

IMPROVING THE SITUATION OF A LOCAL SOUQ AREA IN EGYPT

INFORMALITY ... CAN KLIMAENGINEERING HAVE AN IMPACT?

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The Study Area : Location and Existing Situation

Main Issues (Problems)

Actions Plan (Energy and Comfort Plan) What Can Be Done?

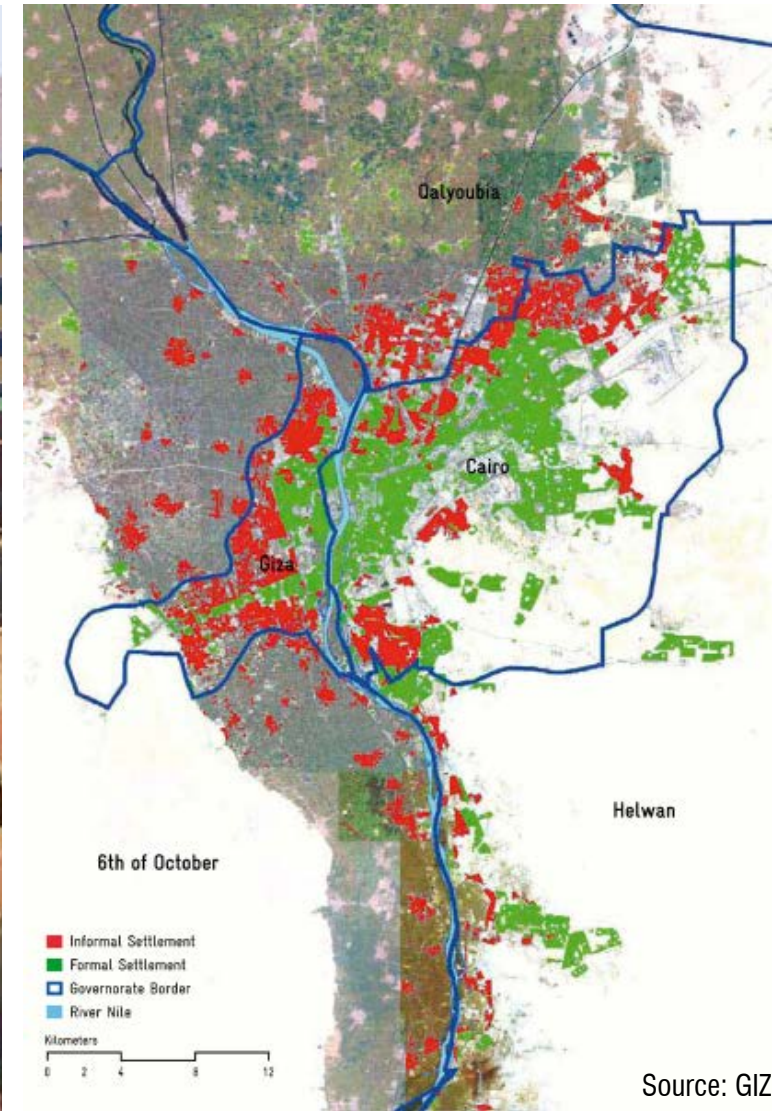
Summary and The Way Forward



1. INTRODUCTION

**WHY THIS AREA? : UNPLANNED
ENERGY CRISIS IN EGYPT
CLIMATE CHANGE AND COMFORT
CONCLUSION : VULNERABILITIES**

WHY THIS AREA? : INFORMALITY - UNPLANNED AREAS



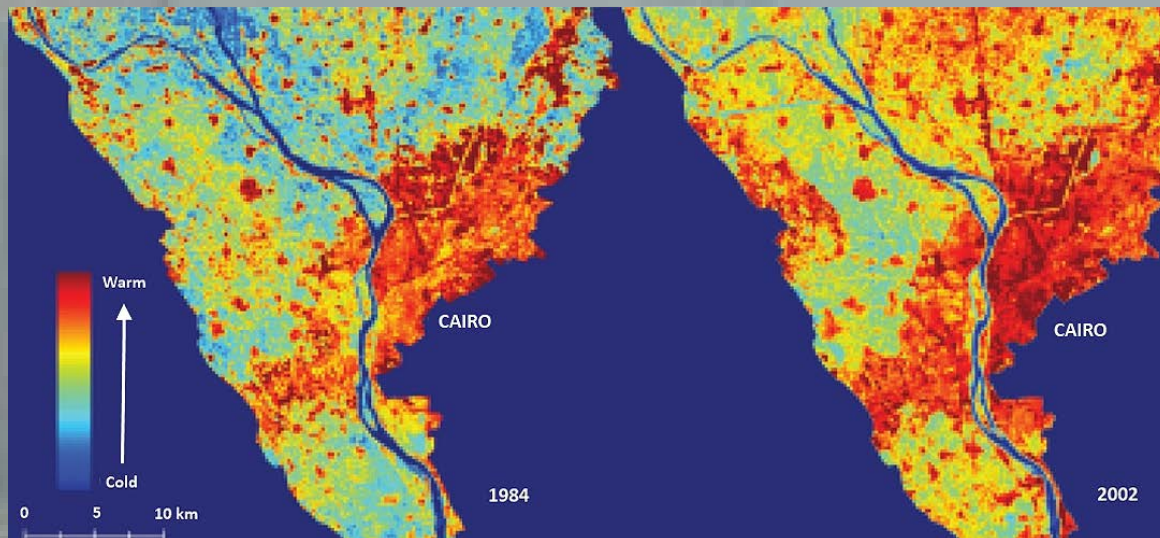
Informality ... unplanned areas form more than half of the urban areas in Egypt (Population 35%:65% - Area 45%:55%)

WHY THIS AREA? ENERGY CRISIS IN EGYPT



Energy Subsidies is accounting for 21% of the public expenditure in Egypt

WHY THIS AREA? CLIMATE CHANGE AND COMFORT



Source: Ghoniem, 2009



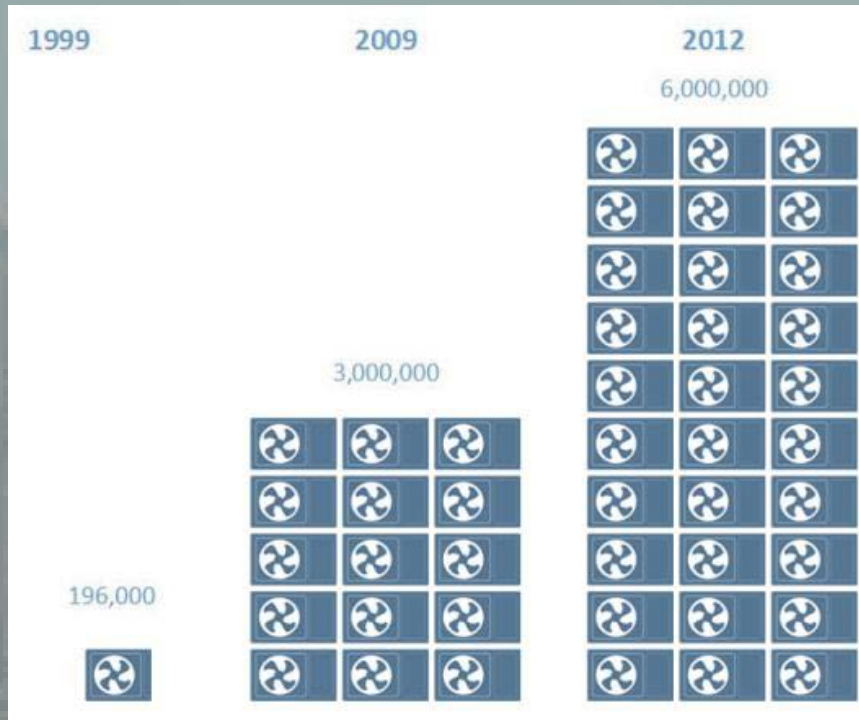
Rising of sea level, Urbanization Process, Global Warming and UHI

WHY THIS AREA? CLIMATE CHANGE AND COMFORT



Egypt belongs to one of the most vulnerable regions worldwide to climate change, **IPCC 2007**

WHY THIS AREA? CLIMATE CHANGE AND COMFORT



3000 %

Increase of ACs in last 13 years

1,2 M

Air conditioners/Year

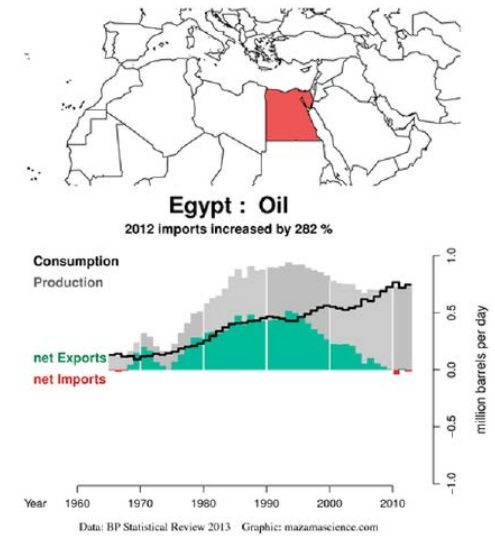
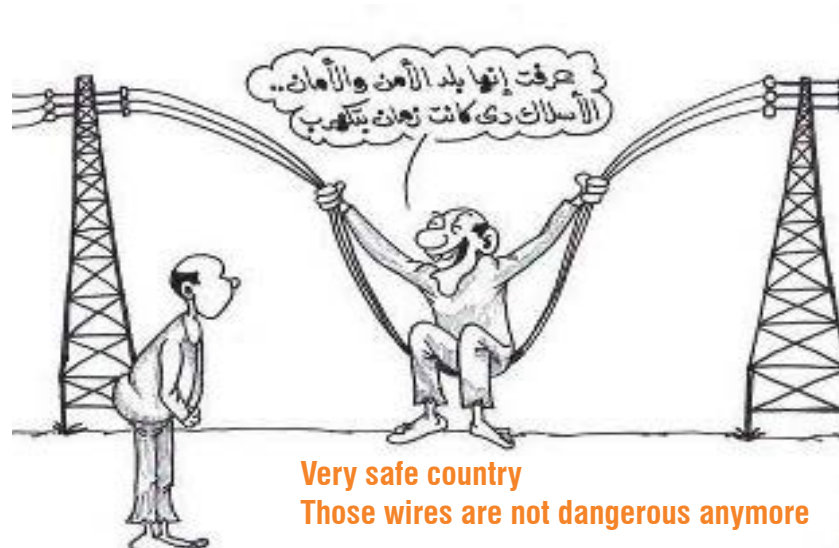
<http://www.carboun.com>

As result, this led to an increase in air conditioning devices (climate change, UHI)

WHY THIS AREA? SUMMARY : VULNERABILITIES

ENERGY

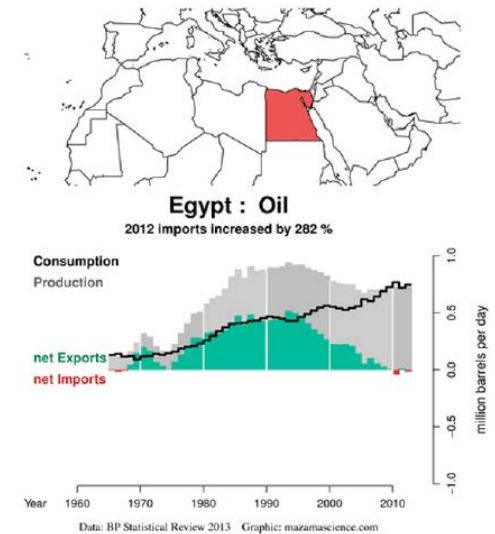
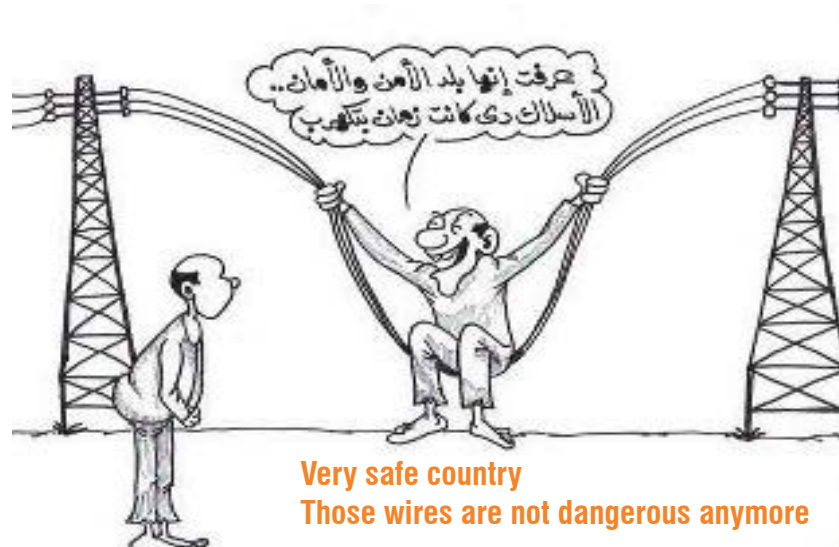
Electricity blackouts
Financial vulnerabilities
Lack of natural gas supplies
Shifting to importing state



WHY THIS AREA? SUMMARY : VULNERABILITIES

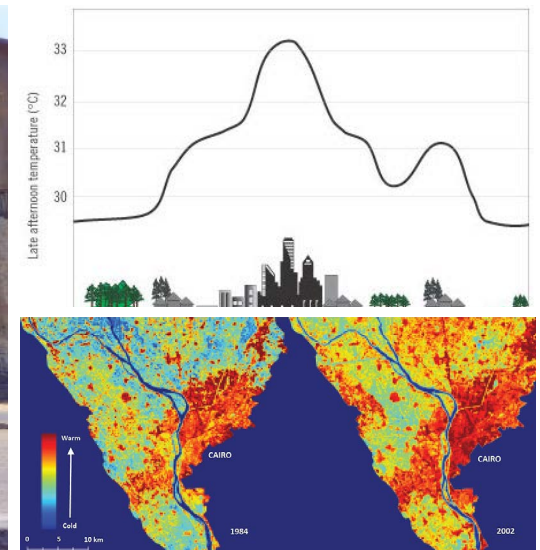
ENERGY

Electricity blackouts
Financial vulnerabilities
Lack of natural gas supplies
Shifting to importing state



CLIMATE & COMFORT

Urban Heat Island
Black clouds
Lack of fresh air
Health Impacts



An aerial photograph showing a dense urban environment. In the foreground, there is a large, sprawling informal settlement with numerous small, makeshift structures and tents. The settlement is surrounded by more formal, multi-story buildings. The overall scene depicts a complex urban landscape with significant informal housing.

2. EXISTING SITUATION

LOCATION

SCOPE OF WORK: (SPATIALLY AND TECHNICALLY)

CLIMATE ANALYSIS

THE MARKET PLAZA

INDOOR COMFORT (BUILDING ENVELOPE)

URBAN AND BUILDING CHARACTERISTICS

ENERGY CONSUMPTION

SUMMARY OF MAIN ISSUES

THE MARKET AREA : LOCATION

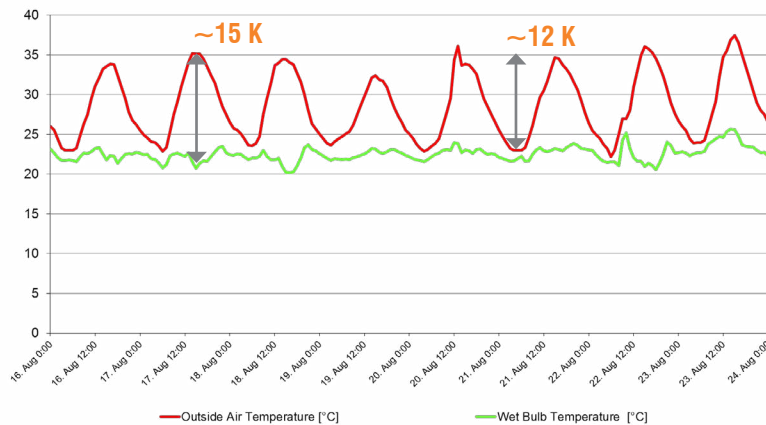


THE MARKET AREA : SCOPE OF WORK (SPATIALLY AND TECHNICALLY)

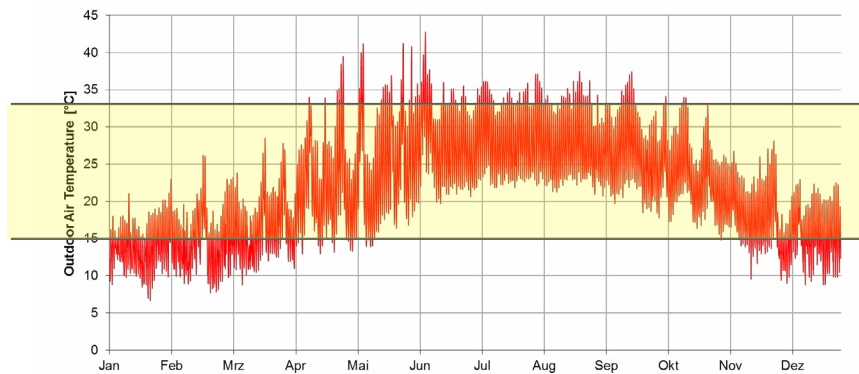


The spatial focus will be on the market plaza and surrounding buildings

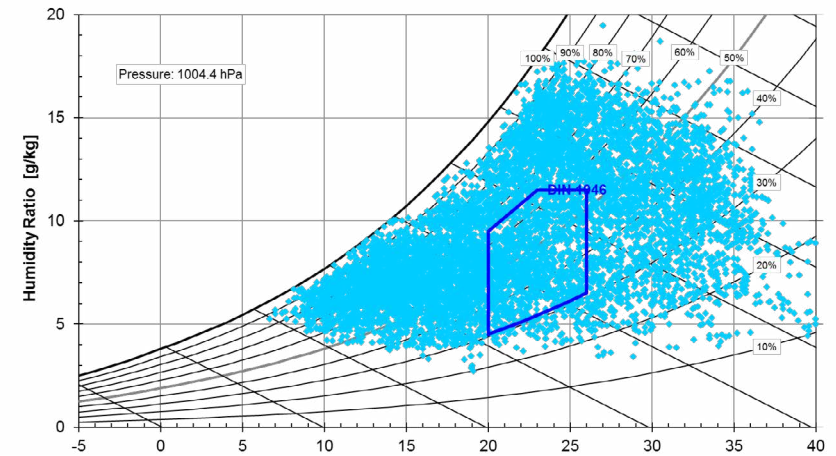
THE EXISTING SITUATION : CLIMATE ANALYSIS



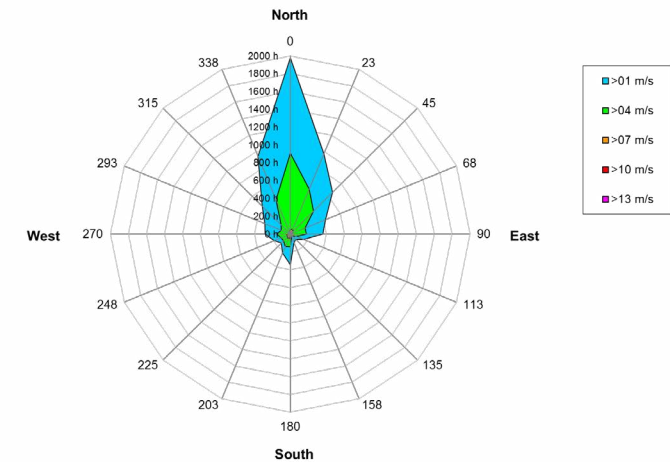
Potential of adiabatic and night time cooling



Annual data for ambient temperature show high summer values staying far outside the human comfort range

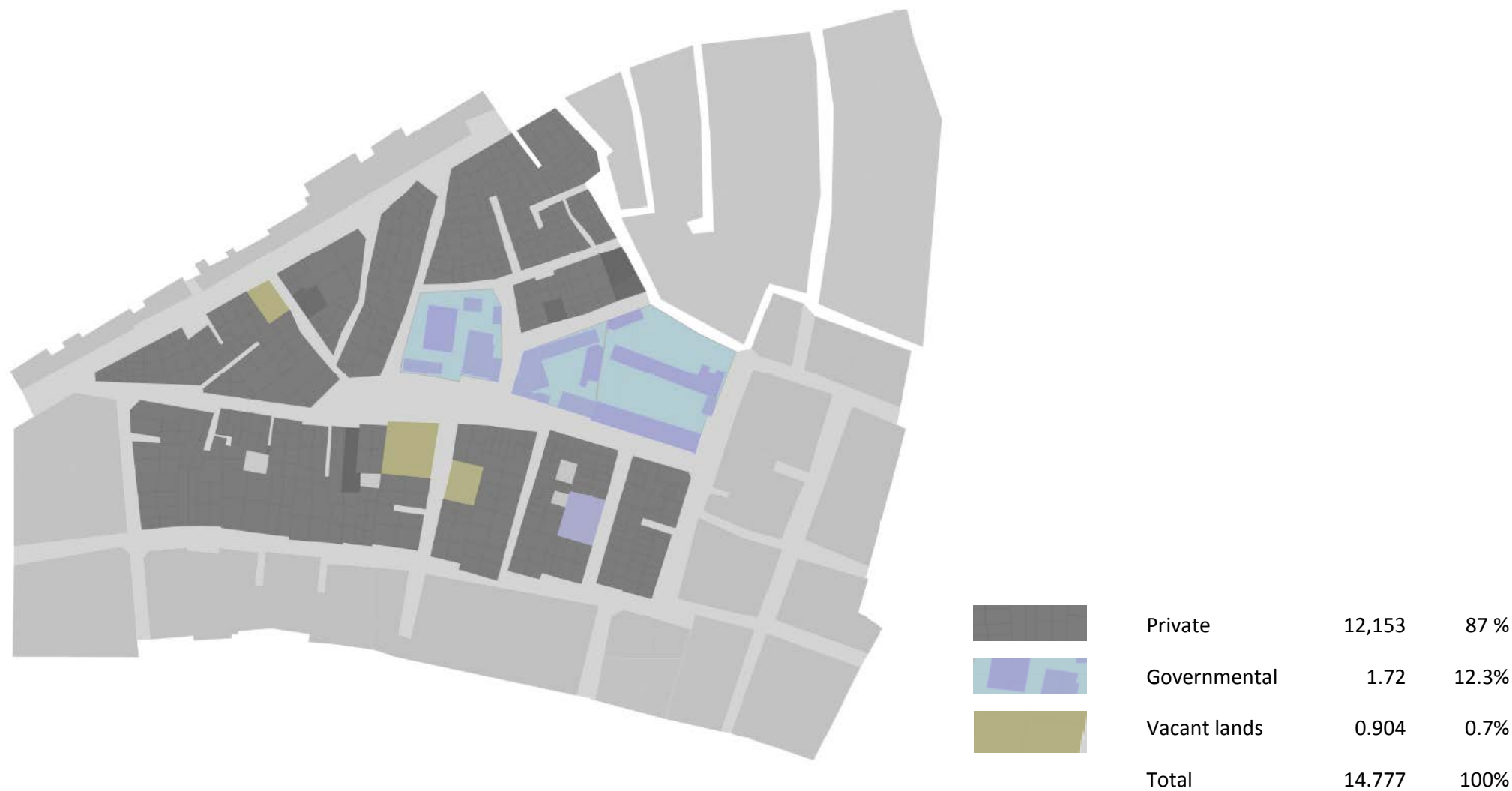


High temperatures require appropriate thermal insulation of the buildings envelope



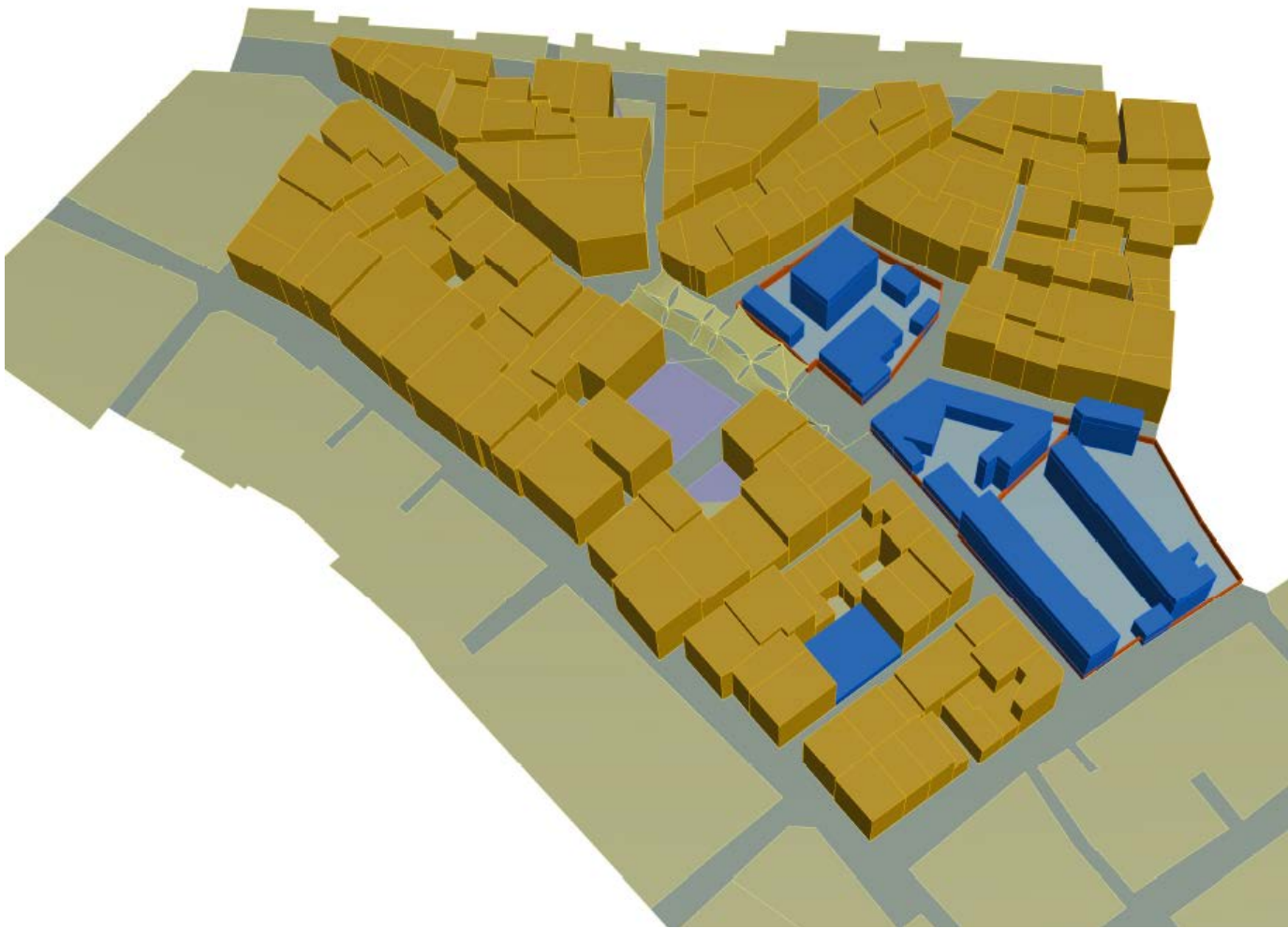
Ideal wind comes from north

THE EXISTING SITUATION : URBAN CHARACTERISTICS/ LAND OWNERSHIP



Mostly Privately Owned, with 12% Govermental lands and buildings

THE EXISTING SITUATION : URBAN CHARACTERISTICS/ LANDUSES



	GFR in Ha	
Residential	44.45	70.7%
Commercial	7.01	11.1%
Clinics & Offices	6.71	10.7%
Restaurants	1.12	1.8%
Public Buildings	1.6	2.4%
Storages	2.10	3.3%

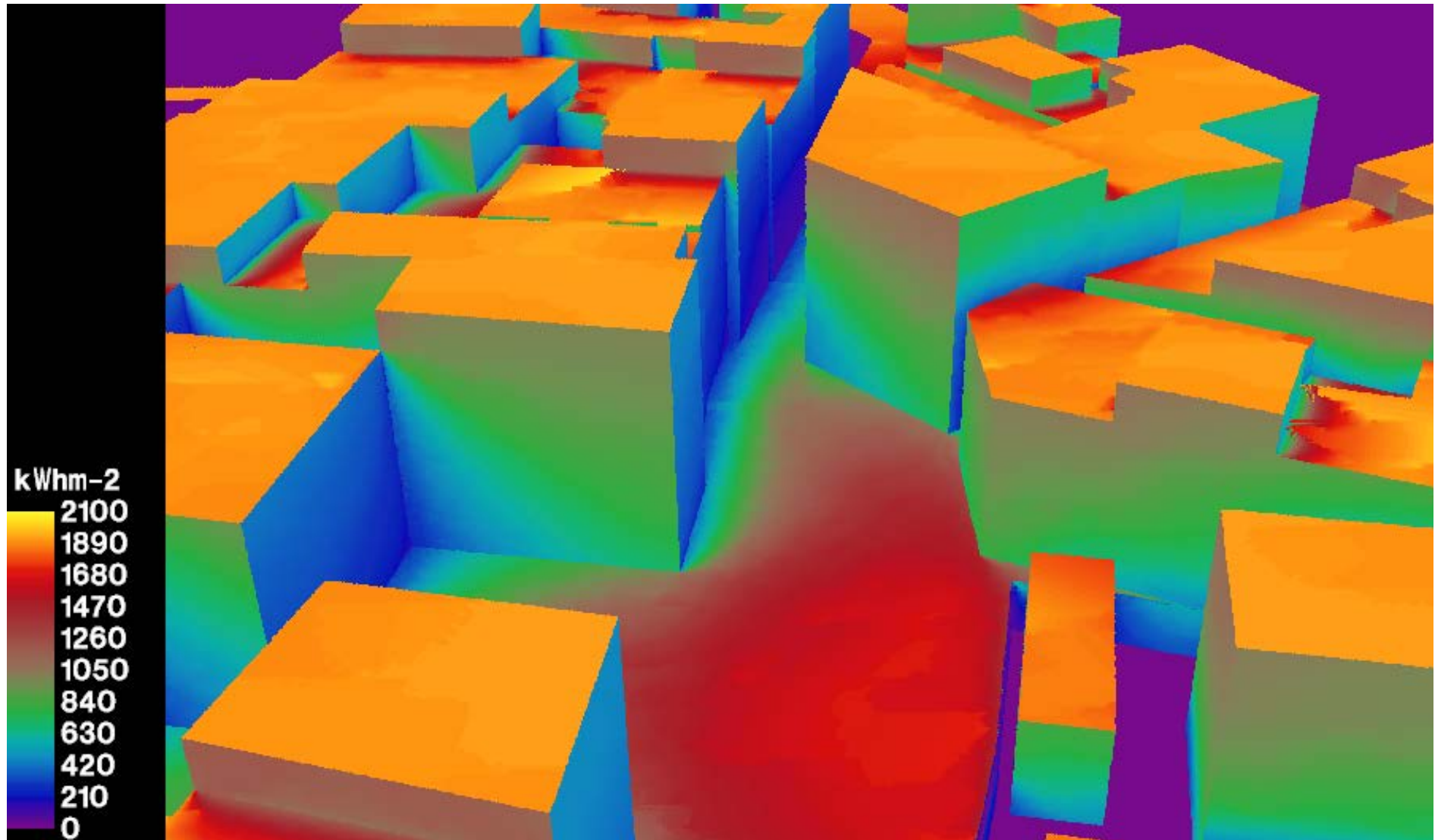
Mainly Residential More than 70%

THE EXISTING SITUATION : THE MARKET PLAZA



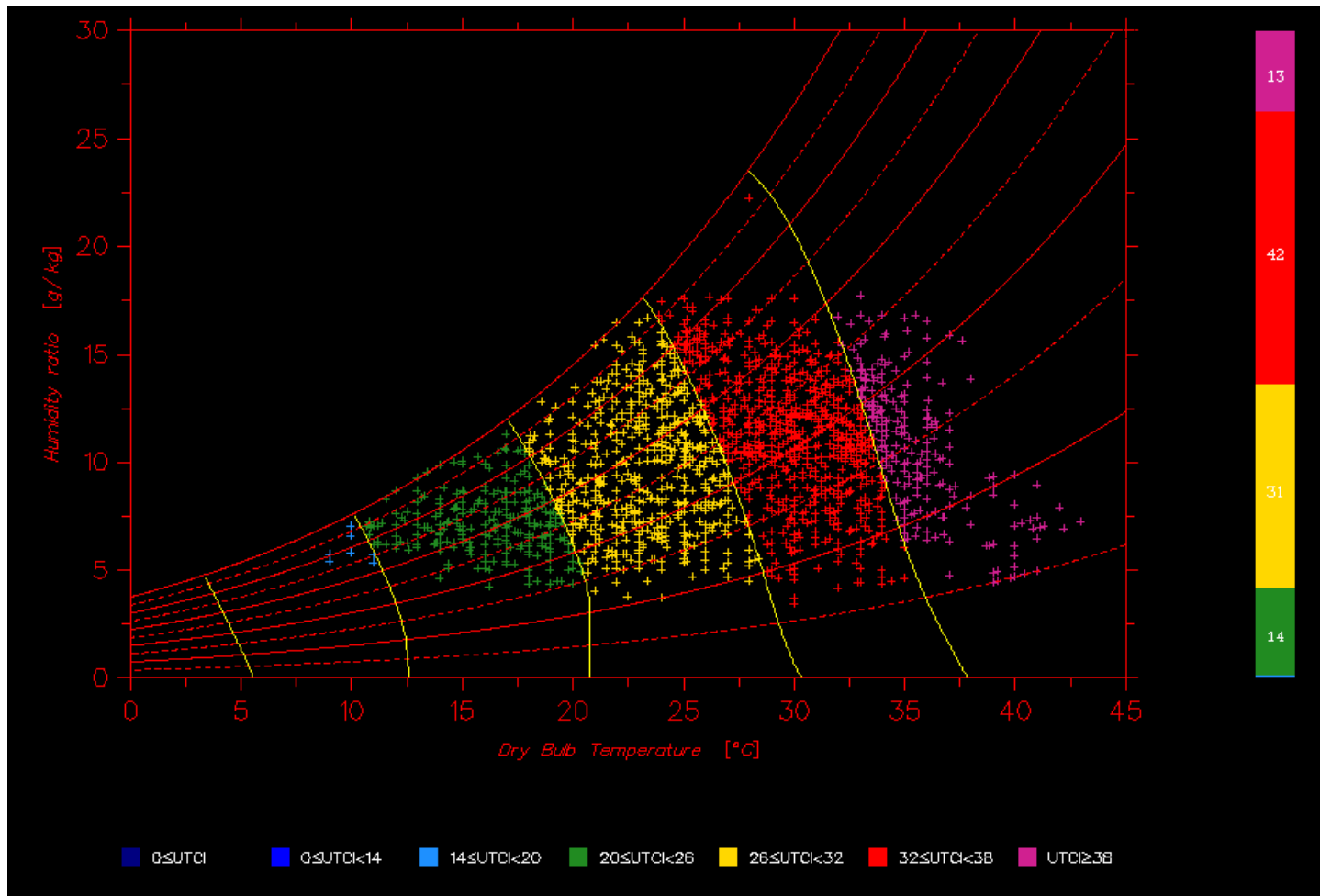
Asphalt, Simple Shades, Permanent Vendors !

THE EXISTING SITUATION : THE MARKET PLAZA



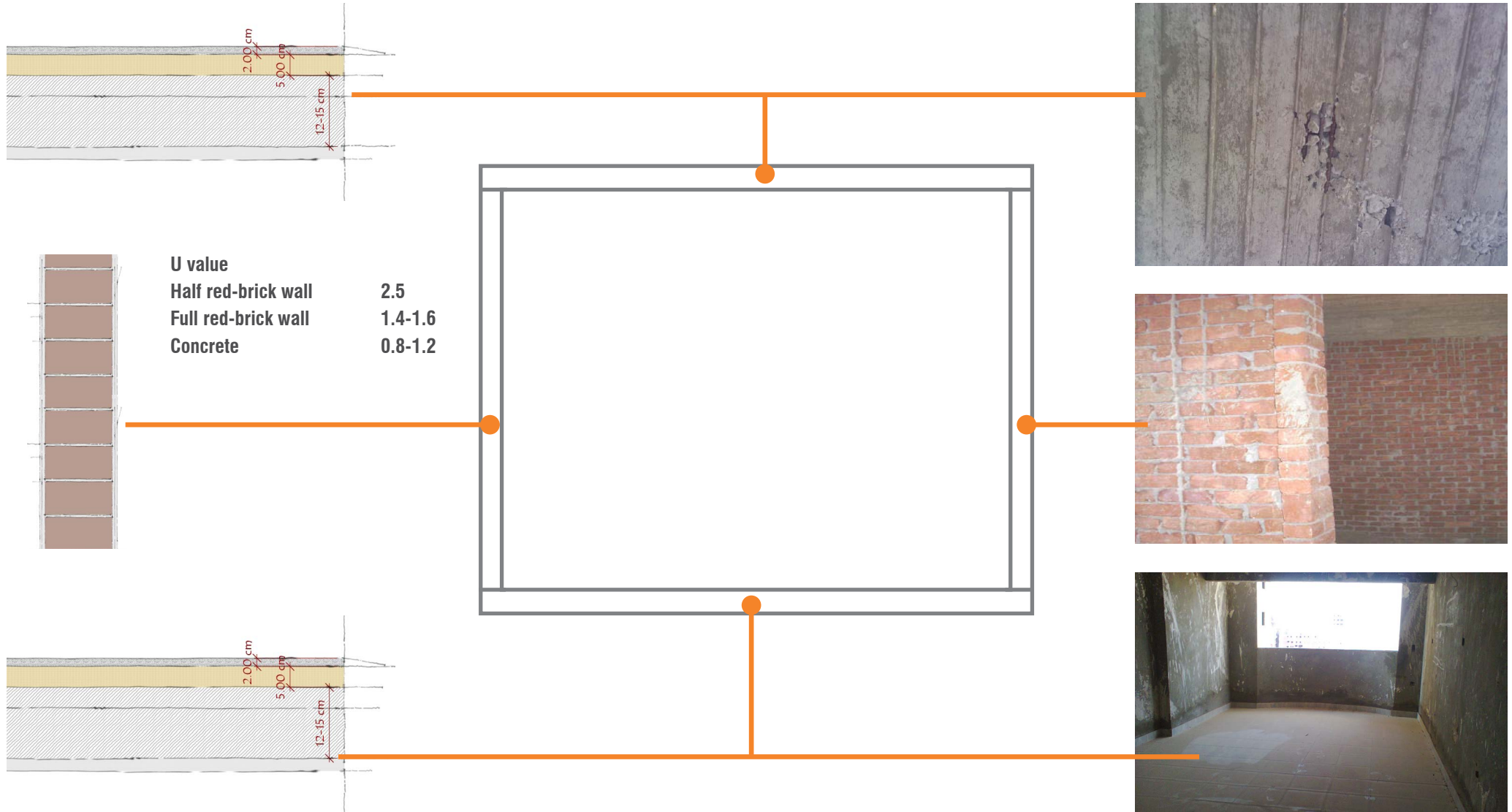
High Solar Radiation on buildings roofs and on plaza

THE EXISTING SITUATION : THE MARKET PLAZA



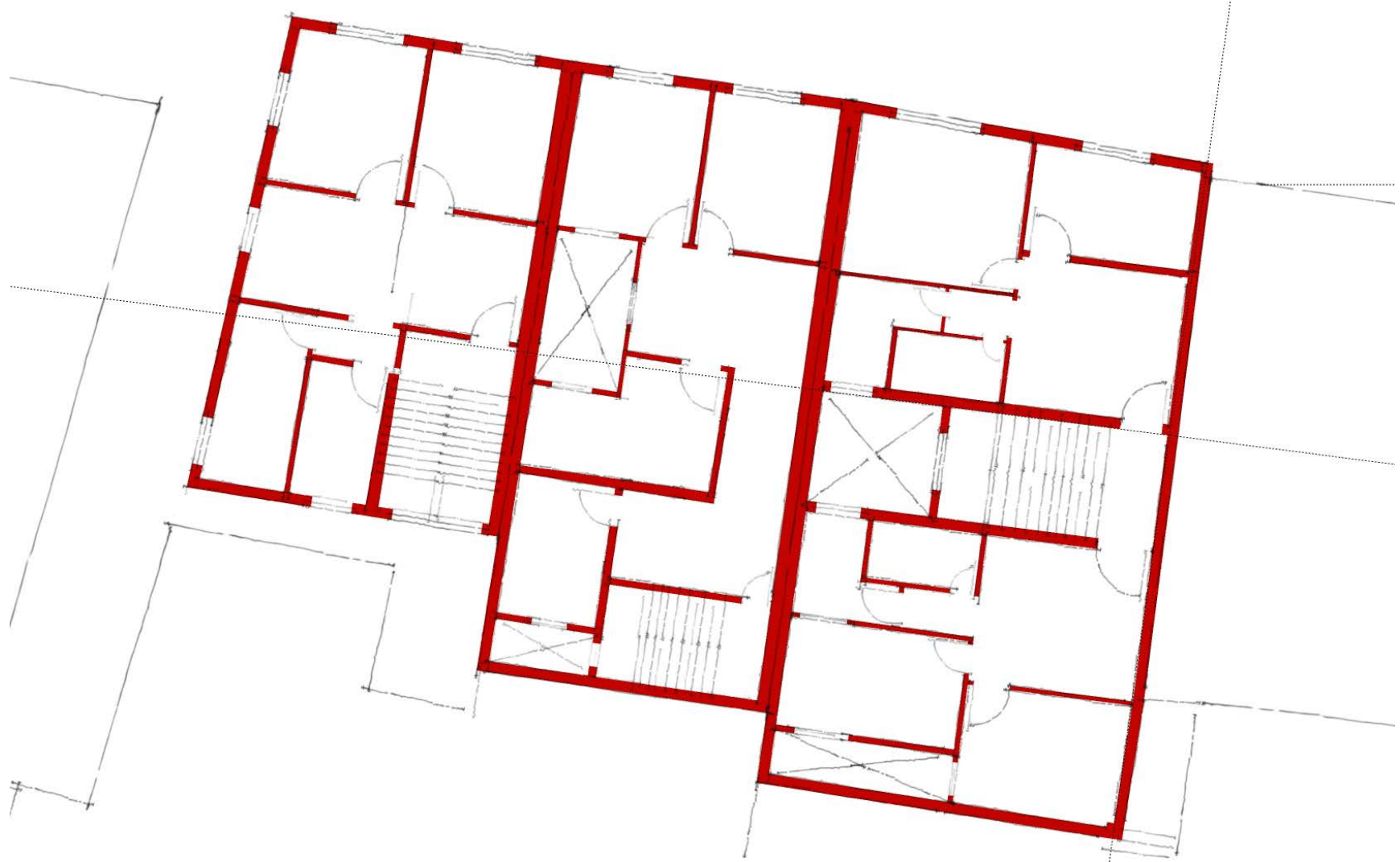
Extreme Heat Stress in more than 45% of the time

THE EXISTING SITUATION : INDOOR COMFORT (BUILDING ENVELOPE)



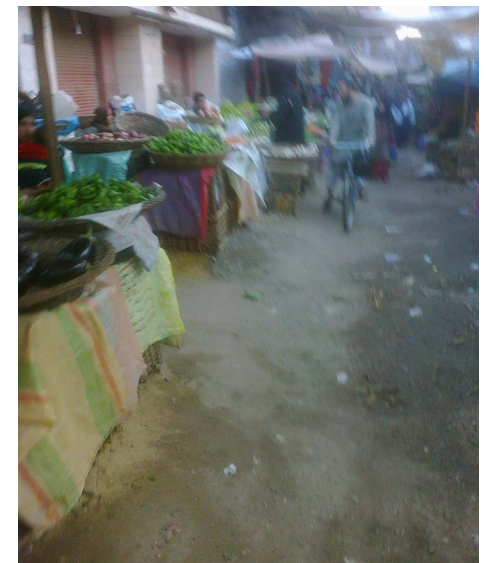
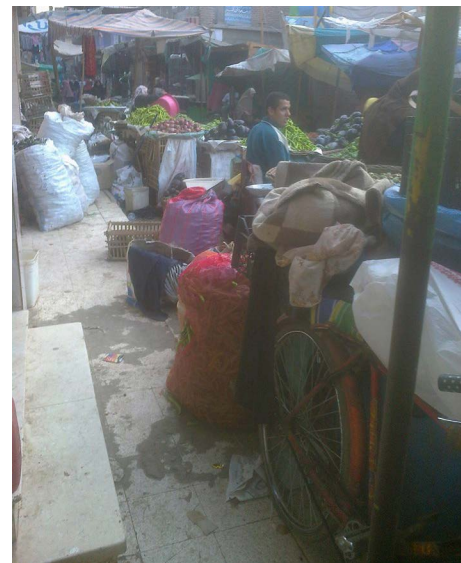
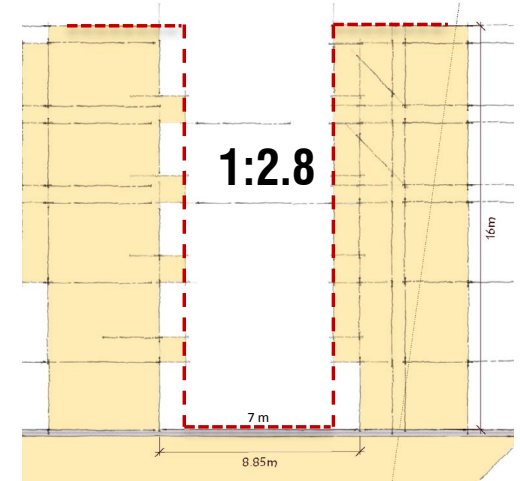
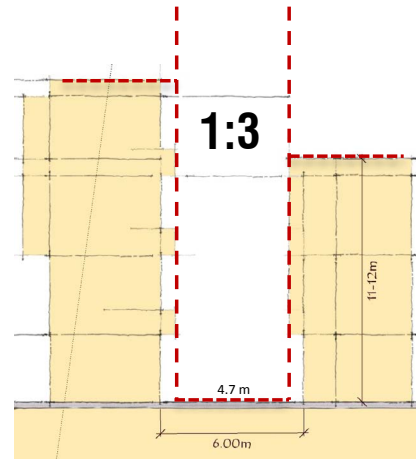
Low Quality Building Envelope

THE EXISTING SITUATION : URBAN AND BUILDING CHARACTERISTICS



Lack of daylight access due to the highly compact urban pattern

THE EXISTING SITUATION : URBAN CHARACTERISTICS / SHADOW DENSITY



High W/H Ratios, Dim narrow streets around the market space.

THE EXISTING SITUATION : **URBAN CHARACTERISTICS / SHADOW DENSITY**



High Level of shadow density, Dim narrow streets around the market plaza

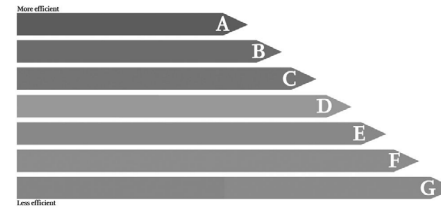
THE EXISTING SITUATION : **ENERGY CONSUMPTION**



**SAMPLES
DIFFERENT APARTMENTS**



**DOMESTIC APPLIANCES
TVS
REFRIGERATORS
ACS
....**

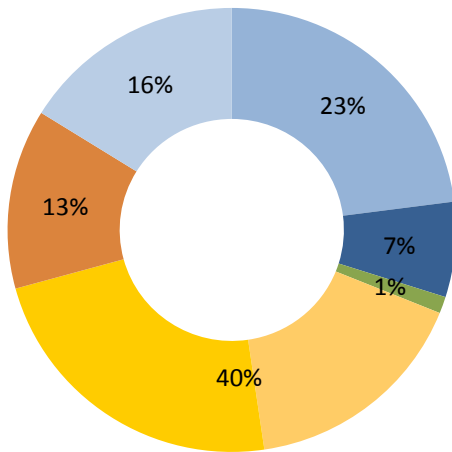
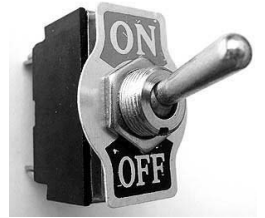
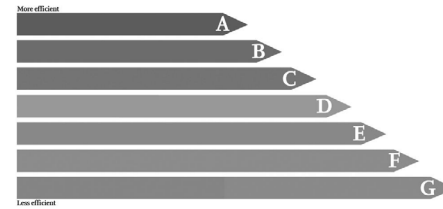


ENERGY CONSUMPTION



**OPERATION HOURS
DAILY
YEARLY**

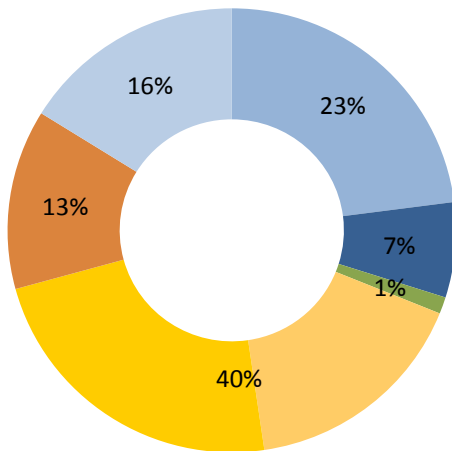
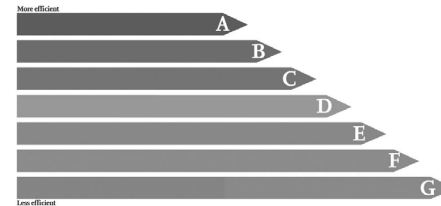
THE EXISTING SITUATION : ENERGY CONSUMPTION



2100 KWH/PERSON/Y

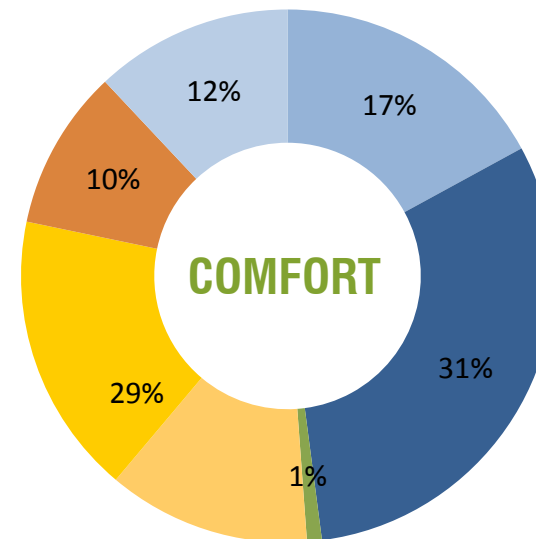
85 KWH/ M2

THE EXISTING SITUATION : ENERGY CONSUMPTION



2000 KWH/PERSON/Y
85 KWH/ M2

2007 : 1300 KWH/PERSON/Y (WB)
 2011 : 1900 KWH/PERSON/Y (WB)
 2014 : 2150 KWH/PERSON/Y (MEE)



3300 KWH/PERSON/Y
135 KWH/ M2

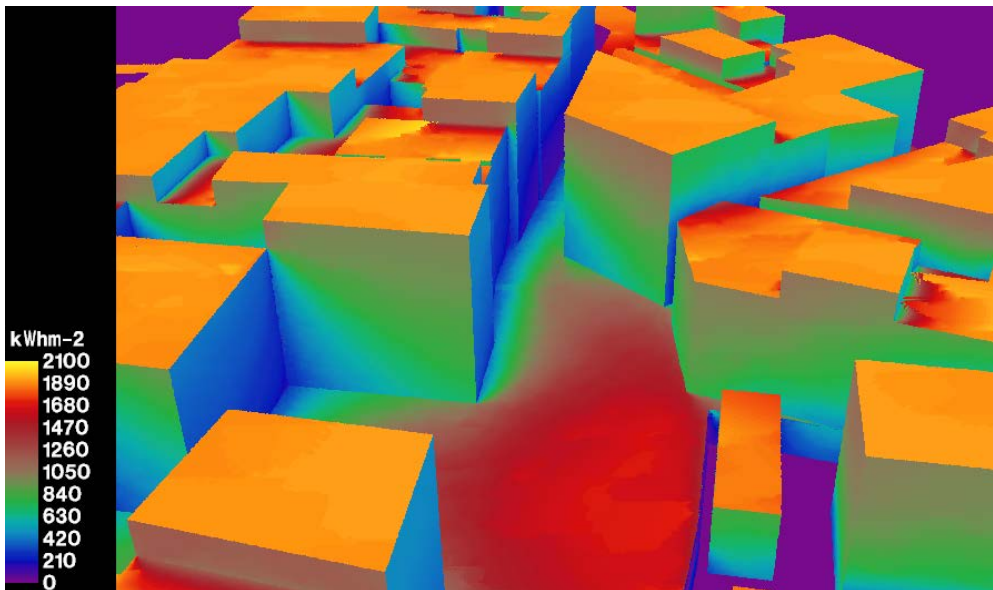
- Refrigerators
- Air conditioners
- Fans
- Lighting equipments
- Electric water heaters
- Domestic Appliances

THE EXISTING SITUATION : SUMMARY OF MAIN ISSUES

HEAT STRESS

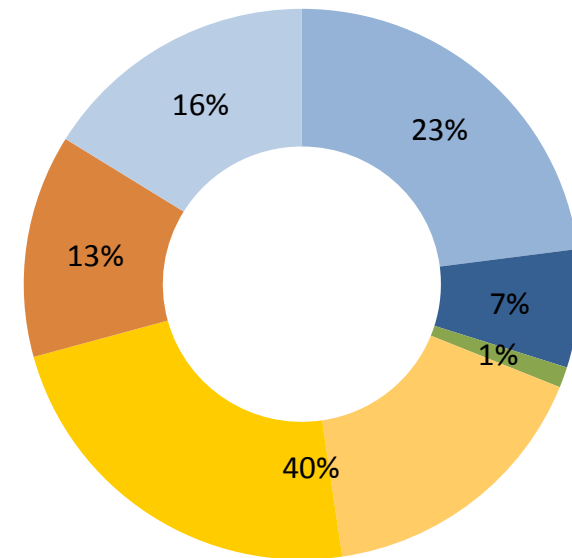
ON THE MARKET PLAZA

ON THE LAST FOOR



LOW QUALITY OF
BUILDING ENVELOPE

ENERGY CONSUMPTION
(LIGHTING)



HIGH POTENTIAL OF UTILIZING SOLAR RADIATION

IMPROVEMENT OF LIGHTING BULBS



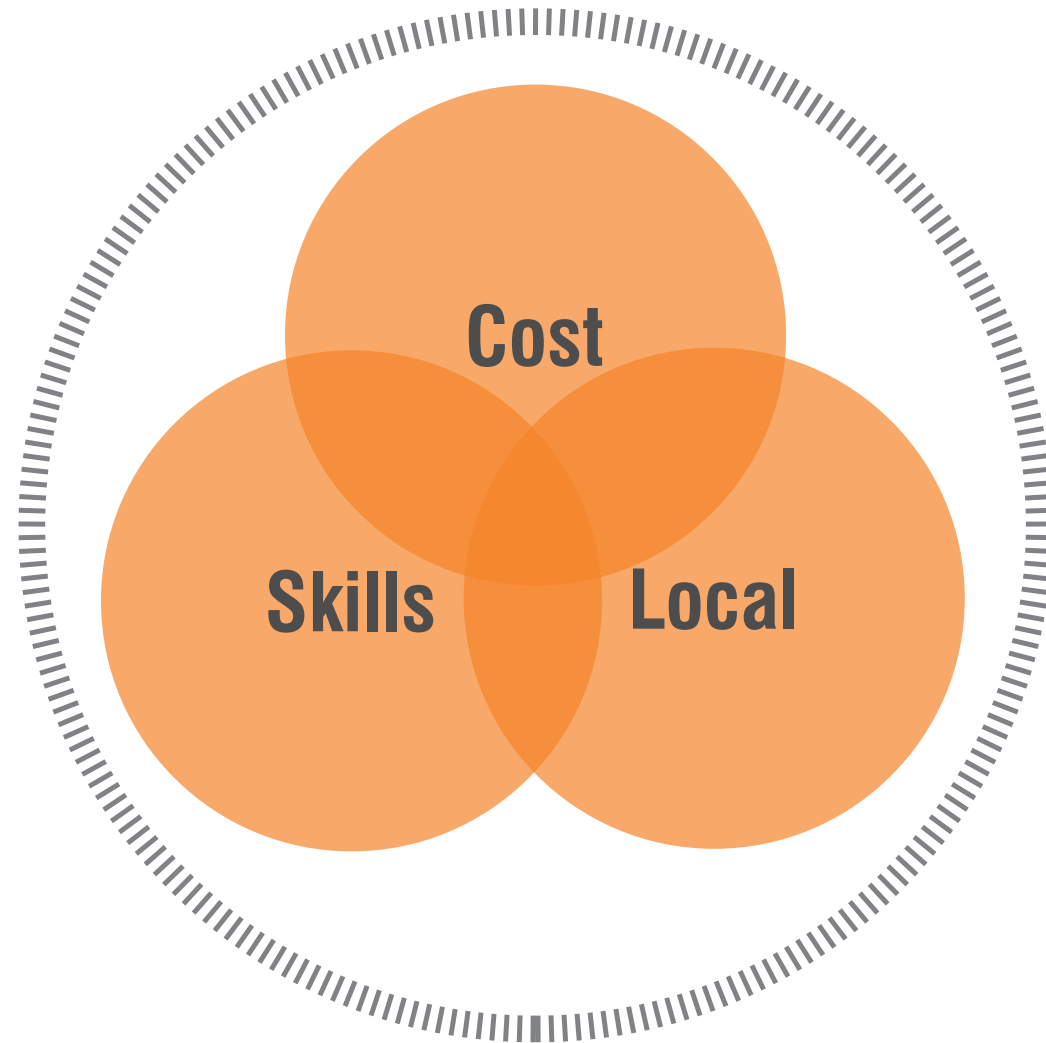
3. ACTIONS PLAN : **OUTLINE OF SEAP** (SUSTAINABLE ENERGY ACTION PLAN)

CONSIDERATION

ACTIONS PLAN

THE WAY FORWARD > NEXT STEPS

ACTION PLAN : **CONSIDERATION**



Reasonable, cheap, local materials and skills

ACTIONS PLAN : **OUTLINE OF SEAP** (SUSTAINABLE ENERGY ACTION PLAN)

**ACTION
#1**

Light Bulbs Replacement



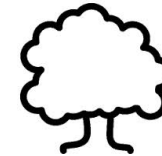
**ACTION
#2**

Water Solar Heaters



**ACTION
#3**

Green Roofs



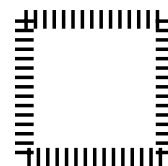
**ACTION
#4**

Shading Market Plaza

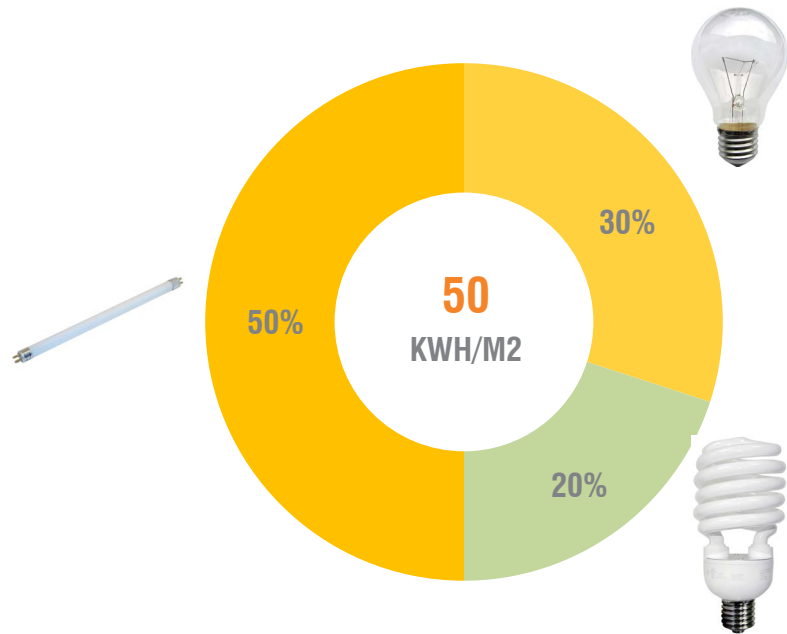


**ACTION
#5**

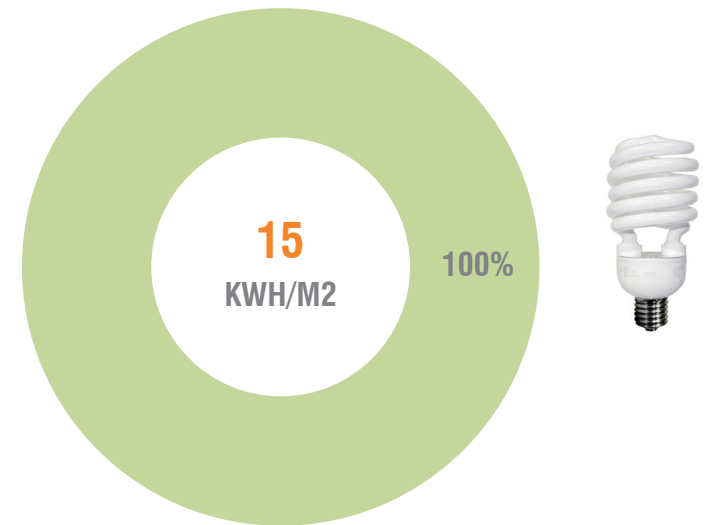
**Building Envelope
Improvements**



OUTLINE OF SEAP : ACTION 01: MEASURE 01/A : CHANGE LIGHTING BULBS



2100 KWH/Y/PERSON



1650 KWH/Y/PERSON

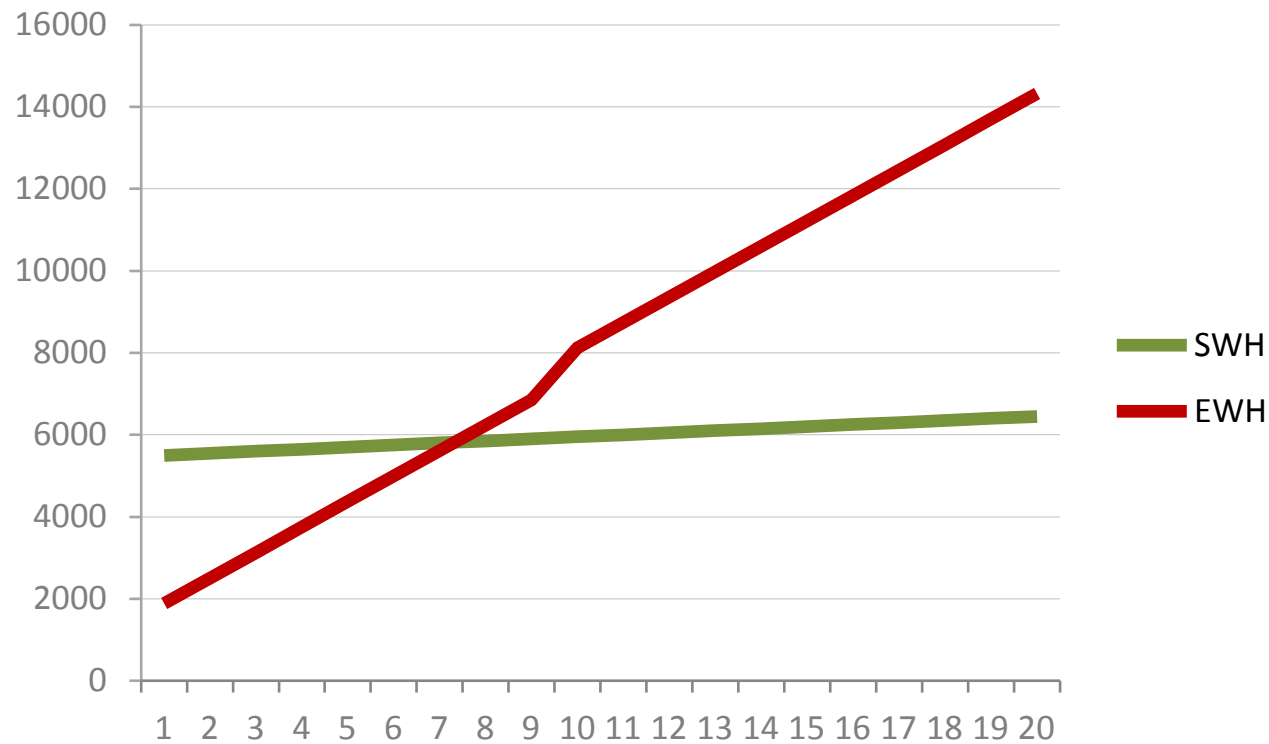


OUTLINE OF SEAP : ACTION 02: **MEASURE 02/A : SOLAR HEATERS**



Utilizing 10% to 20% of roofs area is enough to cover the whole demand of the domestic hot water in the area.

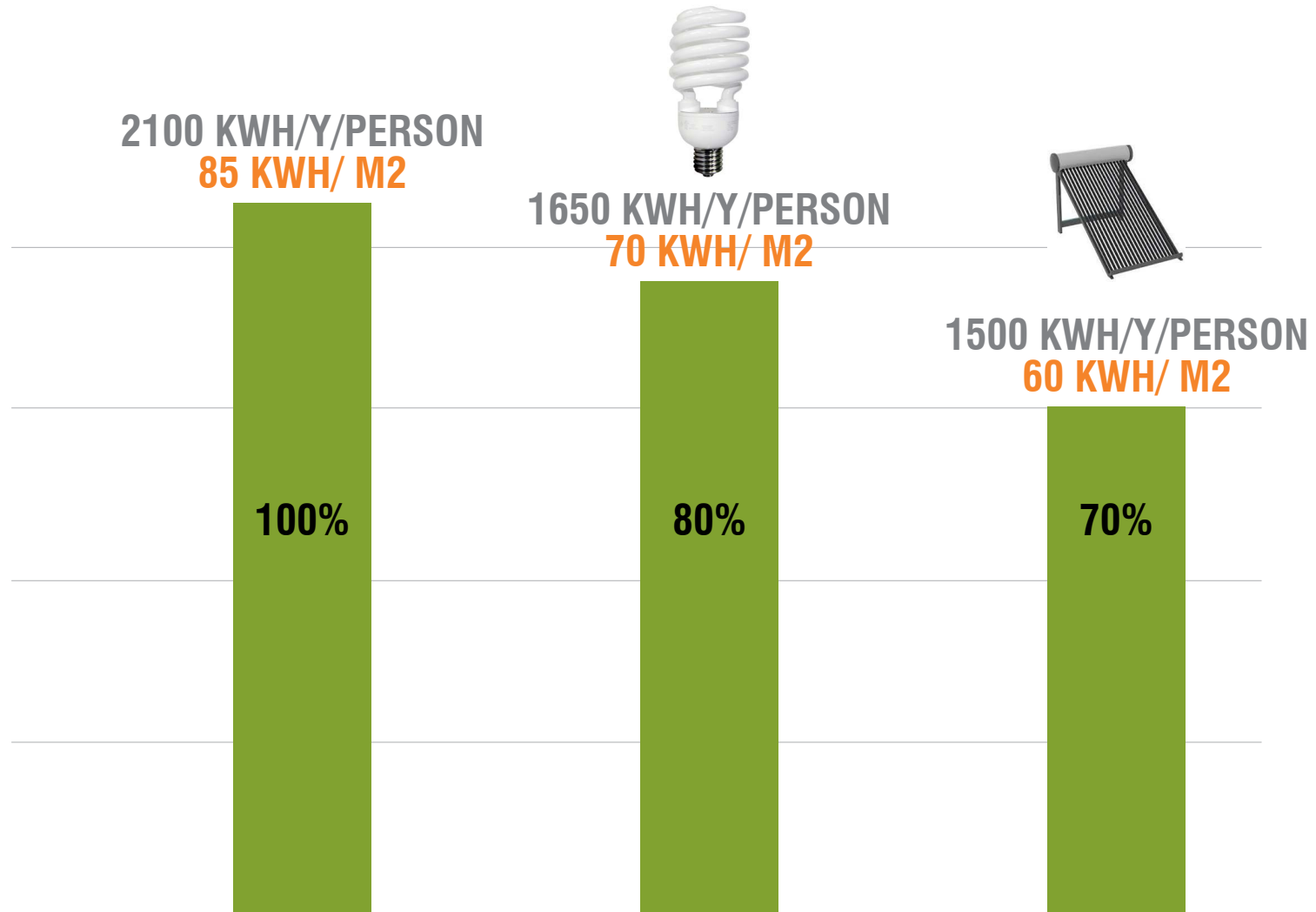
OUTLINE OF SEAP : ACTION 02: MEASURE 02/A : SOLAR HEATERS



The payback period is within **6 – 8 years**



OUTLINE OF SEAP : ENERGY REDUCTION ACTIONS



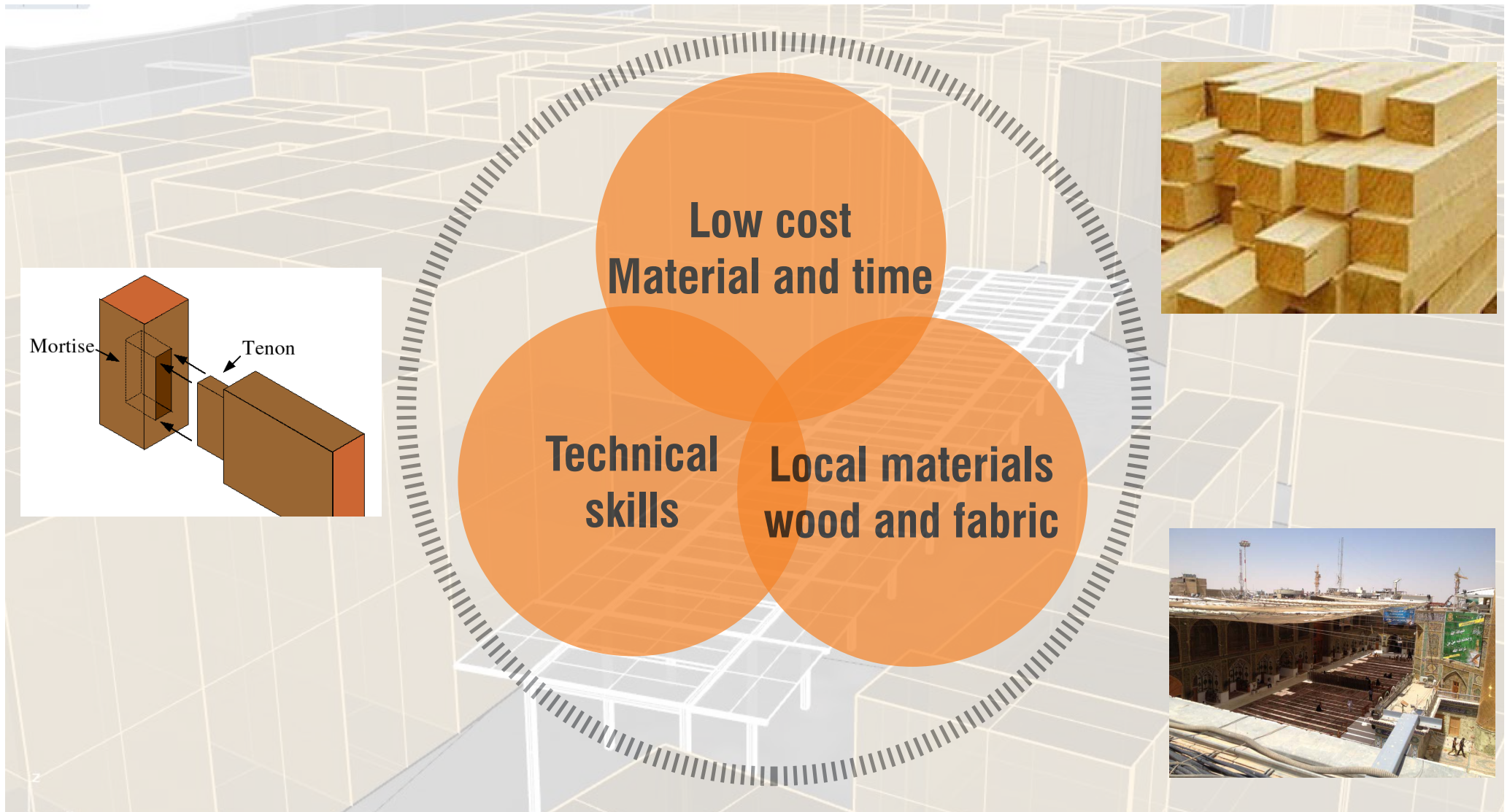
OUTLINE OF SEAP : ACTION 02: MEASURE 02/B : GREEN ROOFS



Green roofs can reduce the heat stress on the last floor by 30%. in addition to the food production it provides

That can be done by many NGOs active in this domain
Greater Cairo

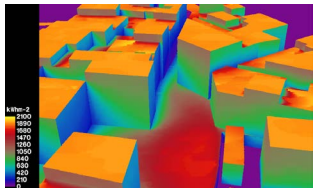
OUTLINE OF SEAP : ACTION 04: MEASURE 04/A SHADING THE MARKET PLAZA



XXXXXXXXXX

OUTLINE OF SEAP : ACTION 04: MEASURE 04/A SHADING THE MARKET PLAZA

A



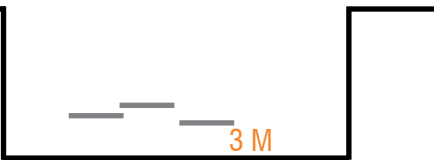
NO SHADE
ASPHALT
MRT = +15

HEAT STRESS

70%



B

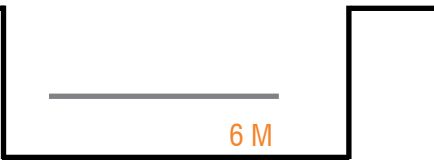


SCATTER SHADE +3
ASPHALT
MRT = +12

55%



C



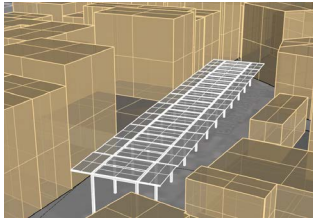
PROPER SHADE +6
ASPHALT
MRT = +10

45%



OUTLINE OF SEAP : ACTION 04: MEASURE 04/A SHADING THE MARKET PLAZA

D

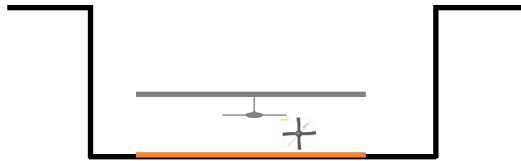
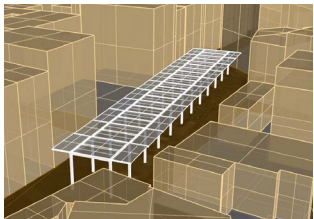


SHADE +6
COOL FLOOR (BRICK)
MRT = +10

40%



E

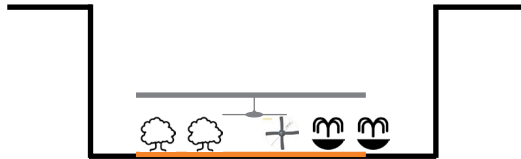


SHADE +6
COOL FLOOR
SMALL FANS
MRT = +5

30%



F



SHADE +6
COOL FLOOR
SMALL FANS
GREEN AREAS
WATER FEATURES

15%



OUTLINE OF SEAP : ACTION 04: MEASURE 04/A SHADING THE MARKET PLAZA

D

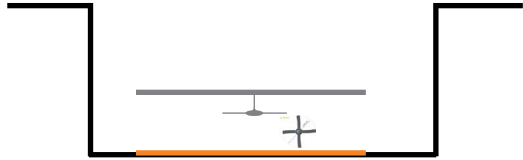
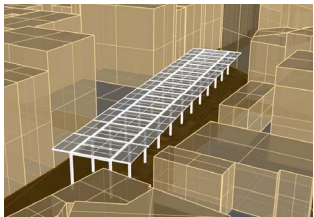


SHADE +6
COOL FLOOR (BRICK)

40%



E

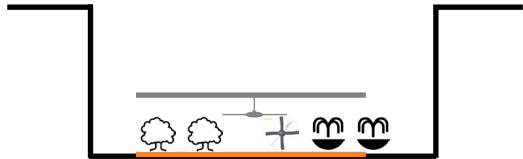


SHADE +6
COOL FLOOR
SMALL FANS

30%



F

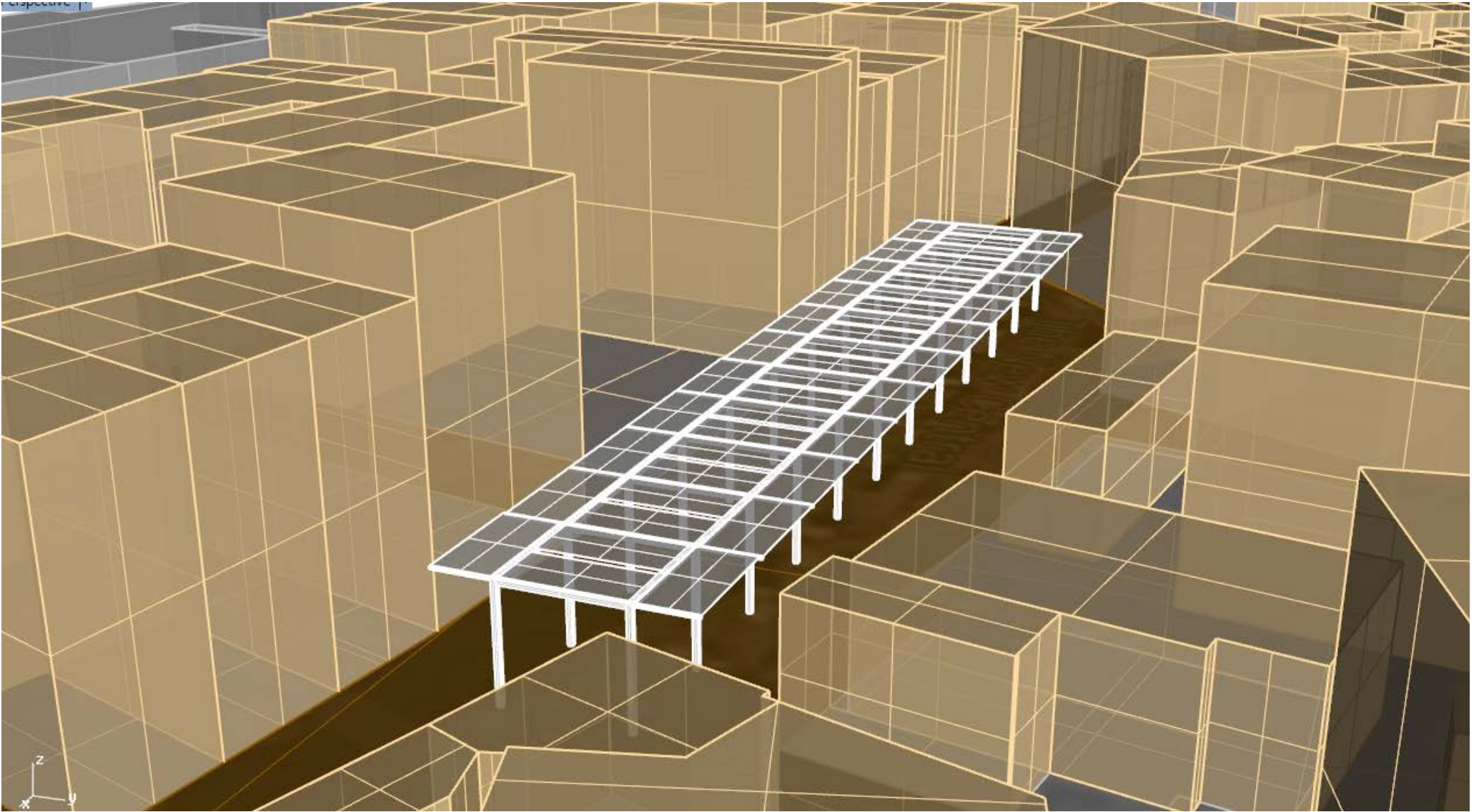


SHADE +6
COOL FLOOR
SMALL FANS
GREEN AREAS
WATER FEATURES

15%

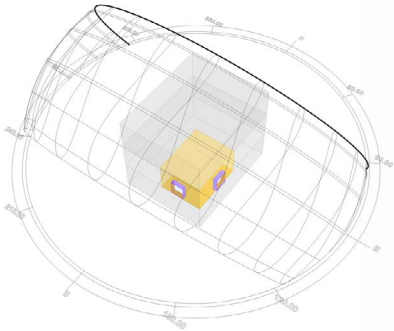


OUTLINE OF SEAP : ACTION 04: MEASURE 04/A SHADING THE MARKET PLAZA



Wood Structure carrying movable shades made out of Fabric with fans.

ACTION 05: BUILDING ENVELOPE IMPROVEMENTS (WORK IN PROGRESS)



Box Dimension

Room width 4.0 m

Room Length 5.0 m

Storey Height 2.8 m

Windows

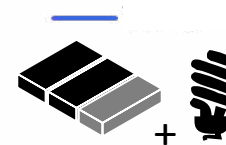
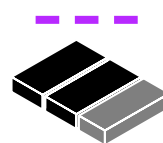
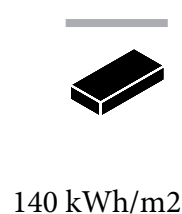
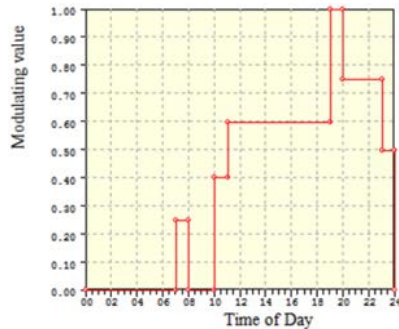
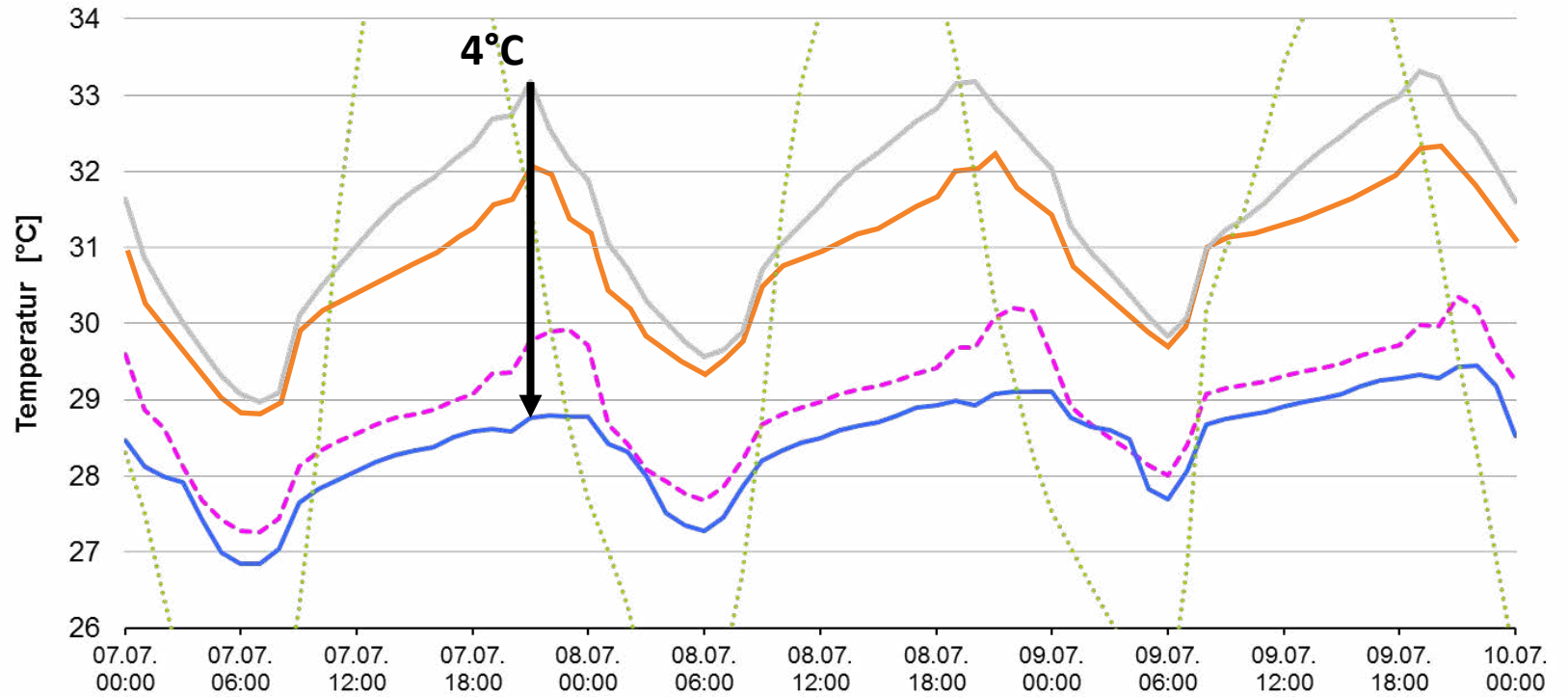
South and East facing

Height 1.2 m

Width 1.4 m

Schedule

Living Room



..... Tamb

Source: Luca Fraccalvieri
Helmut Meyer

CONCLUSION : THE WAY FORWARD > LOOKING FOR:

ACTION #1

Light Bulbs Replacement

ACTION #2

Water Solar Heaters

ACTION #3

Green Roofs

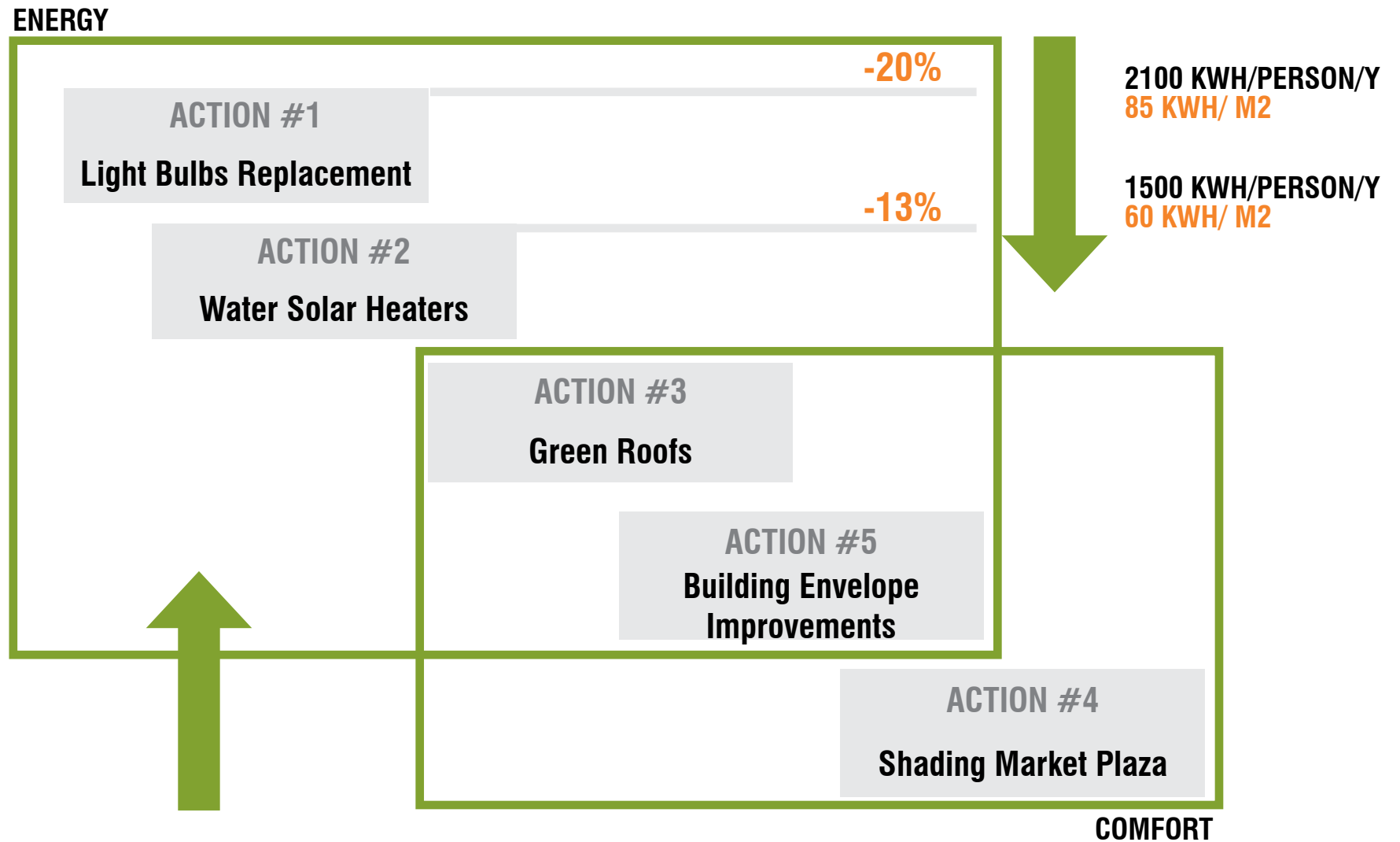
ACTION #4

Shading Market Plaza

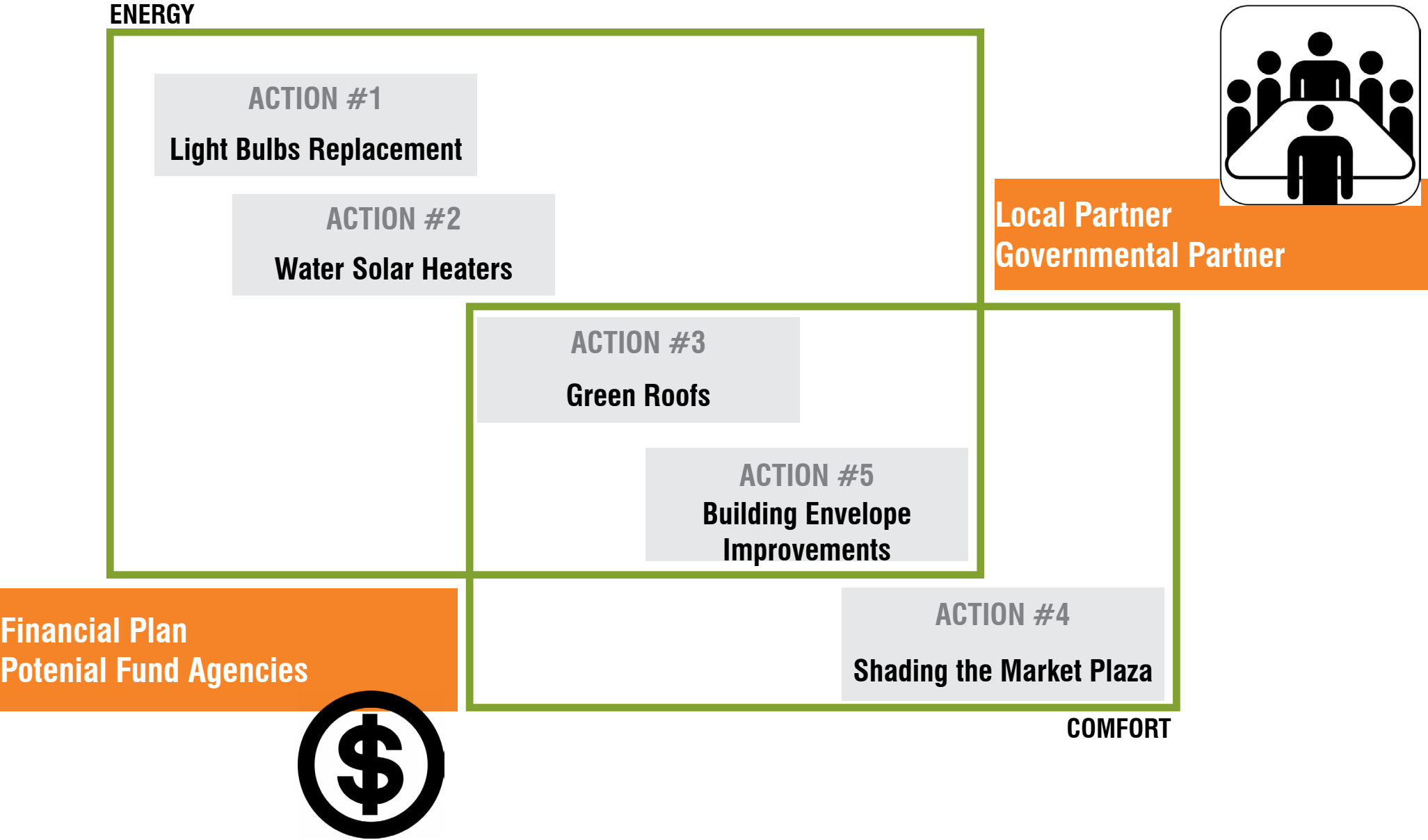
ACTION #5

**Building Envelope
Improvements**

CONCLUSION : THE WAY FORWARD > LOOKING FOR:



SUMMARY : THE WAY FORWARD > LOOKING FOR:



DANKE

THANK YOU

SHOKRAN

AMESEGINALEHU

DHONNABAD