

ROOFTOP WONDERLAND

MARE ISLAND, VALLEJO, CA

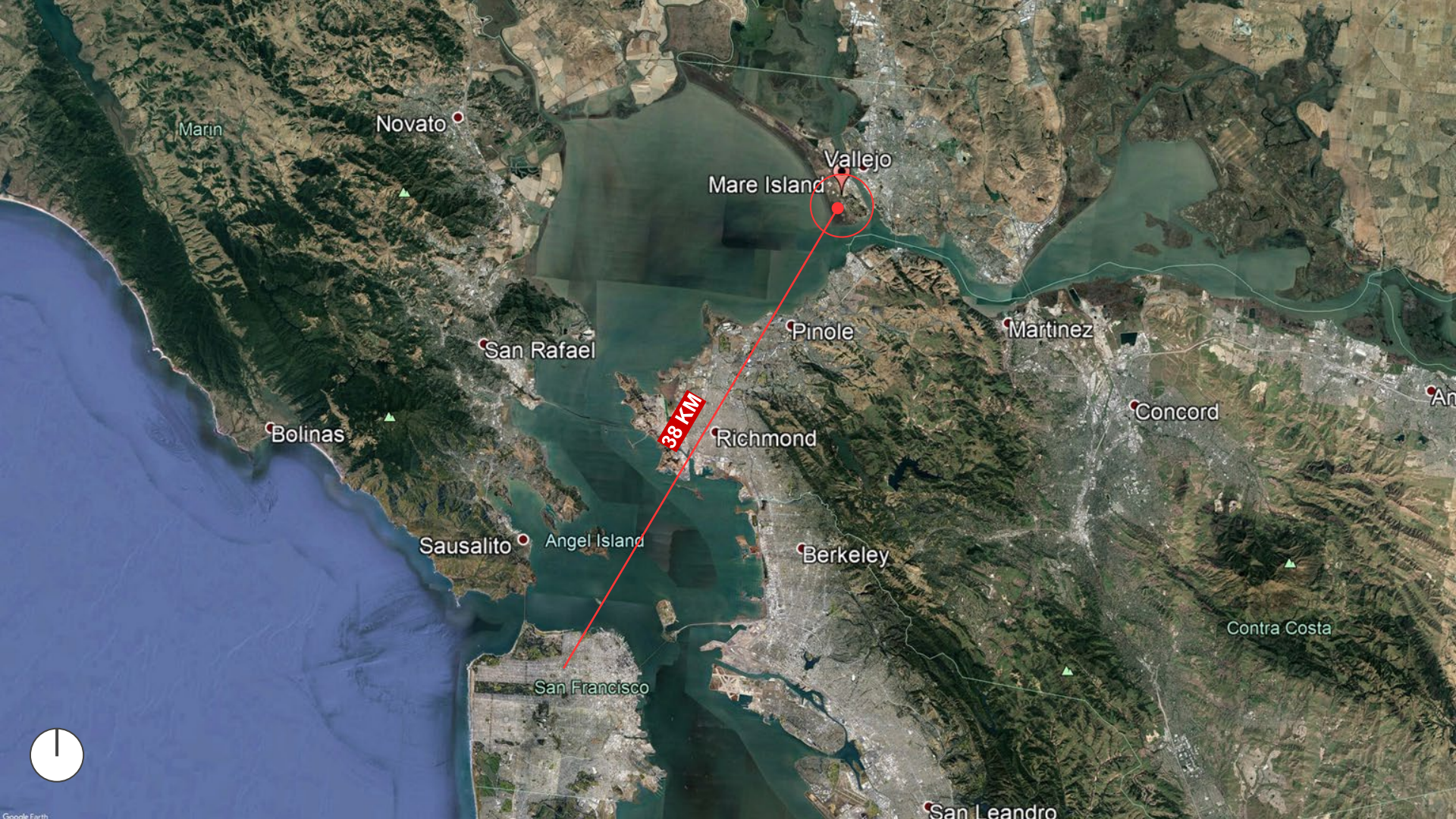
Eakapobh Huang Hanapan

James Kallaos

Shide Salimi

Pablo Taddei

Sara Tepfer



Marin

Novato

Vallejo
Mare Island

San Rafael

Pinole

Martinez

Bolinas

Concord

Sausalito
Angel Island

Richmond

Berkeley

38 KM

Contra Costa

San Francisco

San Leandro





Vallejo

Mare Island
Mare Island

Selby

Crockett





460 m

450 m

Mare Island

Mare Island

GOALS

RESILIENCE

Adapt to extreme events.

Sea level rise
Thermal comfort
Food supply
Energy supply

COST

Balance financial costs and benefits.

Cost-benefit analysis

HEALTH

Create a healthy neighborhood.

Develop urban analog to 9 Foundations of a healthy building¹



ENERGY



EMBODIED
CARBON



CARBON
EMISSIONS



DAYLIGHT



WALKABILITY



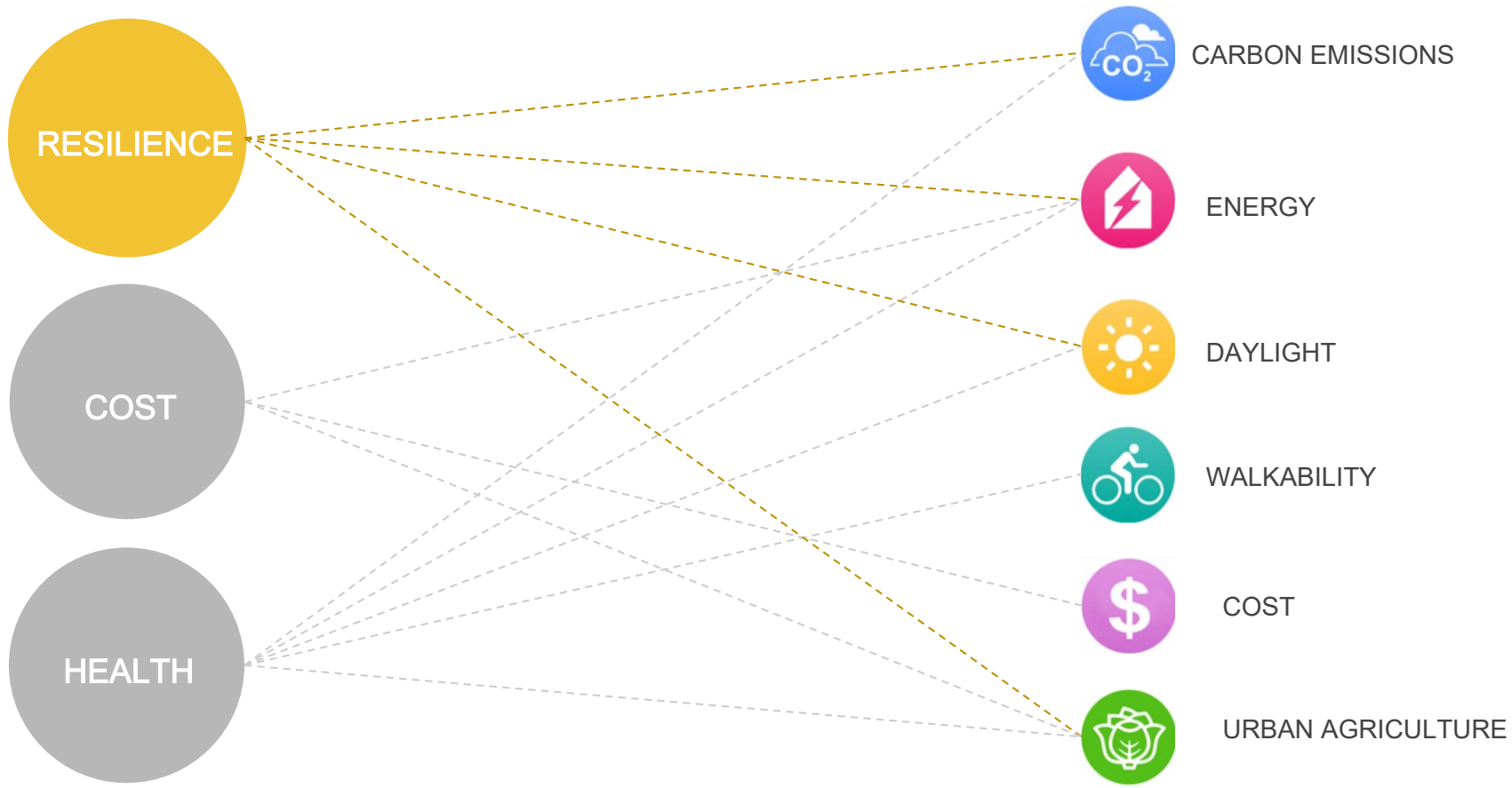
COST

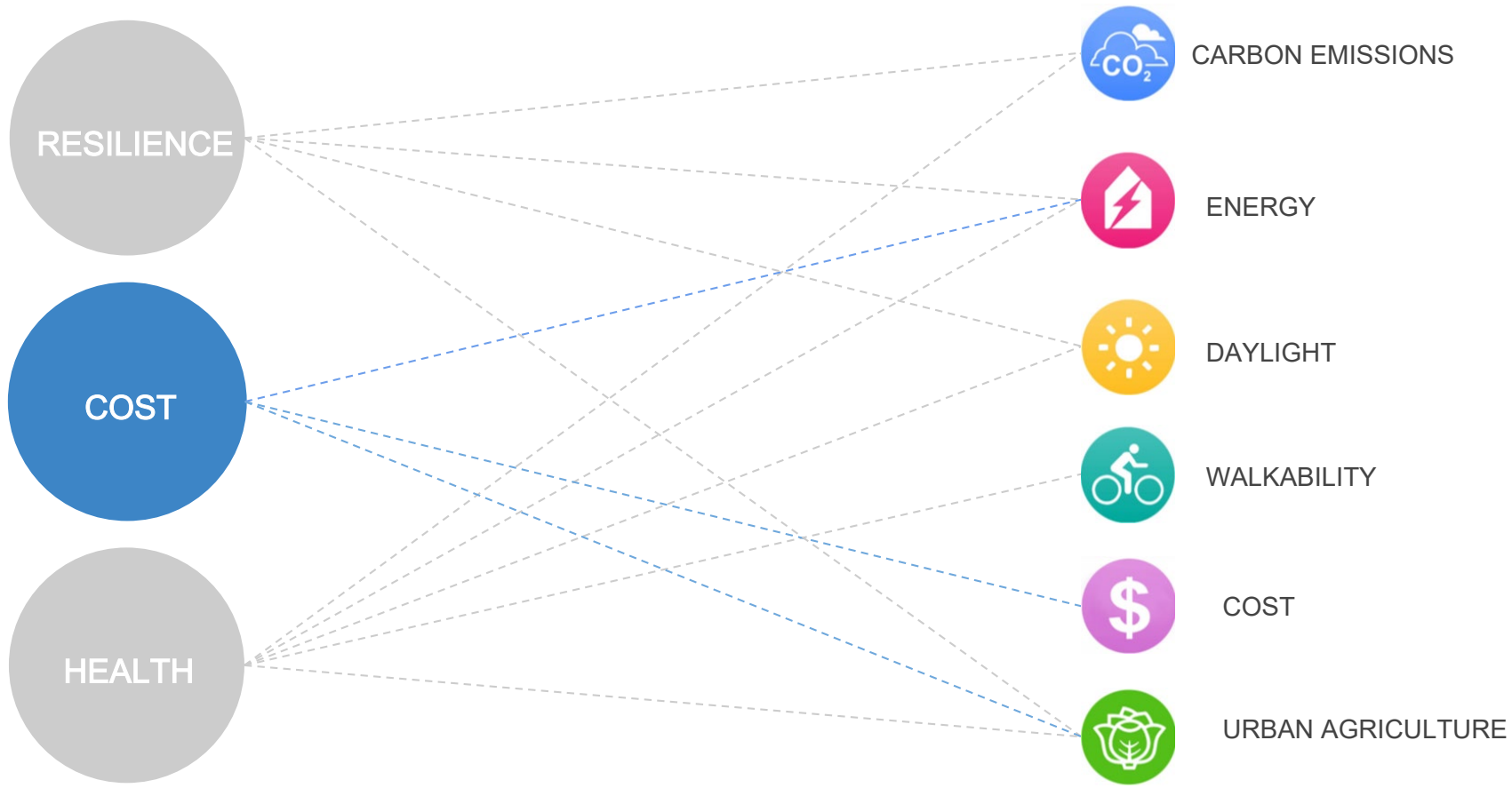


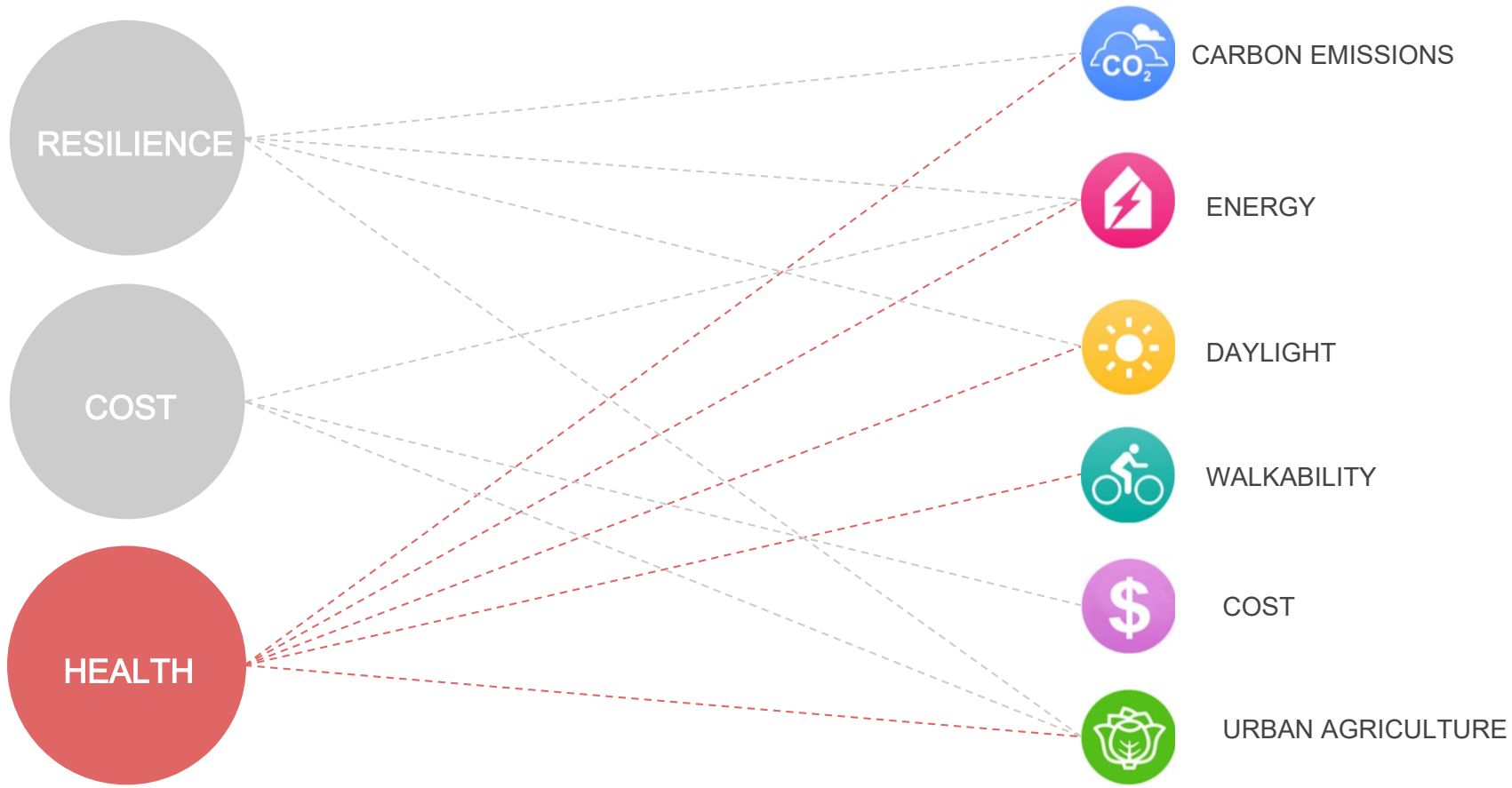
URBAN
FARMING



HEALTH







RESILIENCE

COST

HEALTH



CARBON EMISSIONS



ENERGY



DAYLIGHT



WALKABILITY



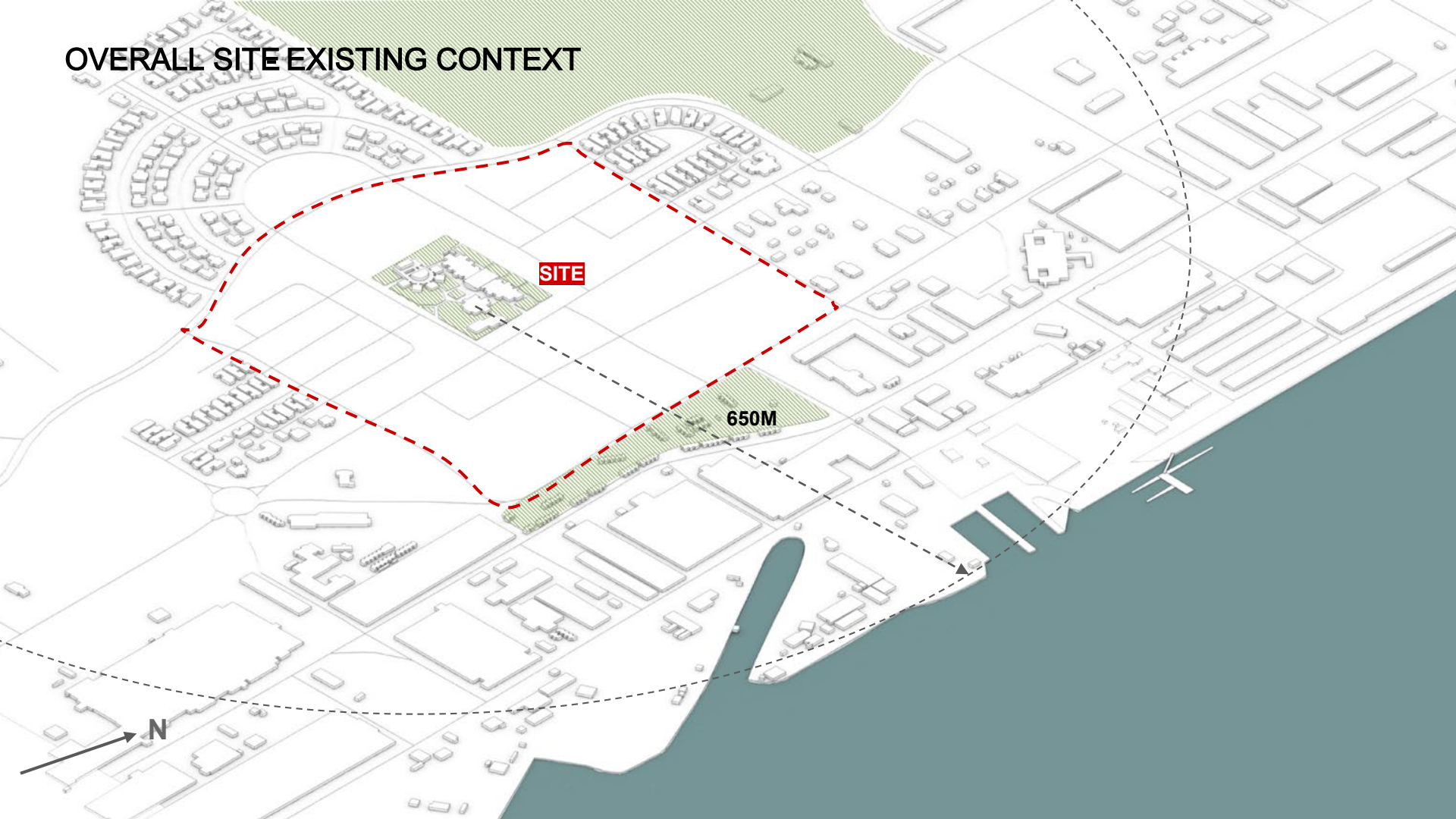
COST



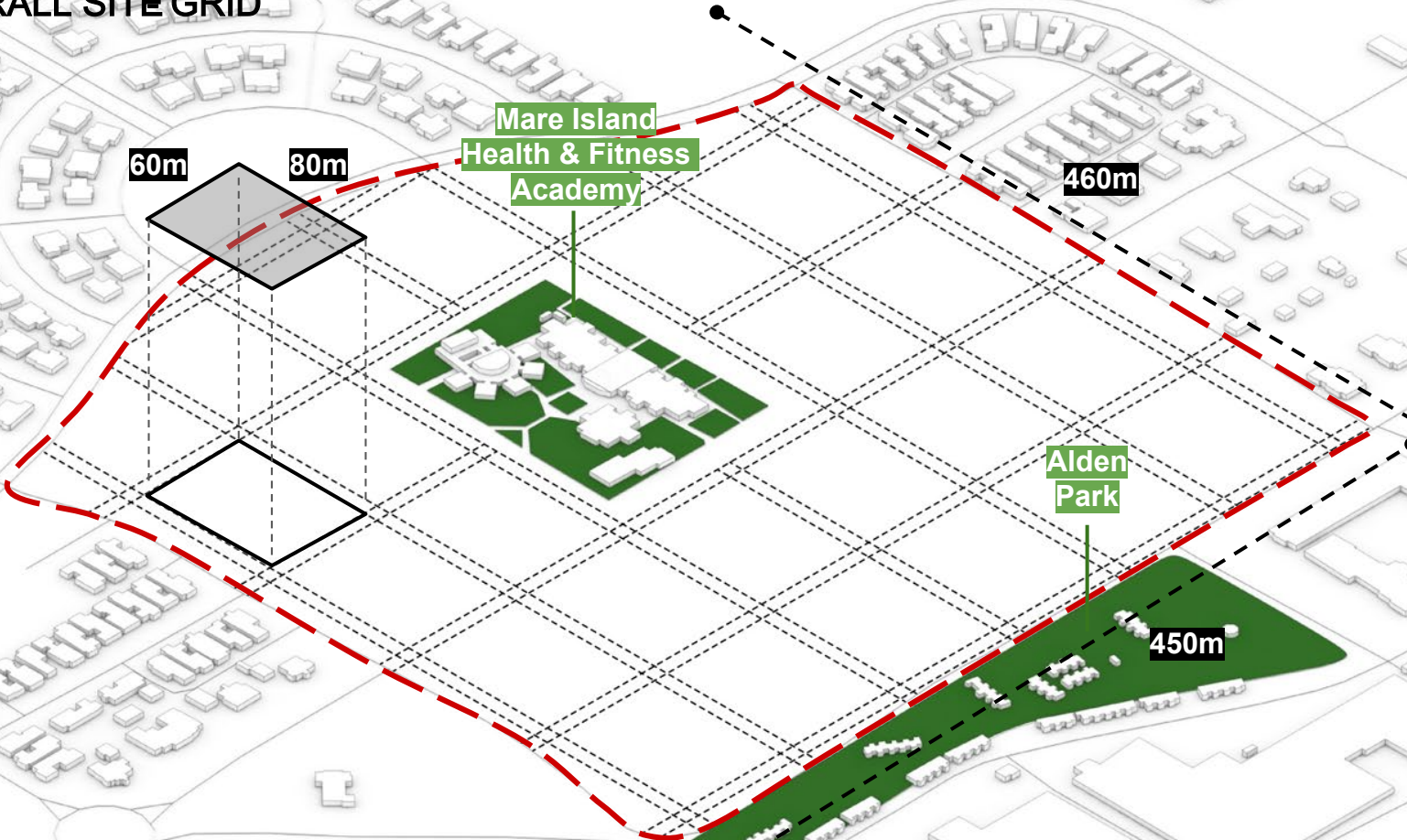
URBAN AGRICULTURE

URBAN STRATEGIES

OVERALL SITE EXISTING CONTEXT



OVERALL SITE GRID



60m

80m

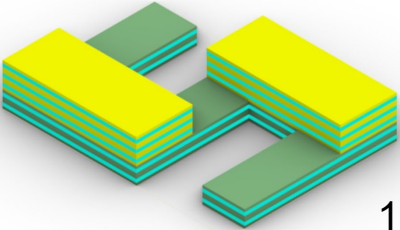
Mare Island
Health & Fitness
Academy

460m

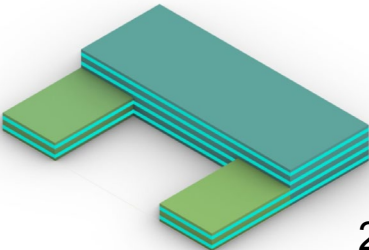
Alden
Park

450m

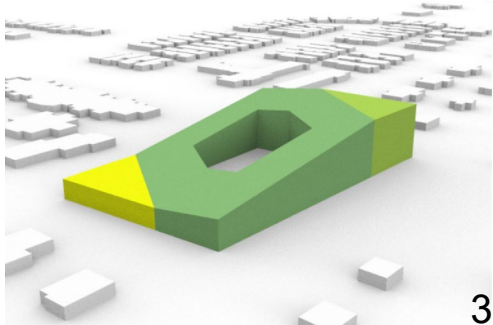
PROTOBLOCK OPTIONS DESIGN BY COMMITTEE!



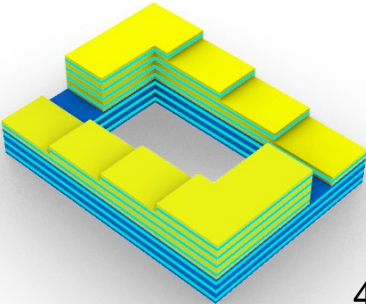
1



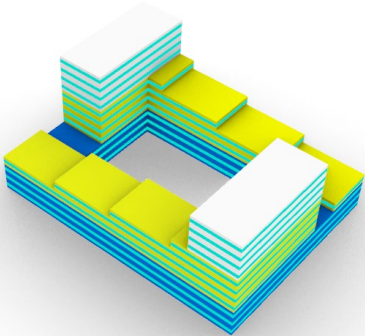
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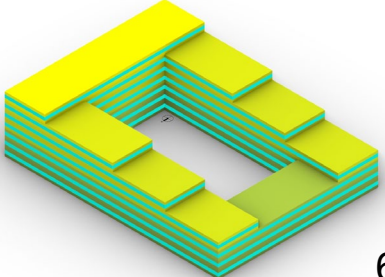
3



4



5



6

OVERALL SITE NEIGHBORHOOD DESIGN

60m

80m

N



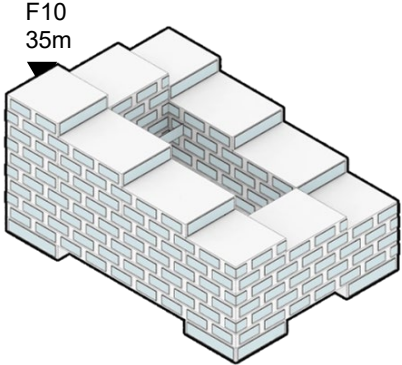
OVERALL SITE NEIGHBORHOOD DESIGN UPGRADE

48m

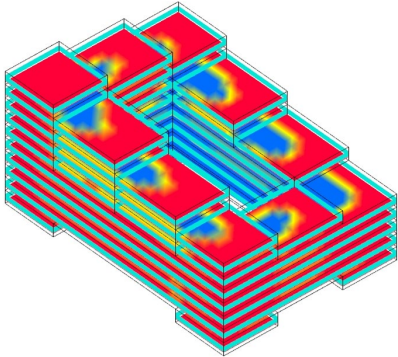
68m



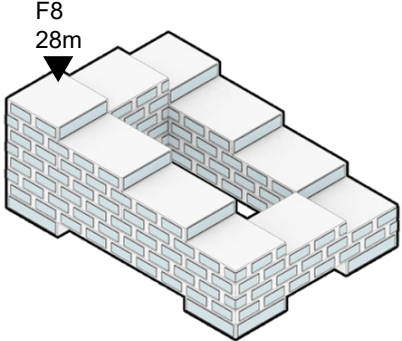
NEW PROTOBLOCK (3) INFO



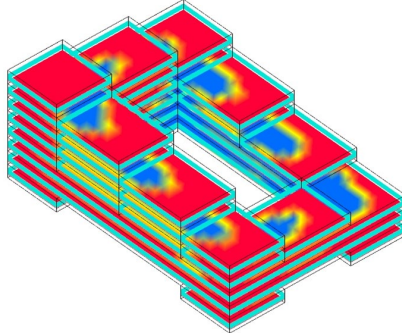
Floor Area : **17,670 sqm**
FAR: **3.7**
WWR: **40%**
SDA: **46**



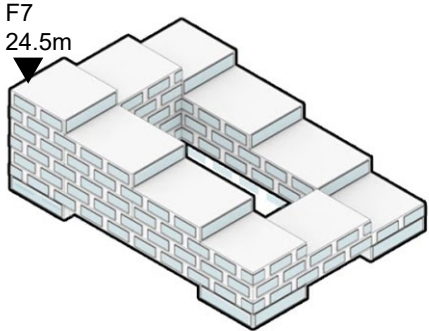
NEW PROTOBLOCK (3) INFO



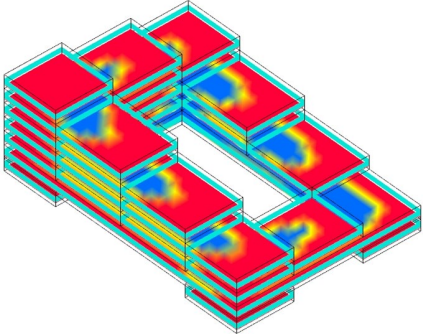
Floor Area : **12,285 sqm**
FAR: **2.5**
WWR: **40%**
SDA: **48**



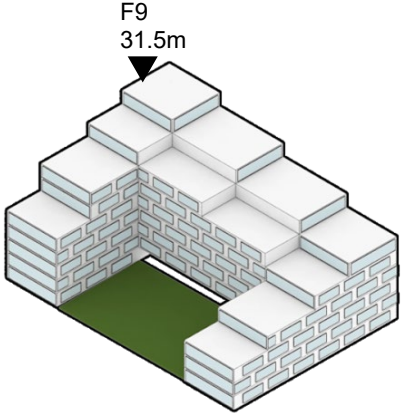
NEW PROTOBLOCK (3) INFO



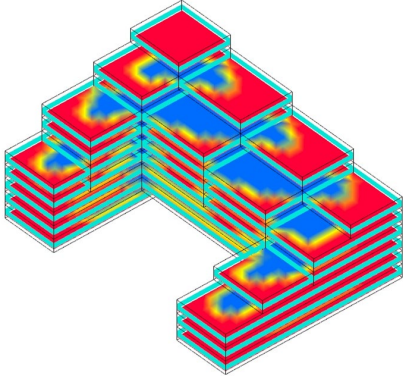
Floor Area : **9,705 sqm**
FAR: **2**
WWR: **40%**
SDA: **51**



NEW PROTOBLOCK (3) INFO



Floor Area : **14,443 sqm**
FAR: **3**
WWR: **40%**
SDA: **45**

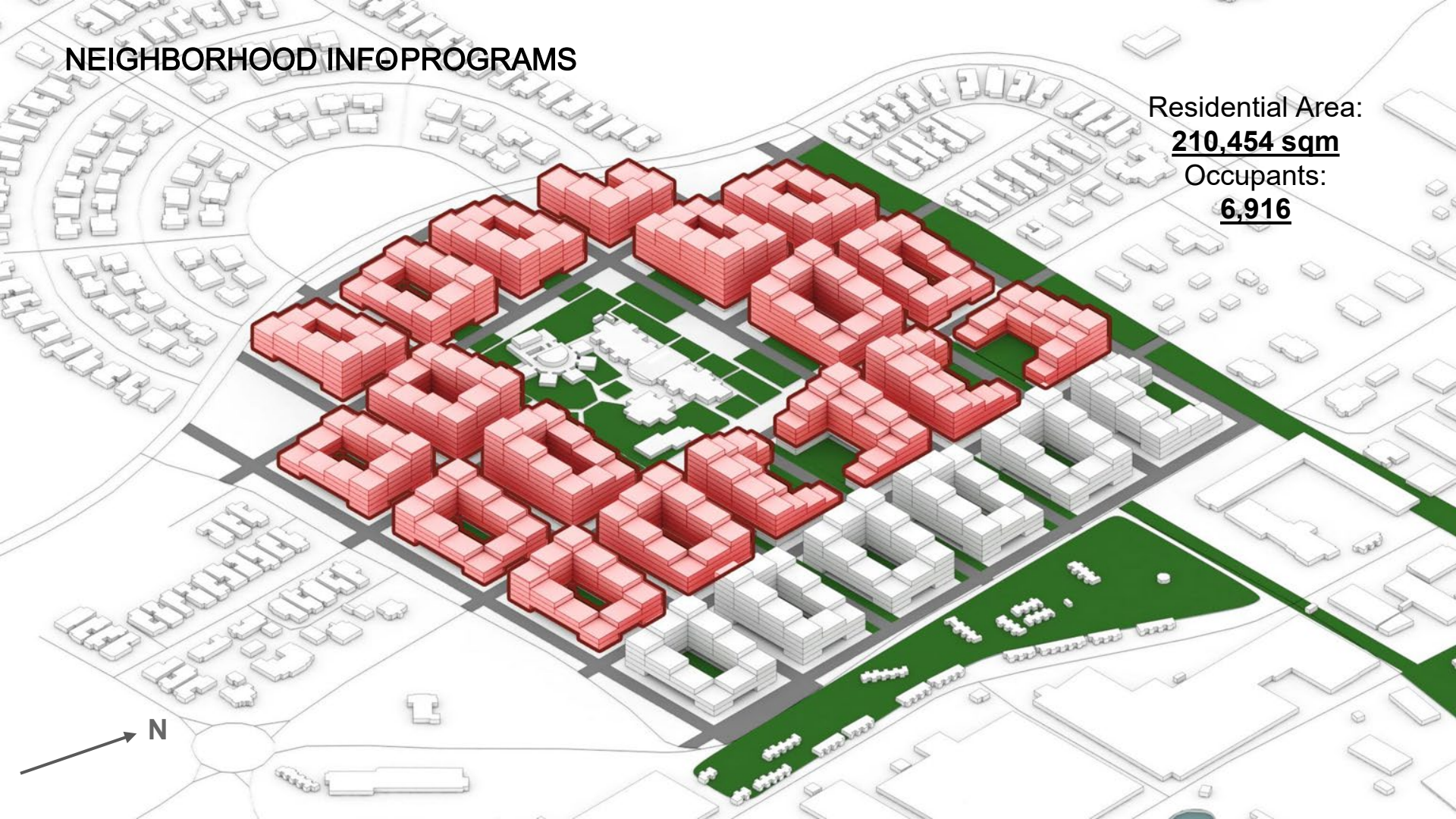


NEIGHBORHOOD INFO MAIN STREET



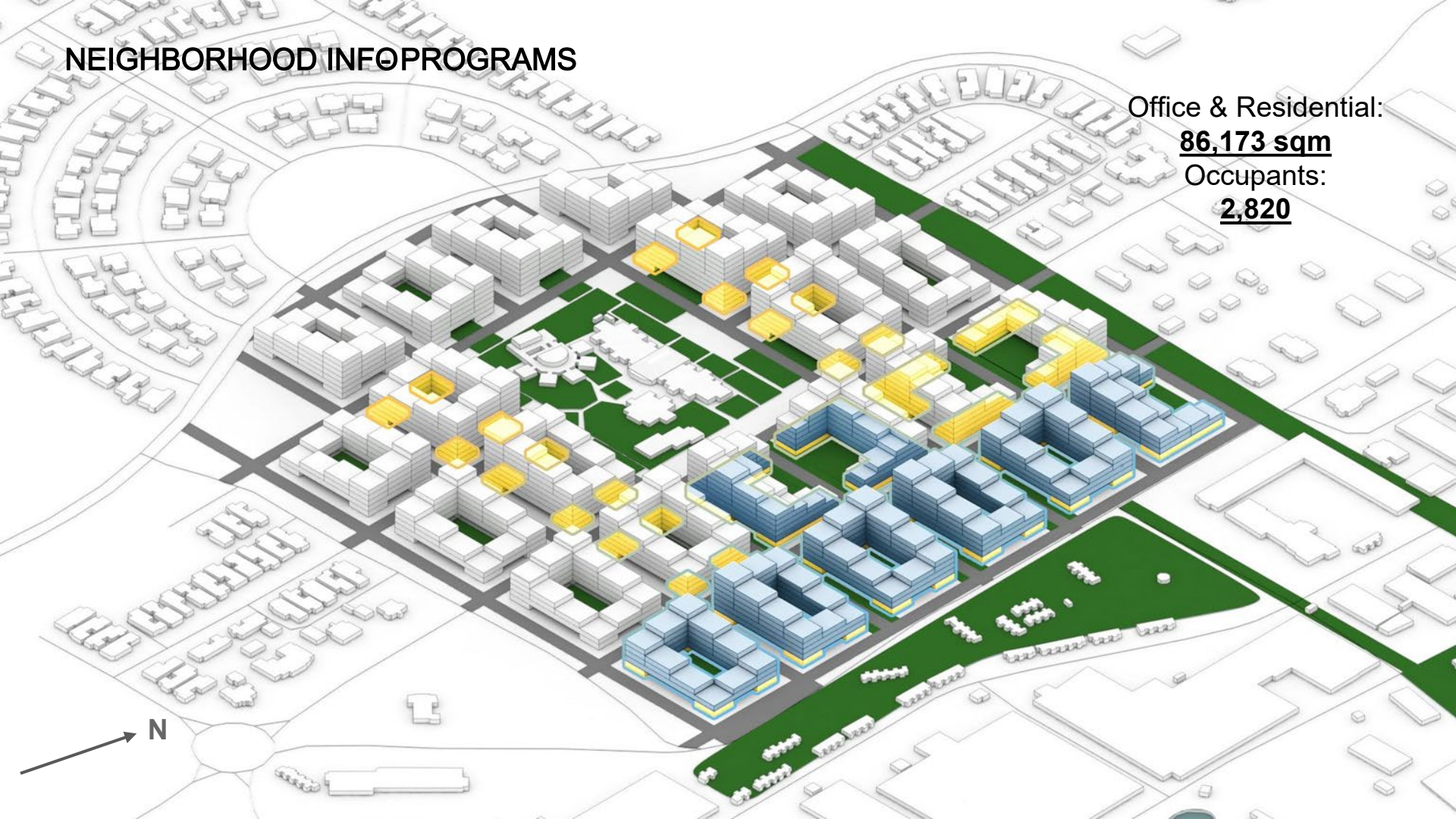
NEIGHBORHOOD INFO PROGRAMS

Residential Area:
210,454 sqm
Occupants:
6,916



NEIGHBORHOOD INFO PROGRAMS

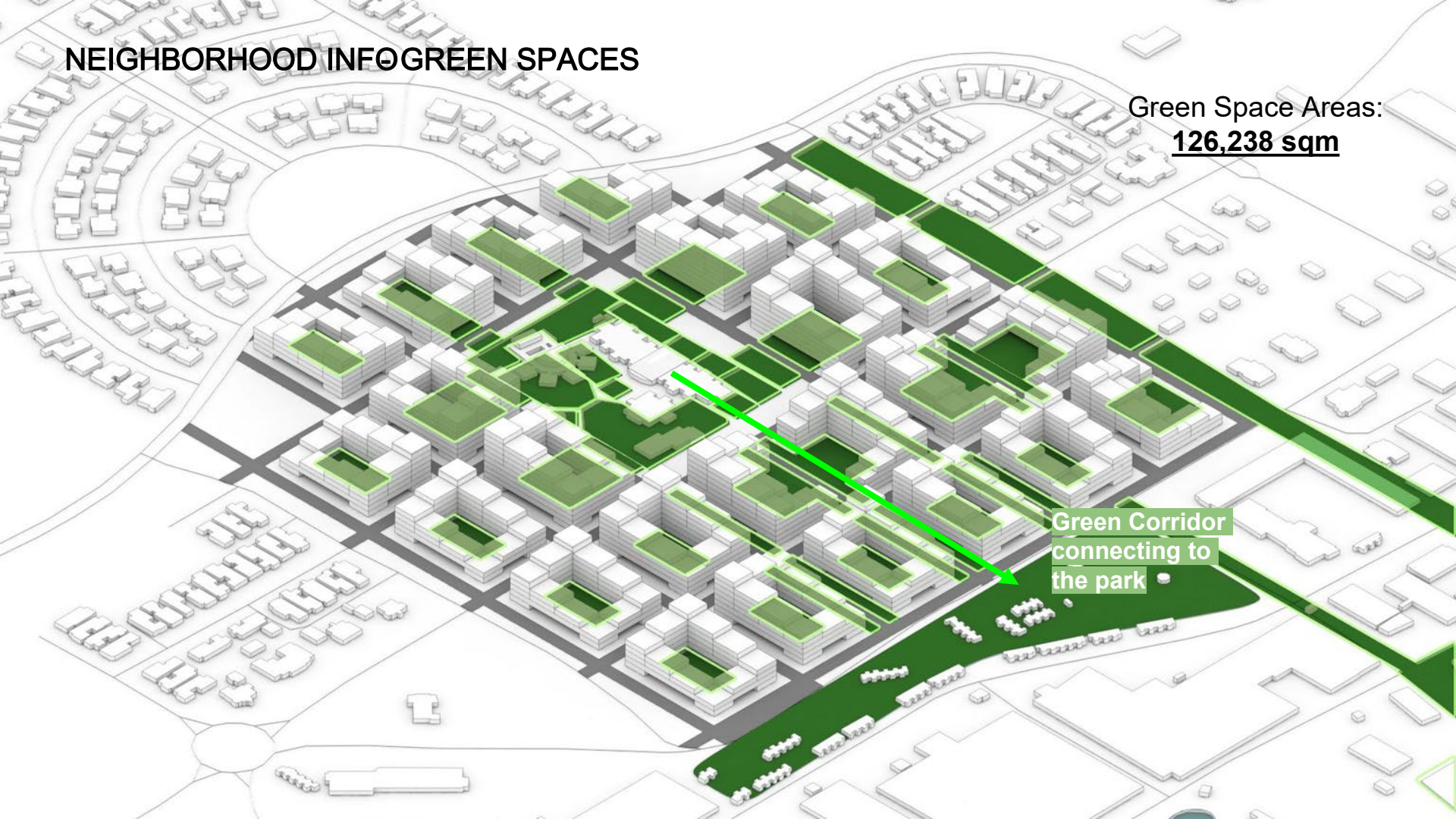
Office & Residential:
86,173 sqm
Occupants:
2,820



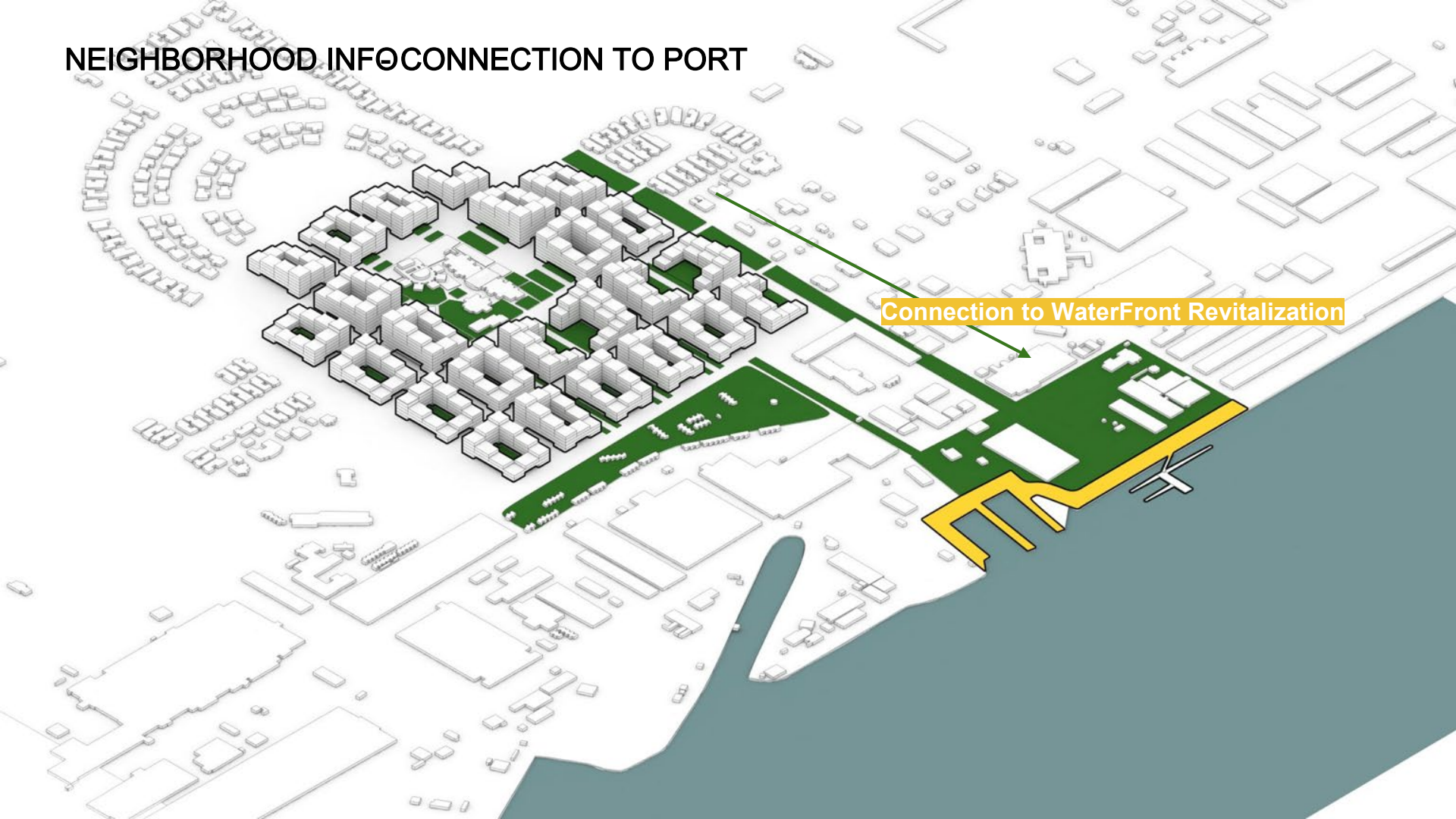
NEIGHBORHOOD INFO GREEN SPACES

Green Space Areas:
126,238 sqm

Green Corridor
connecting to
the park



NEIGHBORHOOD INFO CONNECTION TO PORT



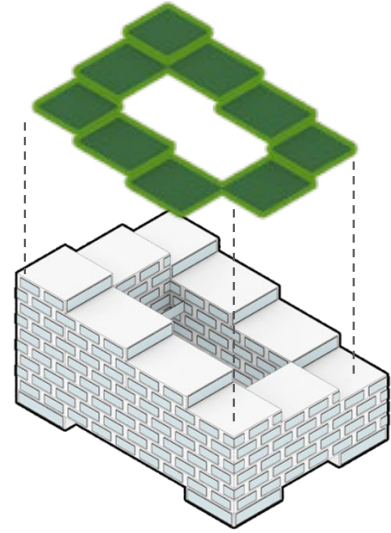
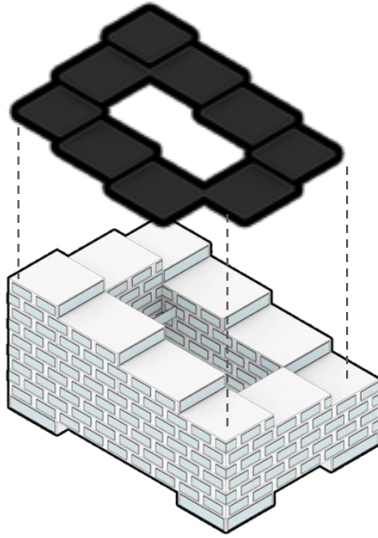
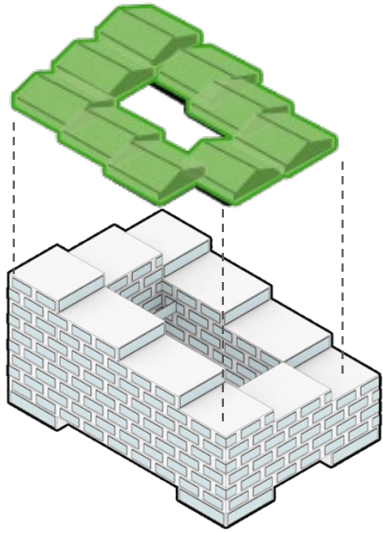
Connection to WaterFront Revitalization

ROOFTOP STRATEGIES

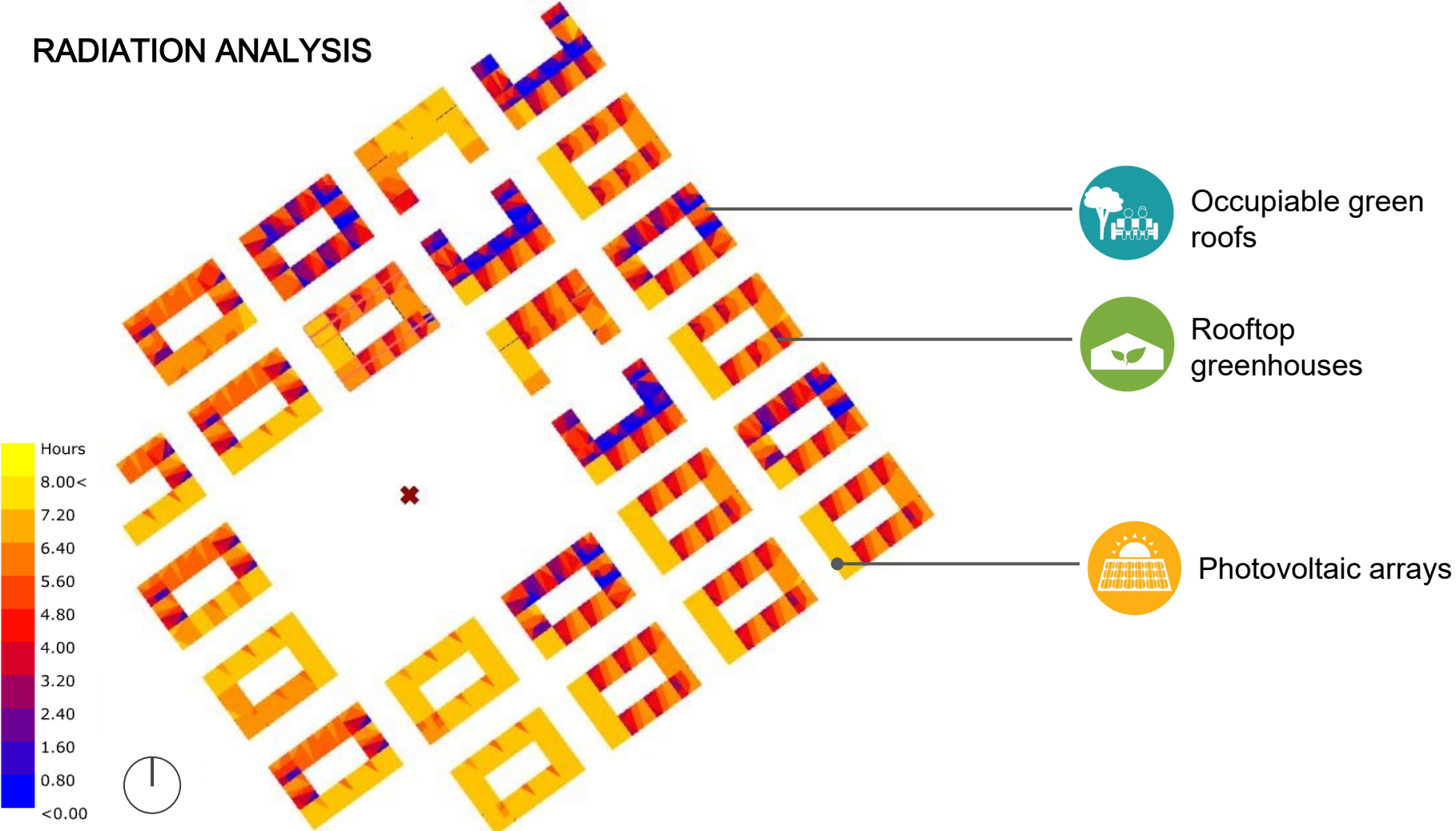
RESILIENCE

COST

HEALTH



RADIATION ANALYSIS



NEIGHBORHOOD PV FARM



NEIGHBORHOOD ROOFTOP FARM



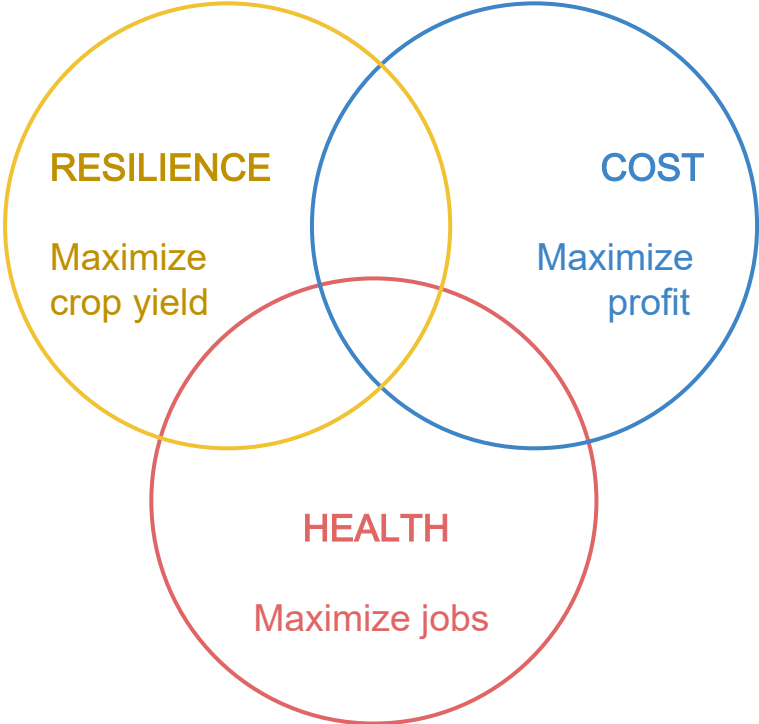
HARVEST

RESILIENCE

COST

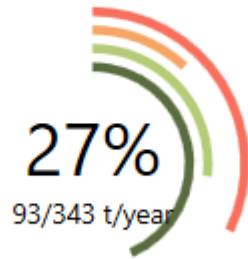
HEALTH

HARVEST GOAL



HARVEST YIELD

Local food production



Water Use
(for farming)



4,112
m³/year

Profit
(vs. baseline)



56
k\$/year

Carbon Savings
(vs. baseline)



27
tCO₂eq/year

Jobs created



43
workers

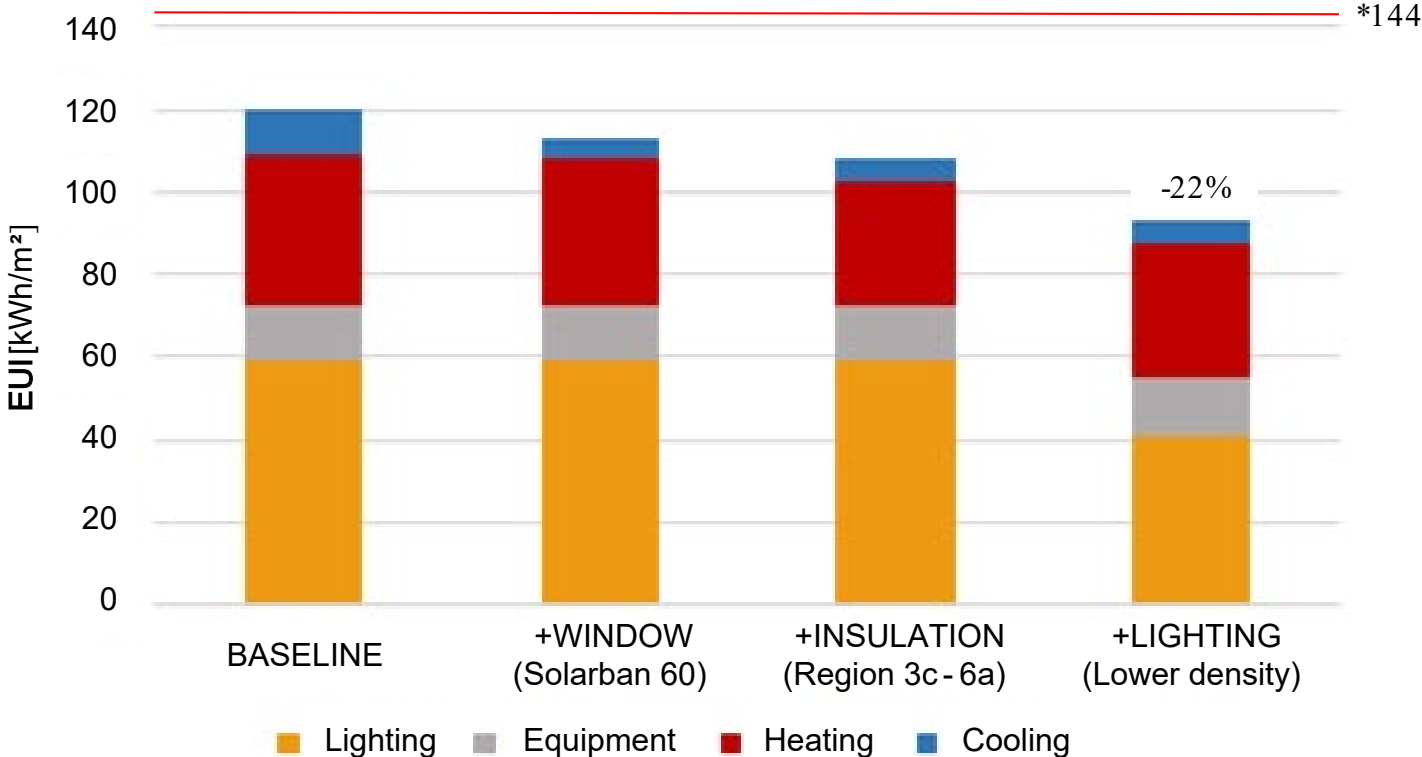
OPERATIONAL ENERGY

RESILIENCE

COST

HEALTH

PROTOBLOCK OPERATIONAL ENERGY ANALYSIS



*Site EUI – The Site Energy Use divided by the property square meters (EPA's Target Finder calculator)

EMBODIED CARBON EMISSION

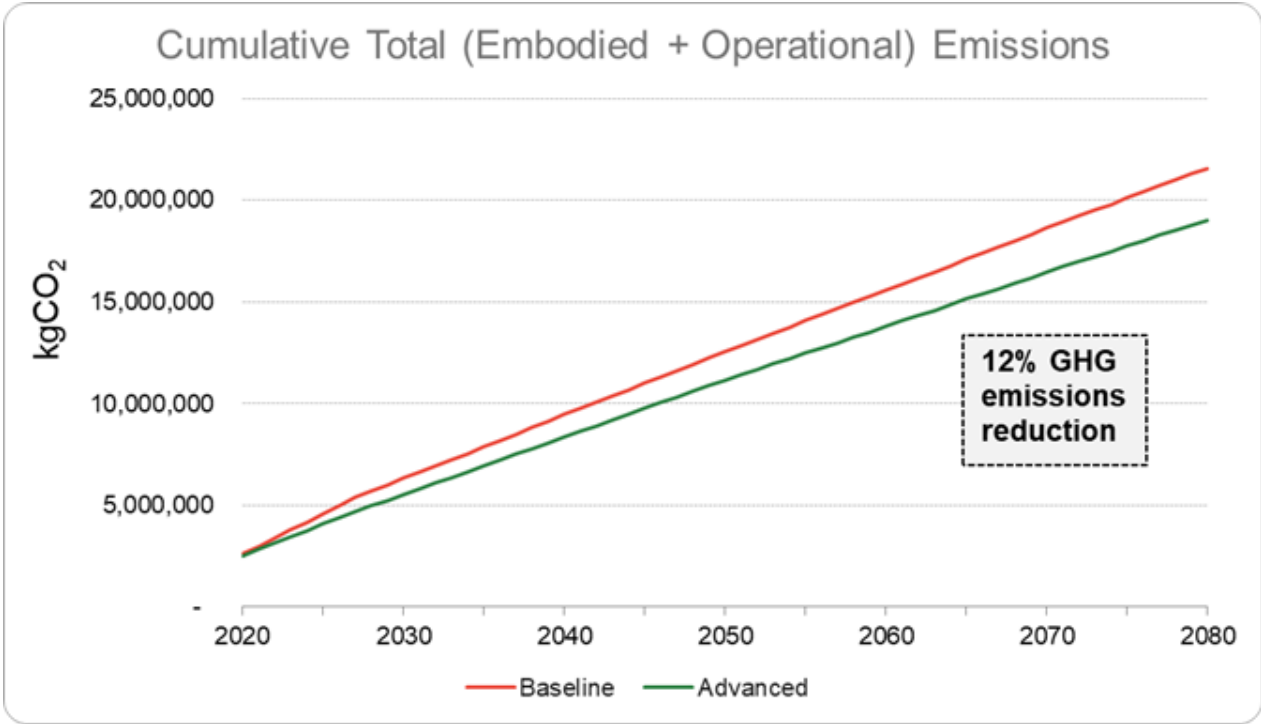
PROTOBLOCK GHG Emissions Baseline vs. Advanced

Electricity Conversion Factor = 0.225

Gas Conversion Factor = 0.181

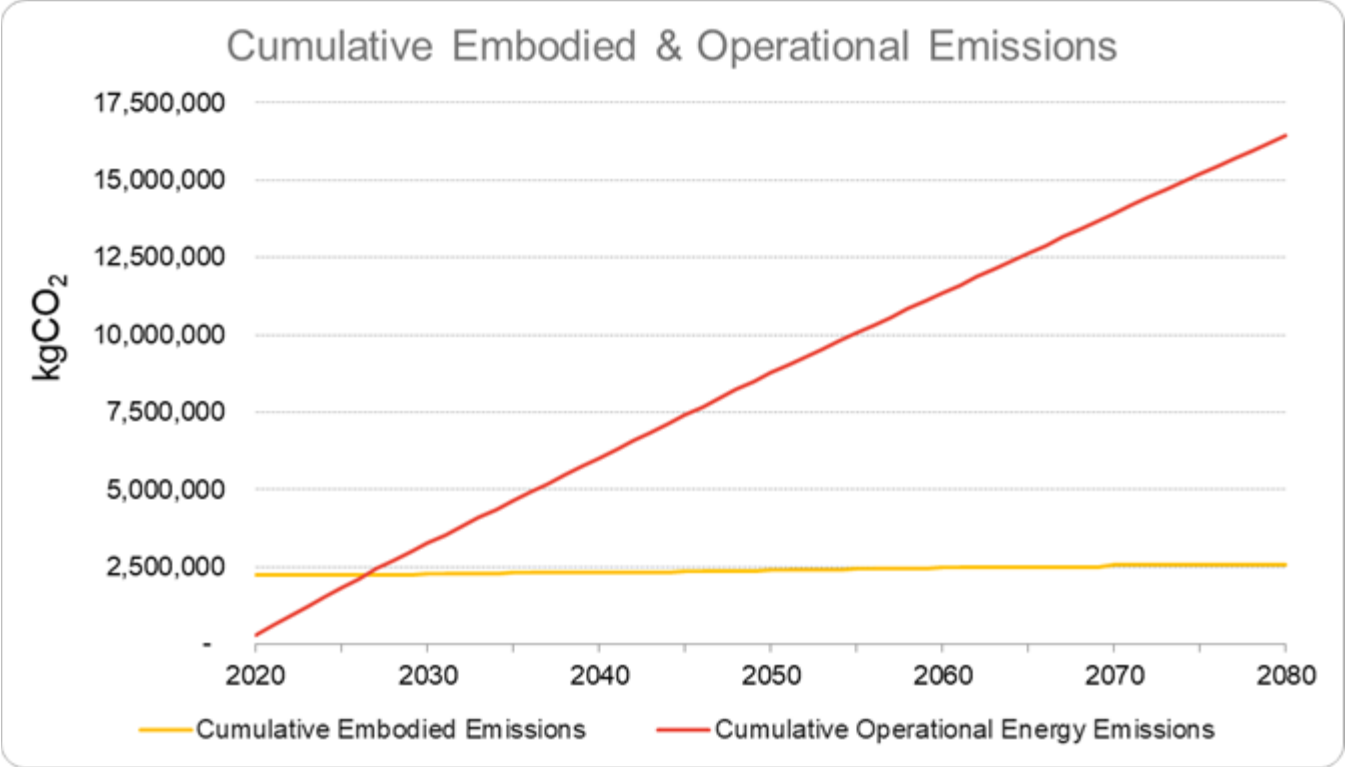
Source: Power Profiler

Source: EIA (U.S. Energy Information Administration)



Doubling the insulation while installing more efficient windows and lighting provides a 12% emissions reduction

PROTOBLOCK GHG Emissions Advanced - Embodied vs. Operational



Total embodied emissions represent about 7.5 years worth of operational energy emissions

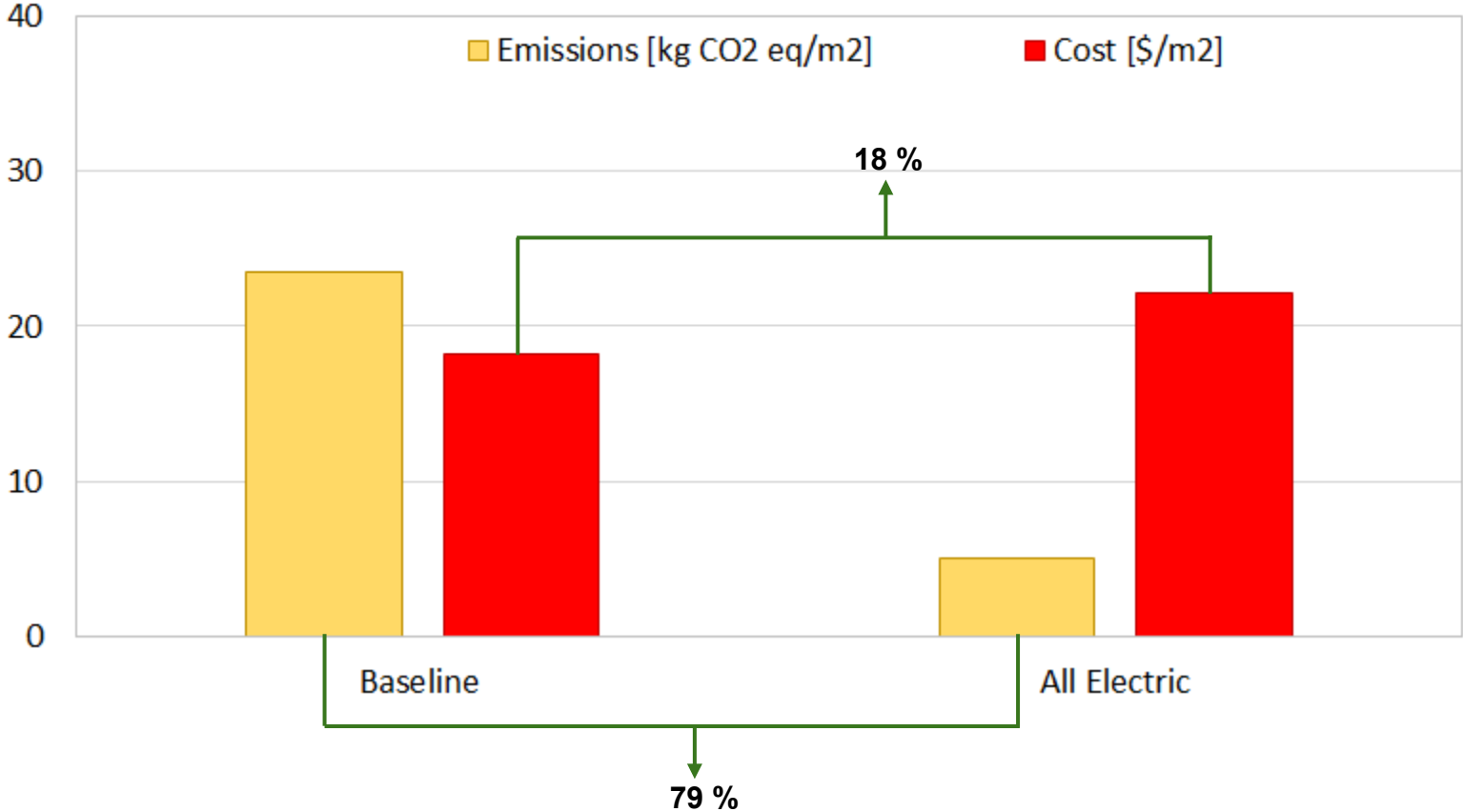
DISTRICT ENERGY SYSTEMS + ENERGY SUPPLY

RESILIENCE

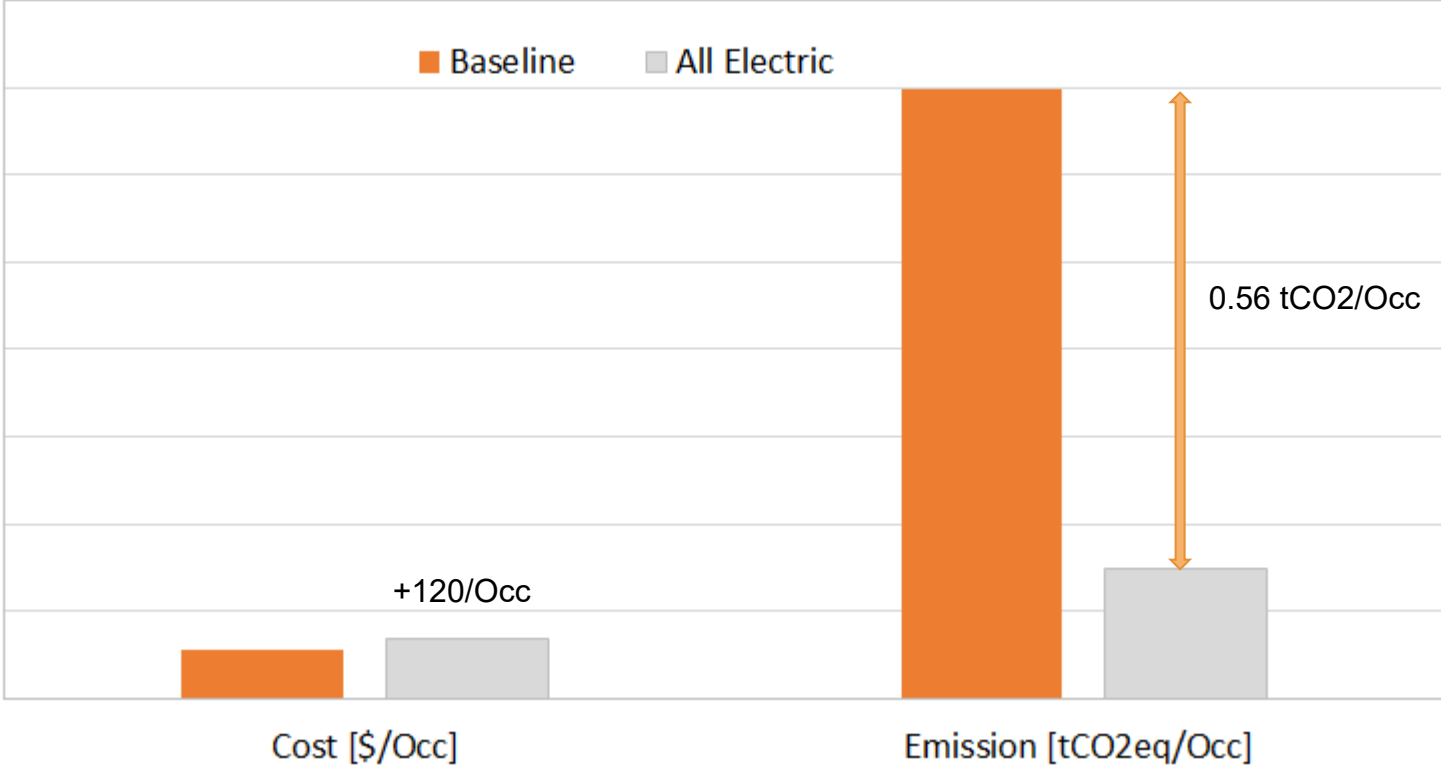
COST

HEALTH

District Energy System: Cost vs. Environmental Impact



District Energy System: Implications for Residents



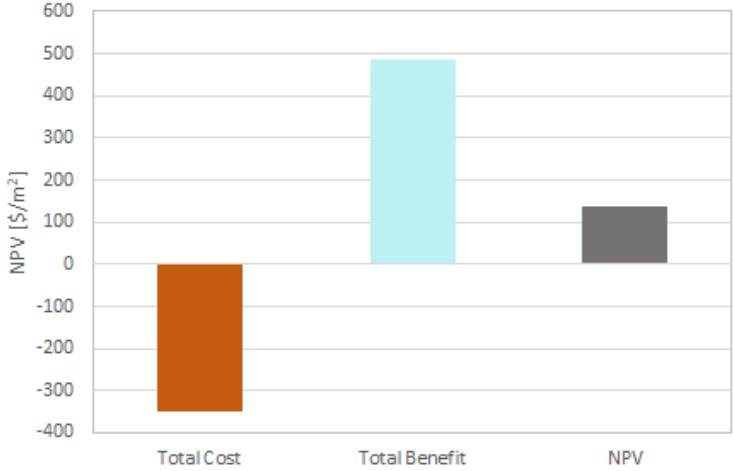
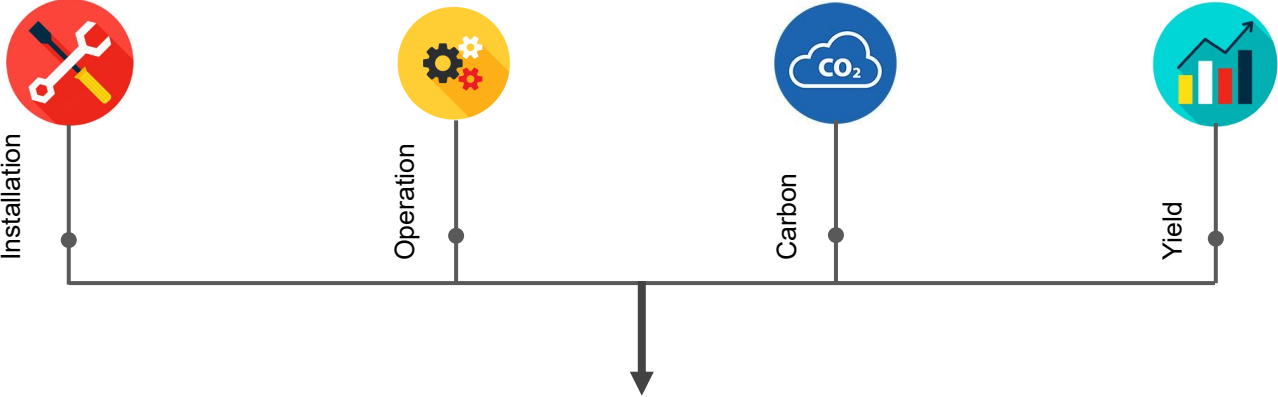
NEIGHBORHOOD PV FARM




= 2,355 sqm

COST

Cost-Benefit Analysis



	NPV (\$/m ²)	IRR (%)	First payback year
BIPV 	138.17	6	13

WALKABILITY + AMENITIES

RESILIENCE

COST

HEALTH



WALKABILITY + AMENITIES



WALKABILITY + AMENITIES



STREET DESIGN

RESILIENCE

COST

HEALTH

One Way (Main Axis) St with bus

A cross-section diagram of a one-way street. From left to right, the components are: a sidewalk (2.4 m), a transit shelter (0.3 m), a bus lane (2.7 m), a drive lane (3.3 m), a 1 m wide area with a diagonal hatched pattern, another 1 m wide area, a red bike lane (1.5 m) with a downward arrow, a green bike lane (1.5 m) with an upward arrow, a 0.3 m wide area, and a final sidewalk (3 m). The diagram includes a blue building on the left, a yellow building on the right, a palm tree, a bus, a car, and cyclists. A '7m' height marker is shown near the transit shelter.

2.4 m	0.3 m	2.7 m	3.3 m	3 m	1 m	1 m	1.5 m	1.5 m	0.3 m	3 m
Sidewalk		Transit shelter	Bus lane	Drive lane						Sidewalk

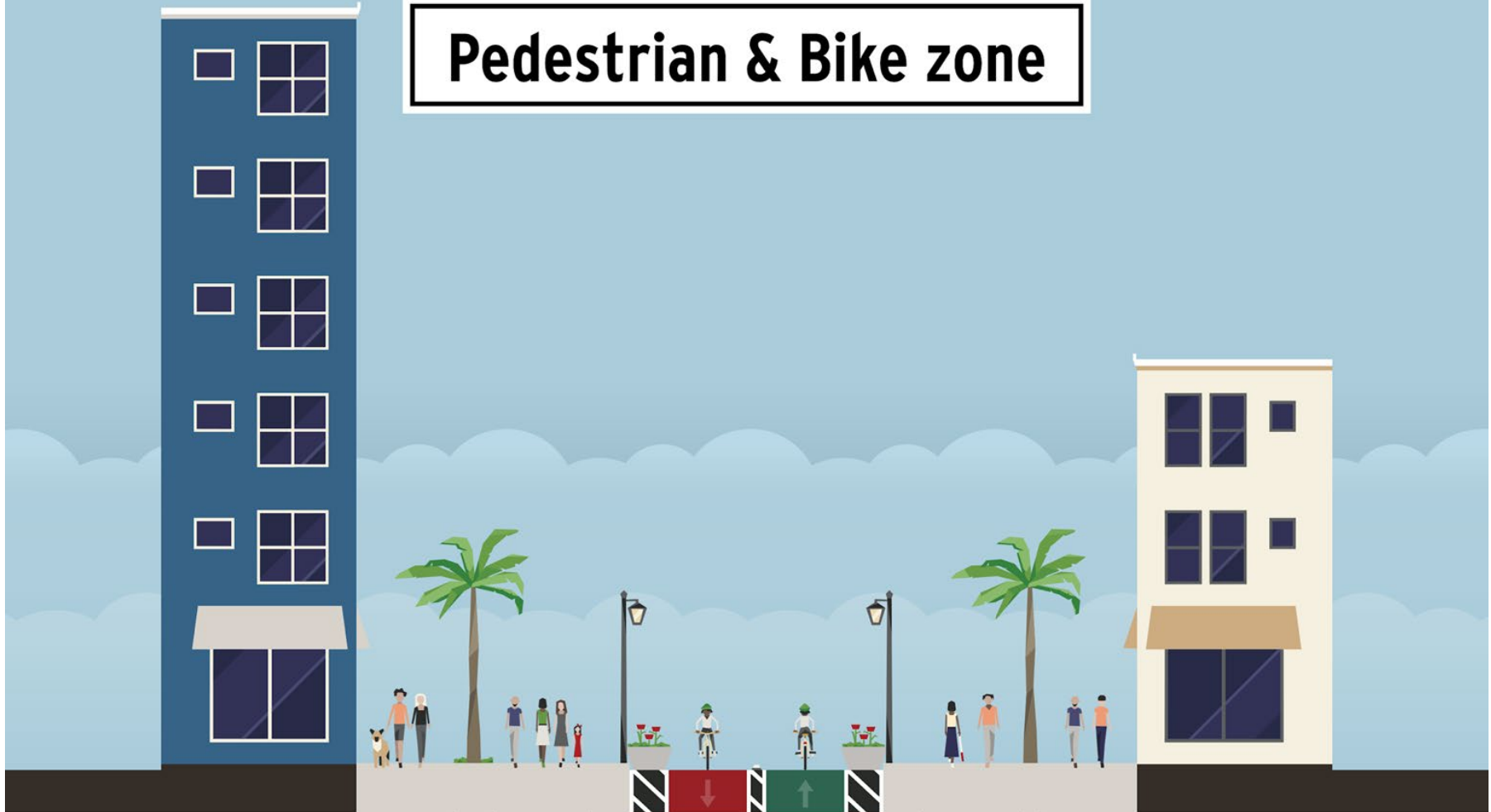
Made with **Streetmix**

One Way St



Made with **Streetmix**

Pedestrian & Bike zone



2.5 m
Sidewalk

1 m

2.5 m
Sidewalk

1 m



2.5 m
Sidewalk

0.5 m

2 m
Sidewalk

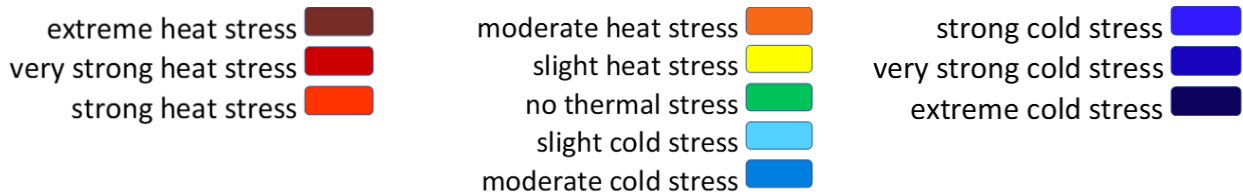
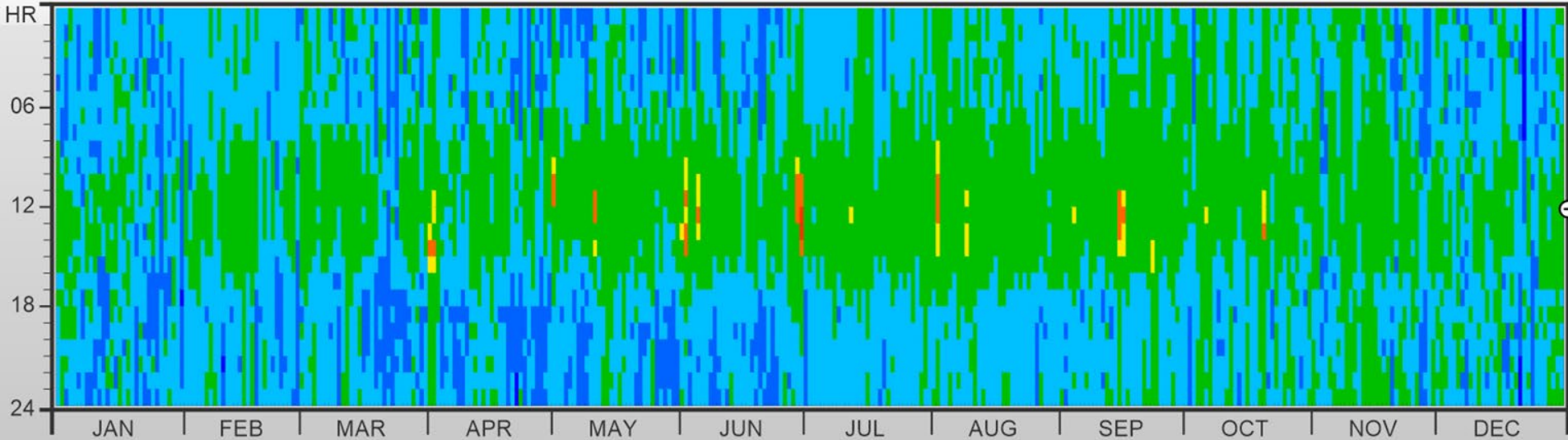
UTC1

RESILIENCE

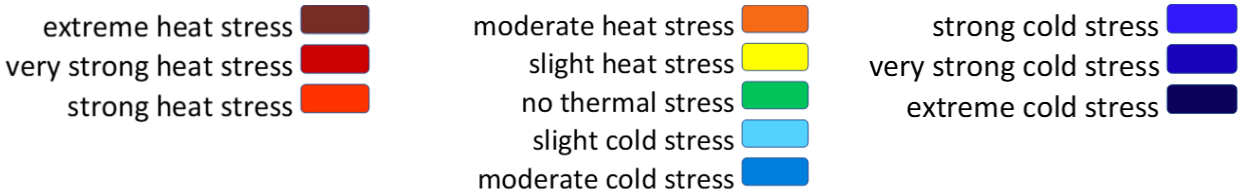
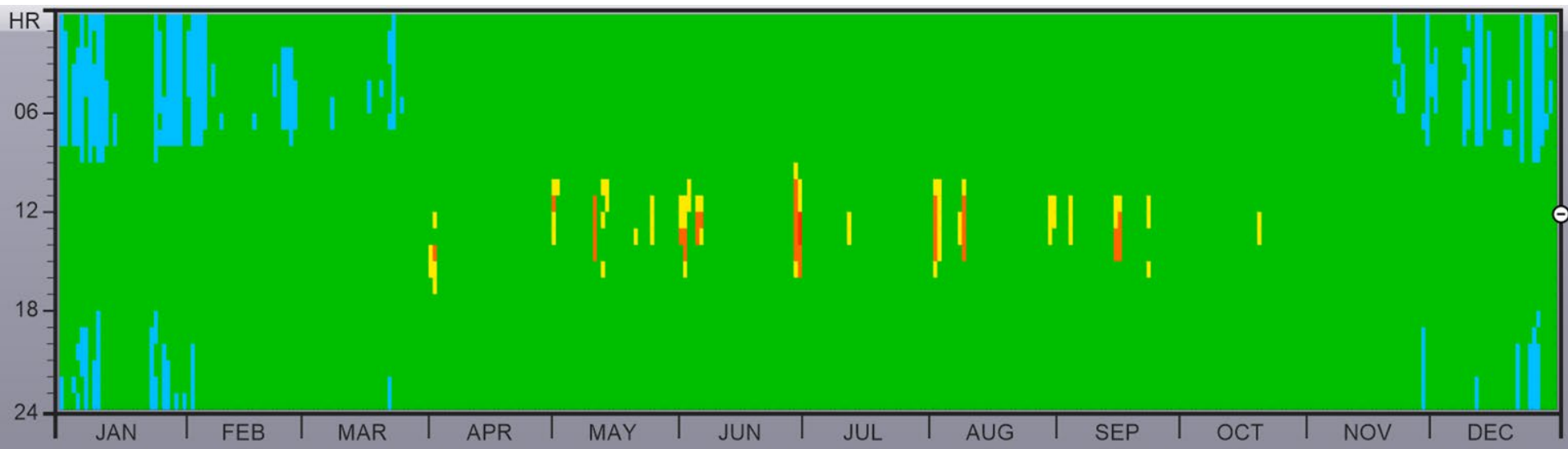
COST

HEALTH

Thermal Comfort Heatmap - Unprotected/Unshaded



Thermal Comfort Heatmap - Protected/Shaded



HEALTH

RESILIENCE

COST

HEALTH
H



Healthy Neighborhood Score

91 /100

Air Quality

Car transit

Y	N	#
		15%
X		

Smoke free

27 /30

Noise

Roads category (A1- A4)

Y	N	#
		A4
		14 km

Aircraft noise

10 /10

Active Design

Walkability

Y	N	#
		81
		5%

Bike lanes

23 /25

Nutrition

Healthy food places

Y	N	#
		8
		7%

Integrated agriculture

13 /15

Biophilia

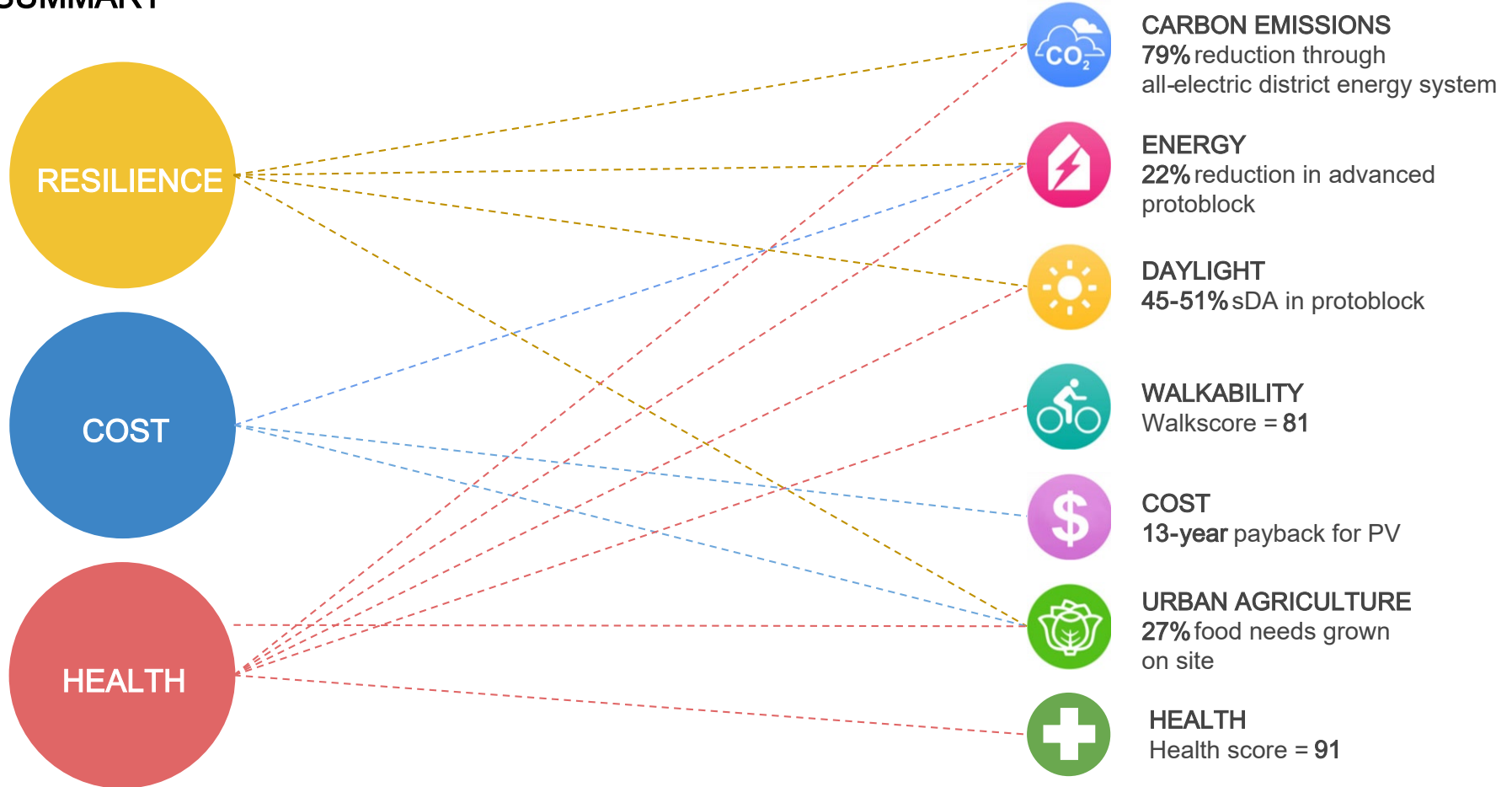
Green rooftops

Y	N	#
		6%
		59%

Parks

18 /20

SUMMARY



THANK YOU