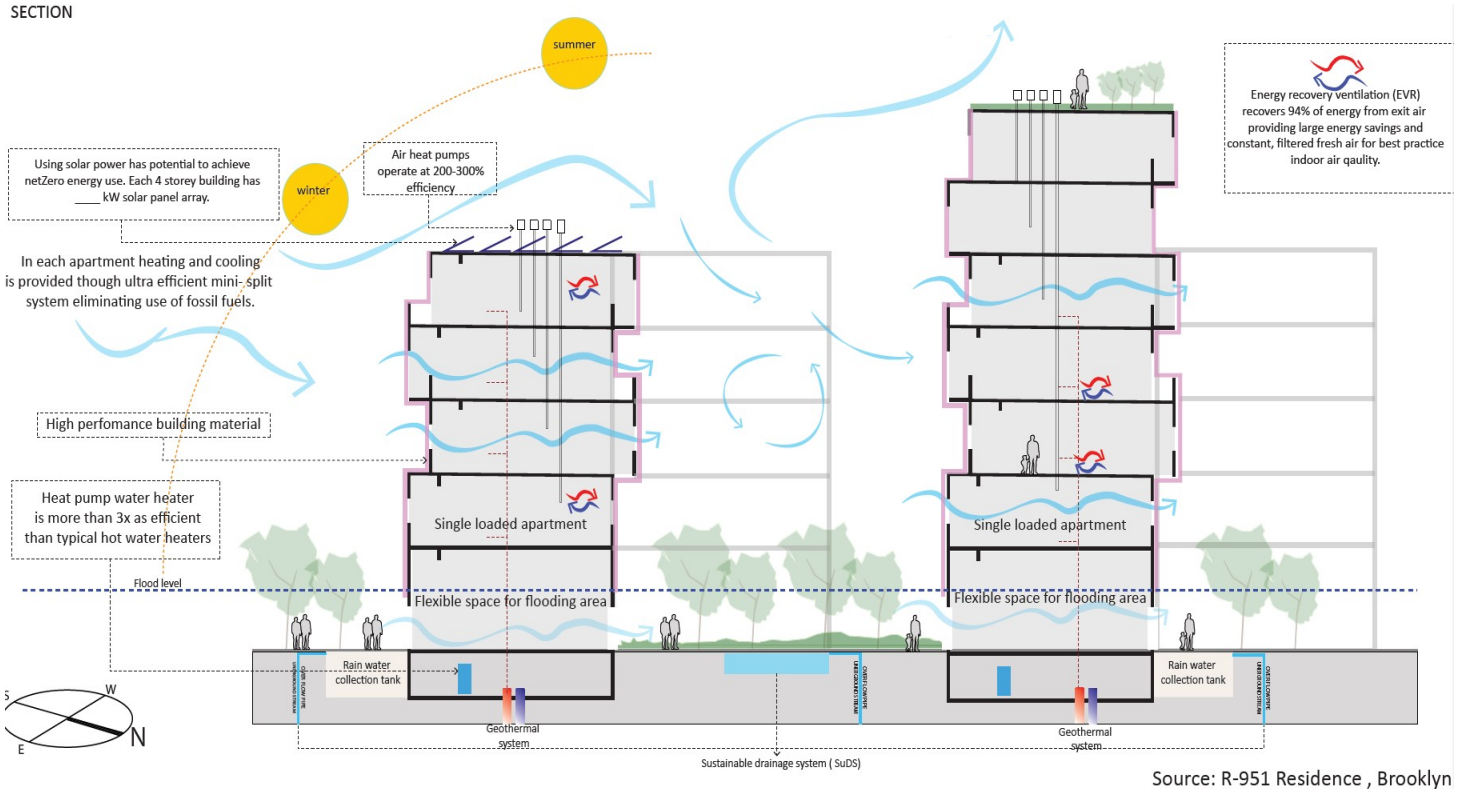
Residential Prototypes



Source: R-951 Residence , Brooklyn

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Industrial & Manufacturing Prototypes

Strategies
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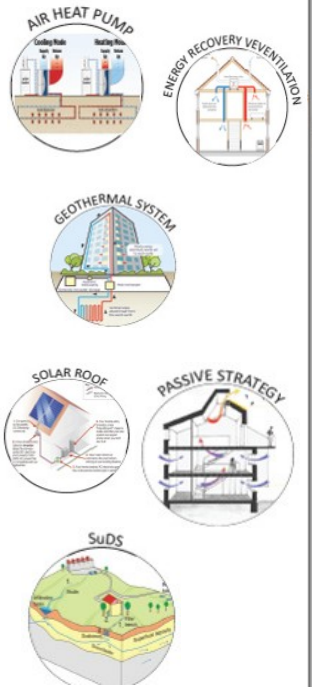

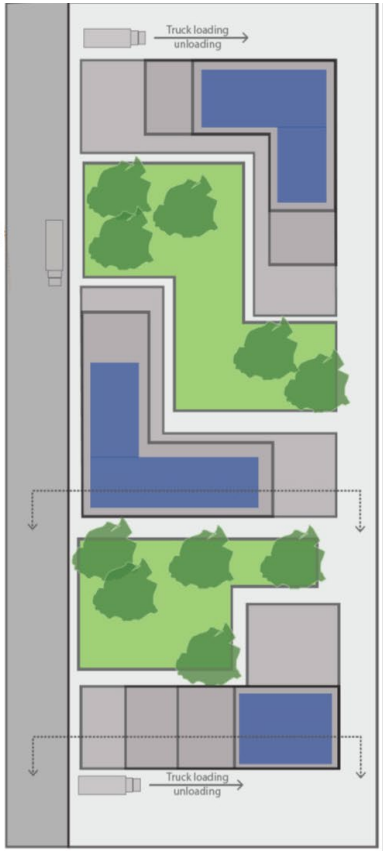

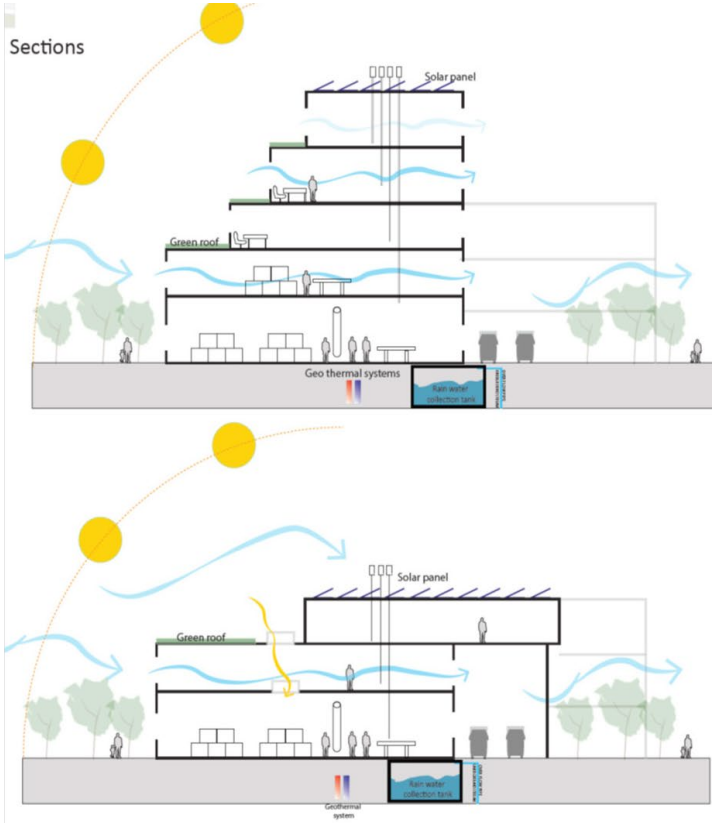

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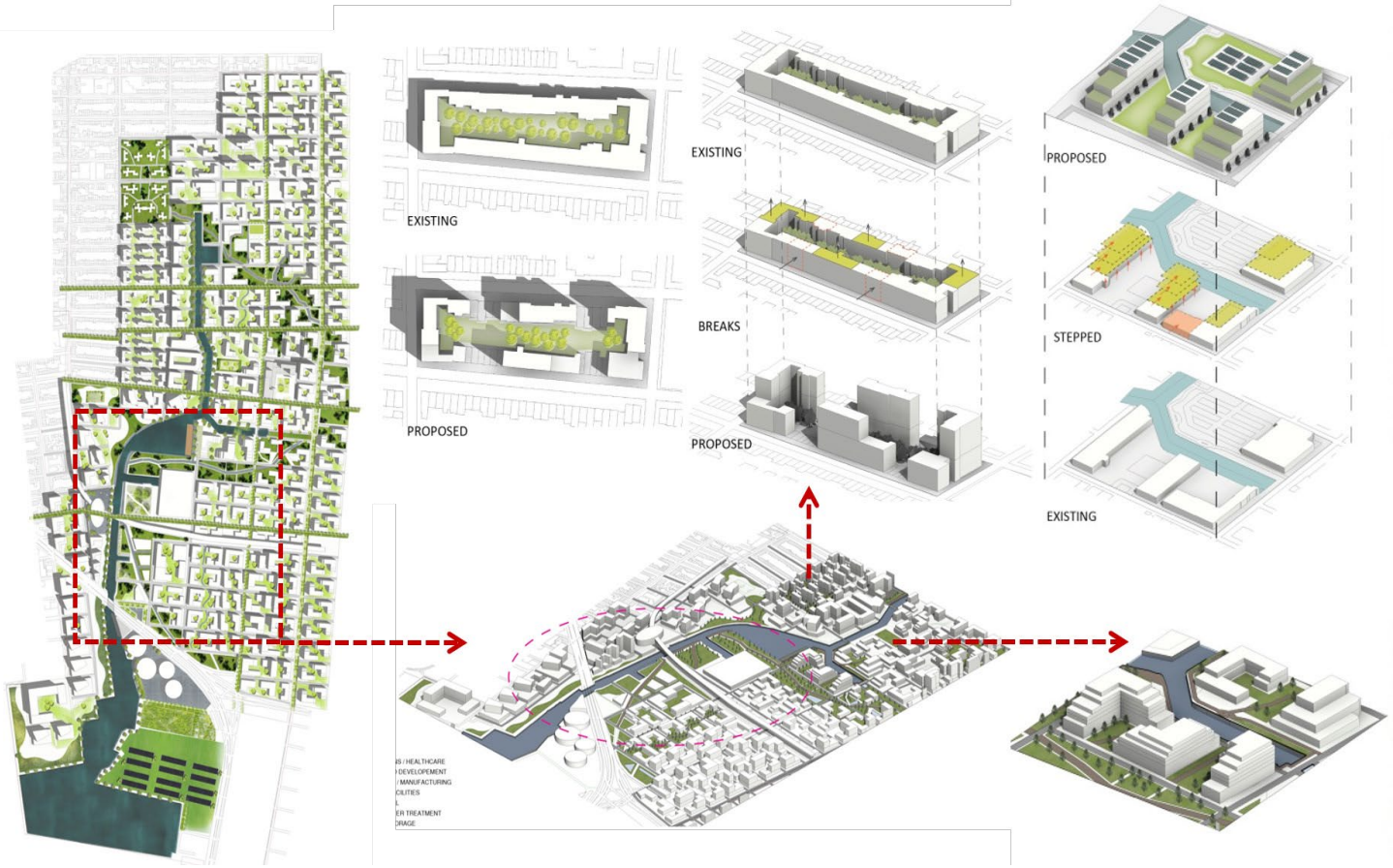
Focus Areas



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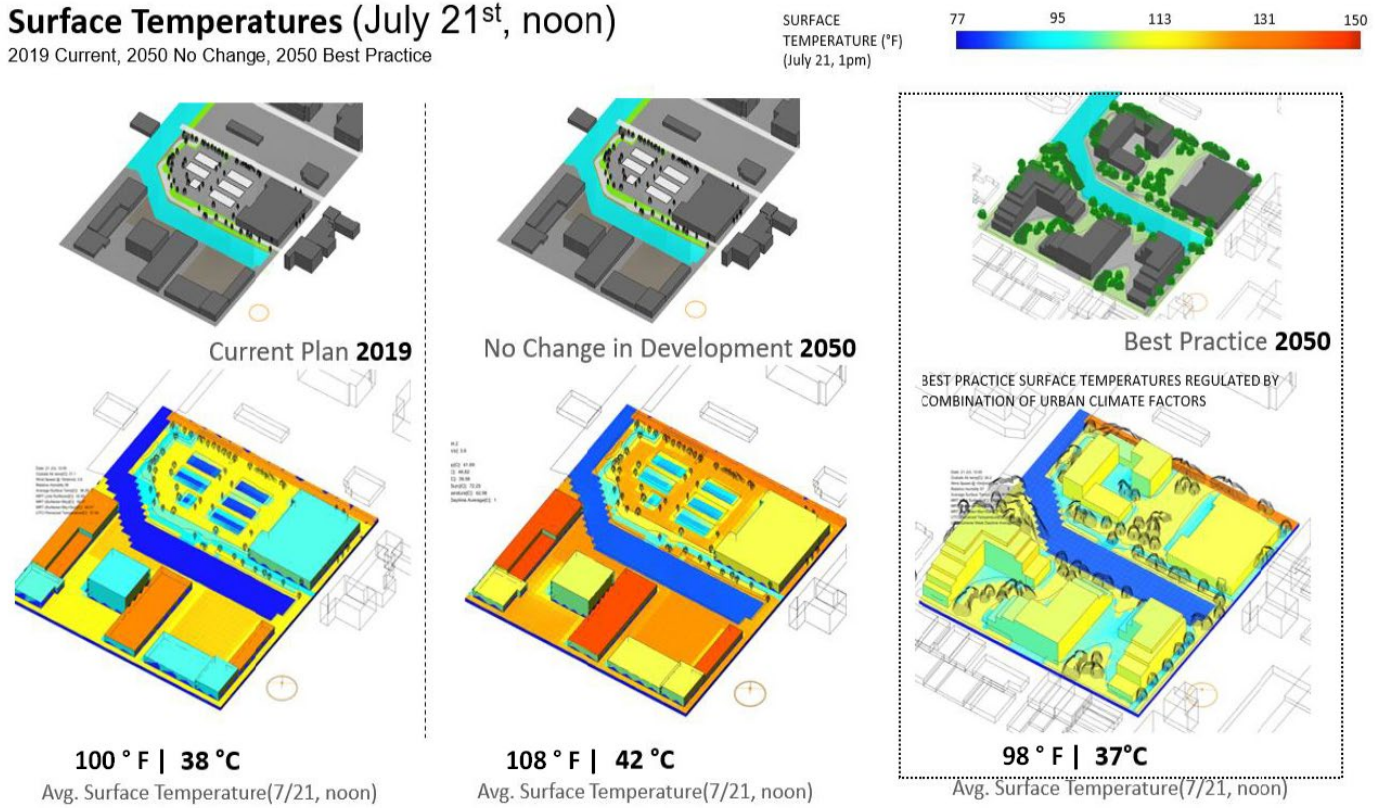
Micro-Climate Analysis: Focus Area



Simulated Surface Temperatures (July 21st, Noon): Current Plan – 2019, Current Plan – 2050, Best Practice - 2050

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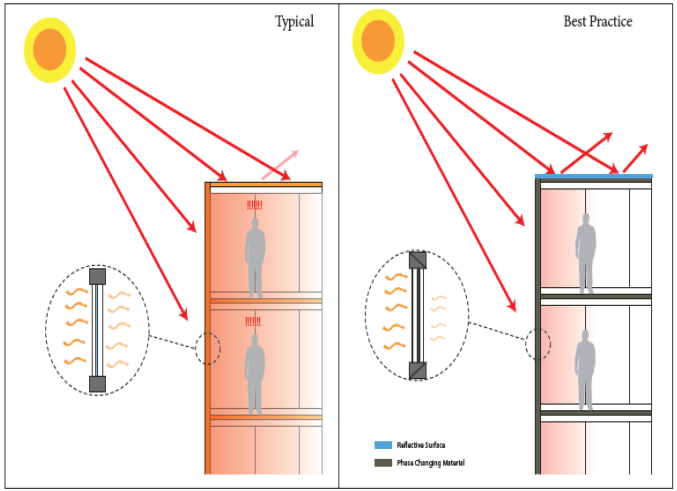
Bridging Science & Action in NYC
Implementation Process: Phasing

Short term
- **Cool roofing**
- **Heat-Resistant Construction Materials**

Medium term
- Decreased vehicle emissions and traffic
- Non-motorized bike and pedestrian accessibility
- Smart drainage system
- Green roofs or green façades
- Include Urban Heat Island consideration in environmental impact statements (EIS)

Long term
- District energy
- Increased Sky-View Factor through TDR
- Smart orientation of buildings considering sun path and wind direction
- Diversity of building forms
- Linear Parks



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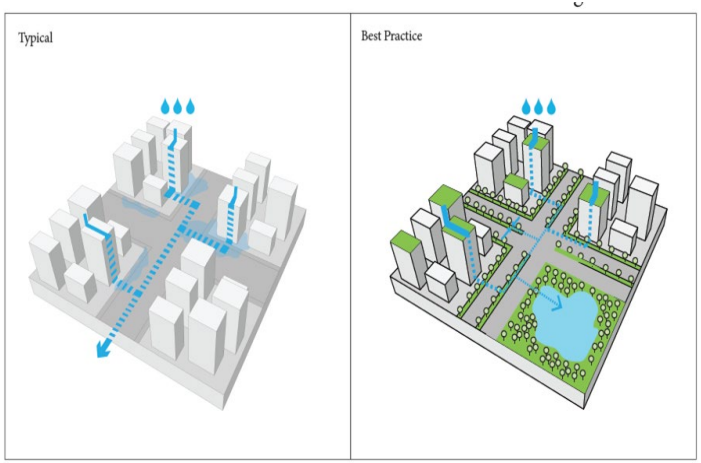

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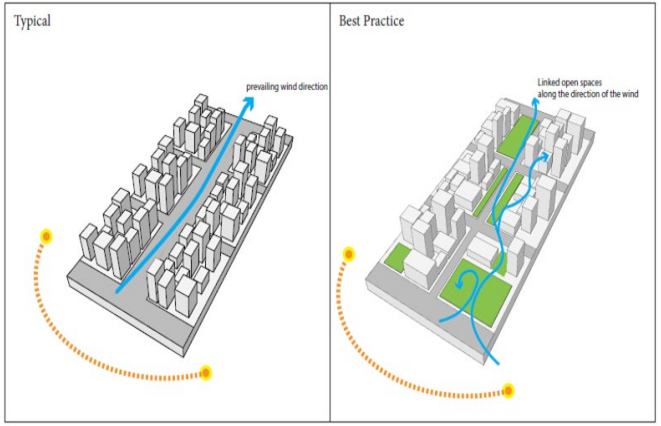

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Value Proposition

Quality of Life

Deliver quality of life as key performance outcome

Social Equity and Cohesion

People-centered urban spaces

Social cohesion and equity as key to resilience, whose success hinges on people-centred urban spaces

Culture

Climate change to lead us to a culture of sustainability

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