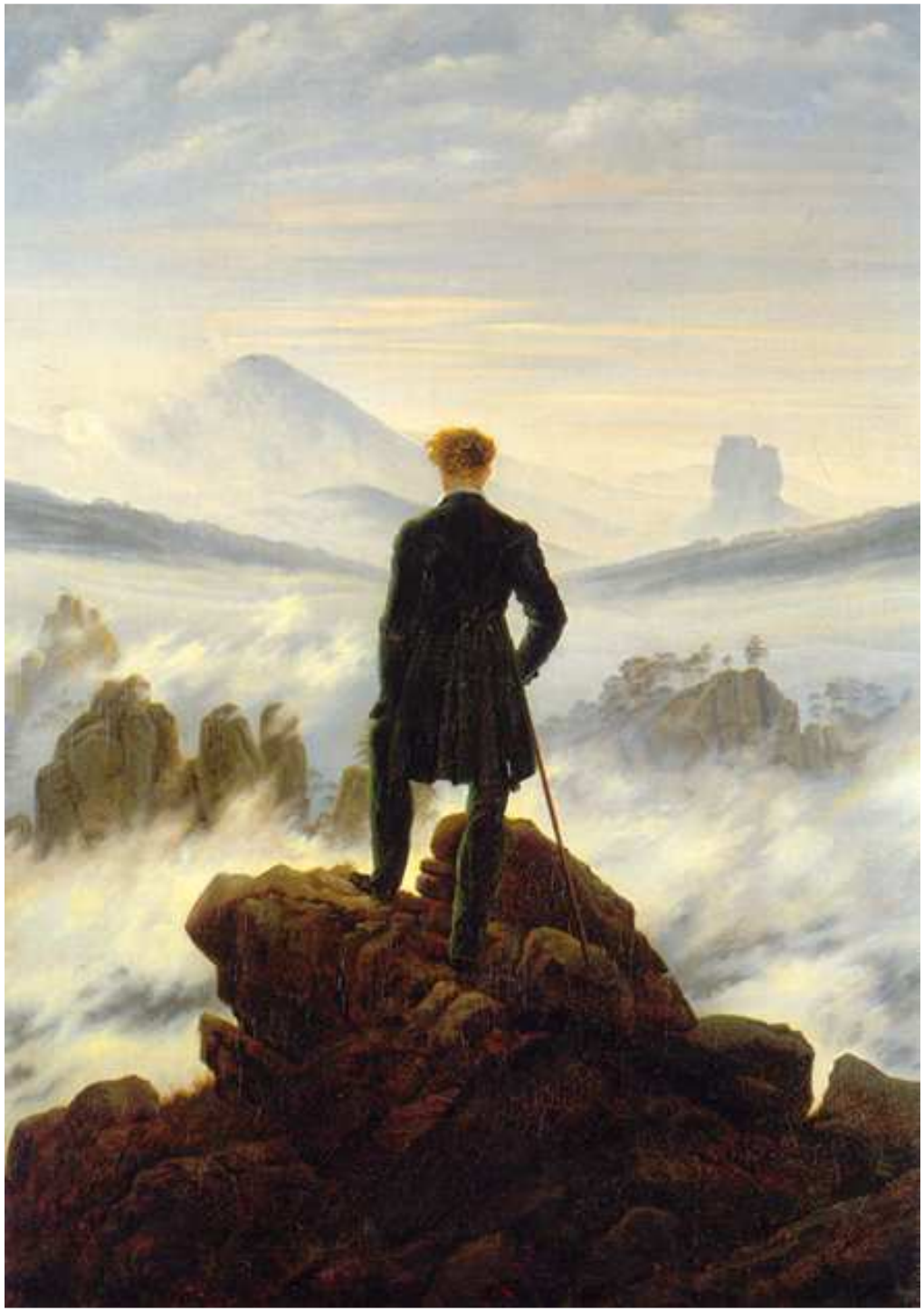


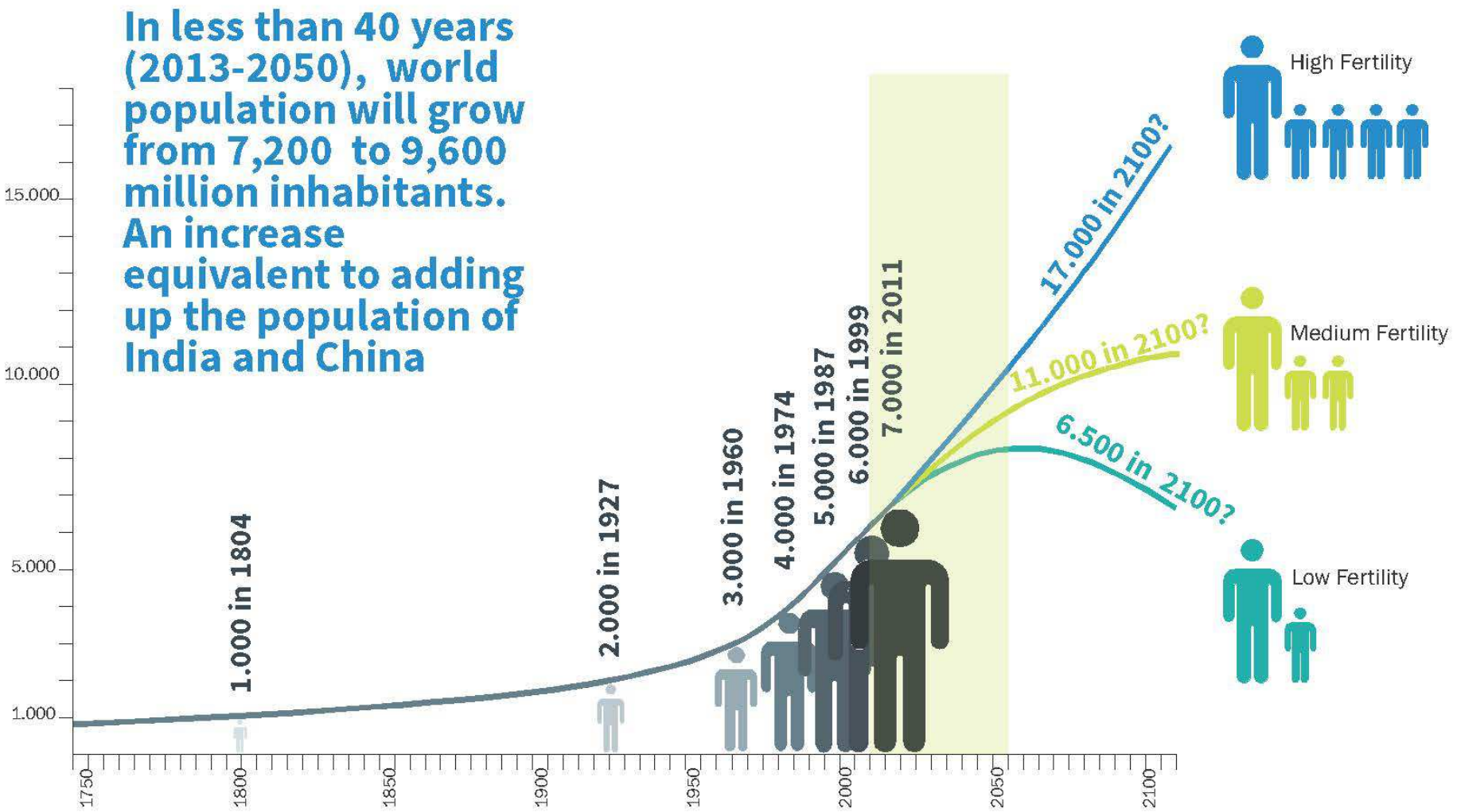


Figure 2 Evolution of world population (World, 1750-2100)

Units: Millions of people

Sources: Elaborated with Report authors on the base of DESA (1999); DESA (2013)

With an increase in income

Half of the global population will have a higher per capita income than current income in OECD countries.

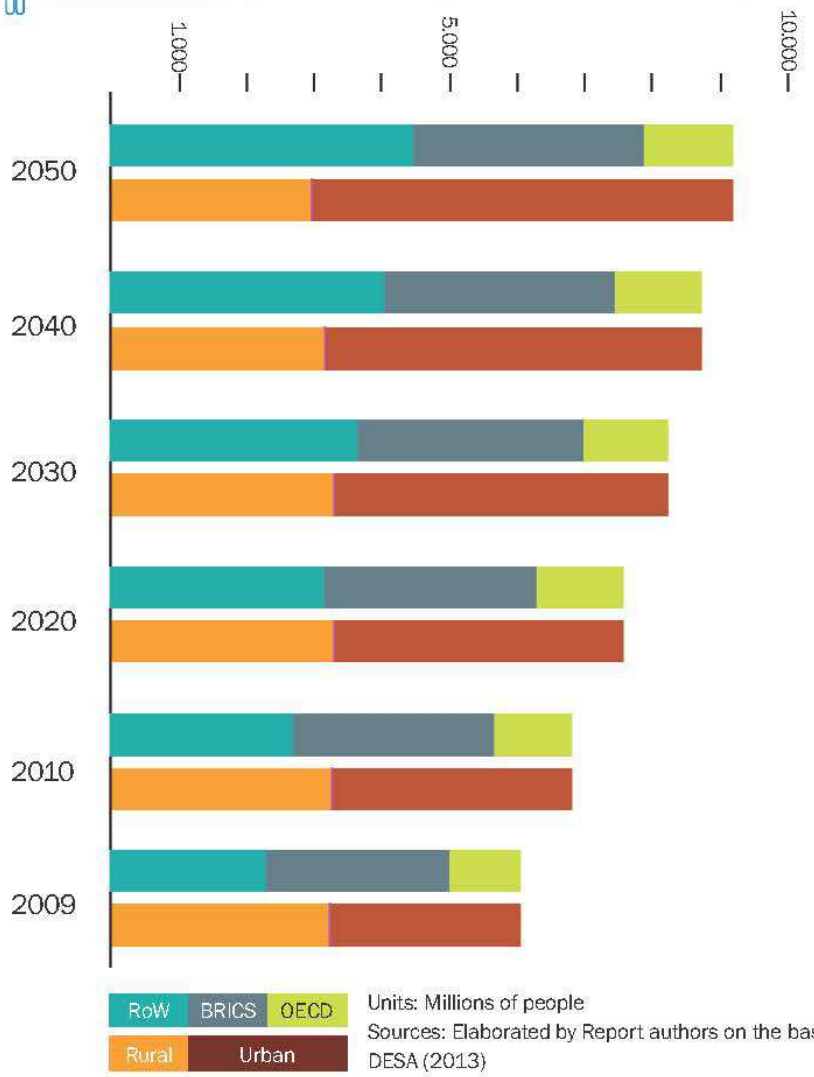
Even though the highest absolute income increase will occur in OECD countries, BRIC nations (Brasil, Russia, India and China) will multiply their GDP per capita by 13. On average, this factor will quadruple in the rest of the countries.

And in cities

The whole population increase will happen in cities.

More than half of the global population already lives in cities. But future growth will almosts exclusively happen in urban environments: by 2050, there will be more people living in cities than there were living on the whole planet at the beginning of this century.

Figure 3 Evolution of population 2000-2050 (World and regions/ Urban and rural)



Units: Millions of people

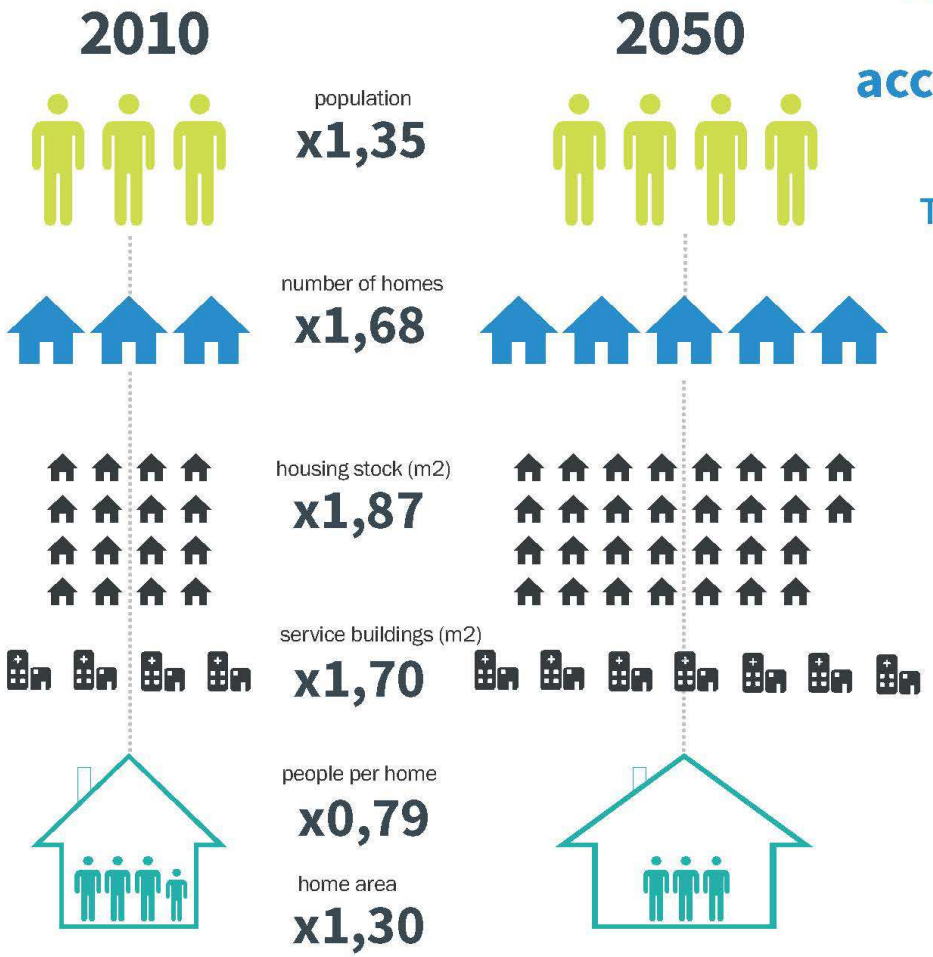
Sources: Elaborated by Report authors on the base of DESA (2013)

Growing population demands habitability: new homes and non-residential buildings

An increase in population will mean going from nearly 1,900 million homes in 2010 to nearly 3,200 million in 2050.

This will require an increase in housing stock from 160,000 million m2 to nearly 300,000 million m2.

Likewise, demand for service buildings – non-residential – will entail growth equivalent to nearly 70% of current area –nearly 38,000 million m2. Approximately half of this growth will occur in BRIC countries.



... in renewed social and productive conditions, and supported by acceptable social models

This new habitability is expected to produce homes with less dwellers.

– from 3.7 persons per home in 2010 to 3 persons per home in 2050 - but larger – from 23m2/dweller in 2010 to 30m2/dweller in 2050 – and with better service quality.

Built areas will also increase, from 5,4 m2 to 6,6 m2 per capita, in order to cover the needs of a progressing society.

Timquijano (Flikr user)

In order to create and maintain this habitability, the building sector's need for resources will swell dramatically

New resources will be needed to construct the buildings that will, in turn, satisfy the need for habitability.

Modern construction direct building materials demand is close to 2T/ m2. Emissions produced during their manufacturing process rise to approximately 0.5 tonnes of CO2/ m2.

A strong increase in built-up area will entail a large increase in the demand for building materials, energy, and the emissions produced in the manufacturing process.

But today there are strong global environmental limits to resource availability

Climate change produced by man-made GHG emissions

Climate change mitigation is one of the determining challenges, key to our society's future. The latest IPCC Report 2014 shows us, once again, the urgent need to act, offering 4 reference scenarios – including actions and economic costs – related to different transformation speeds of our productive model, towards a less emitting one.

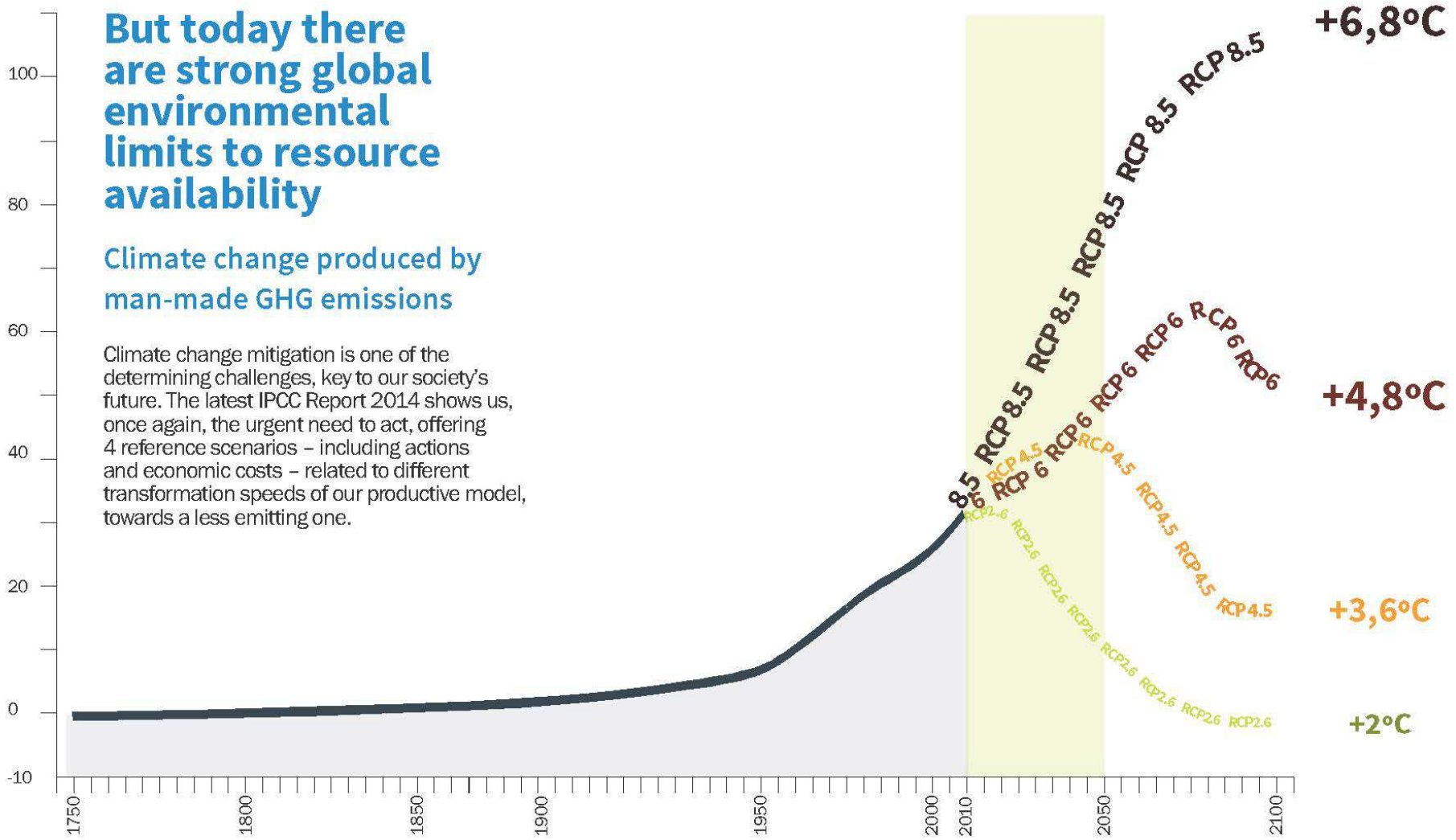


Figure 5 Evolution of annual world CO2 emissions (World, 1750-2100)

RCP 8.5, RCP 6, RCP 4.5 y RCP 2.6 are different scenarios defined by IPCC
Units: GtCO2/year
Sources: Elaborated by Report authors on the base of IEA (2013); IPCC (2014)

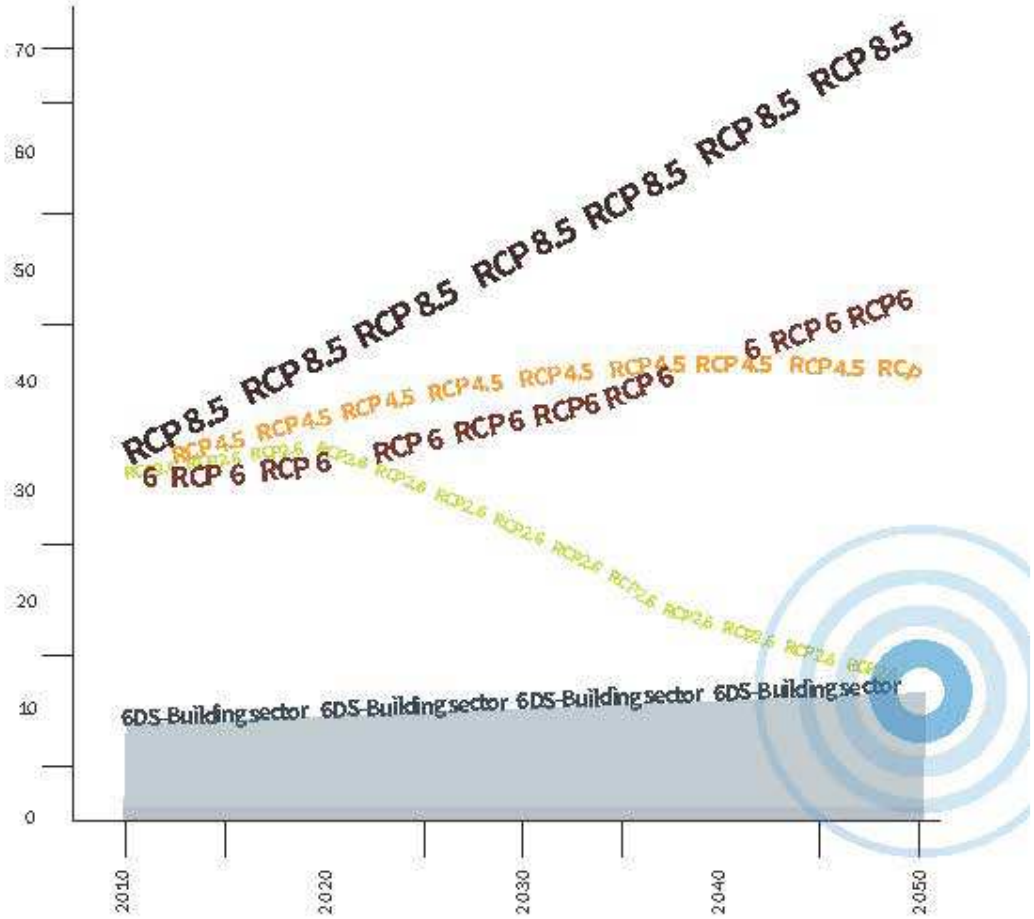
Following current tendencies, by 2050 the building sector alone will be responsible for all the global emissions that the 2°C increase scenario allows.

It is impossible to reach desirable climate change scenarios with the current building sector

If, by 2050, building energy demand is satisfied following current tendencies, marked by the building sector's present situation, this sector will produce all the GHG global emissions that the IPCC report considers would result in the 2°C increase scenario in average Earth temperature since pre-industrial times.

Solving the habitability necessities that the population growth until 2050 will demand requires a deep transformation of the building sector, accompanied by a global change in our whole productive system.

Figure 8 Evolution of annual global and building sector CO_2 emissions (World, 2010-2050)



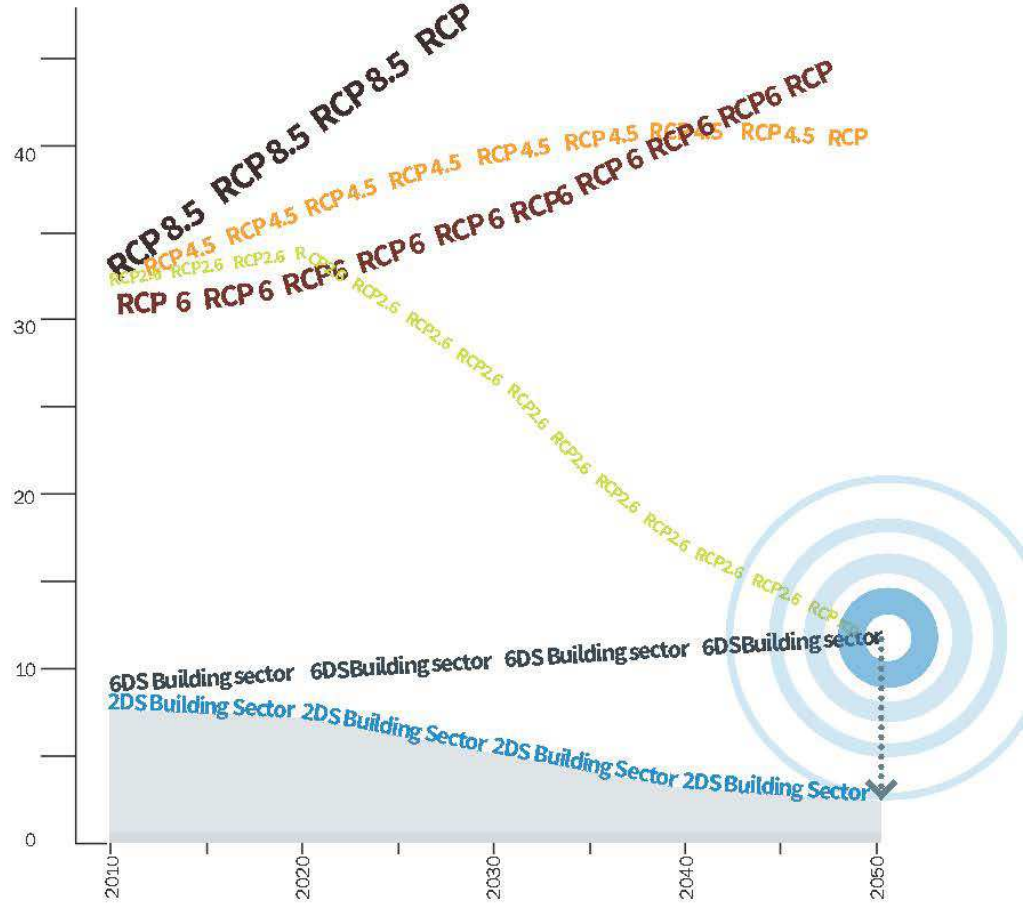
6DS and 2DS are different scenarios defined by IEA
Units: GtCO2/year
Sources: Elaborated by Report authors on the base of IEA (2013); IPCC (2014)

In 2050, building sector emissions could be brought down to 23% of the emissions that the 2ºC increase scenario predicts for that year

The building sector must reduce its emissions' share significantly

Emissions derived from energy use in buildings could be reduced to reach less than the current (2010) 26% of total annual global emissions, thus contributing to climate change mitigation, based on low temperature increase scenarios.

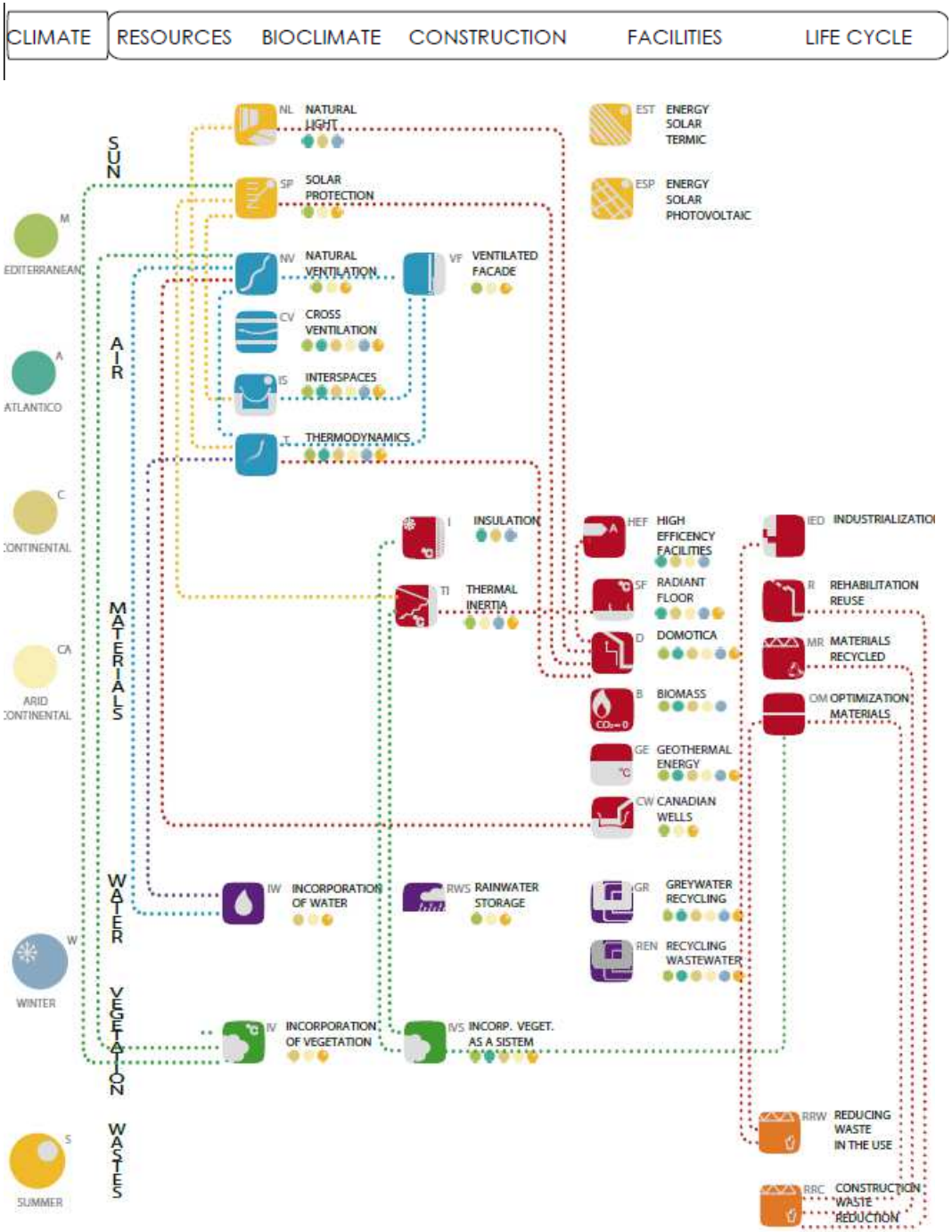
Figure 12 Evolution of annual global and building sector CO2 emissions in different scenarios (World, 2010-2050)



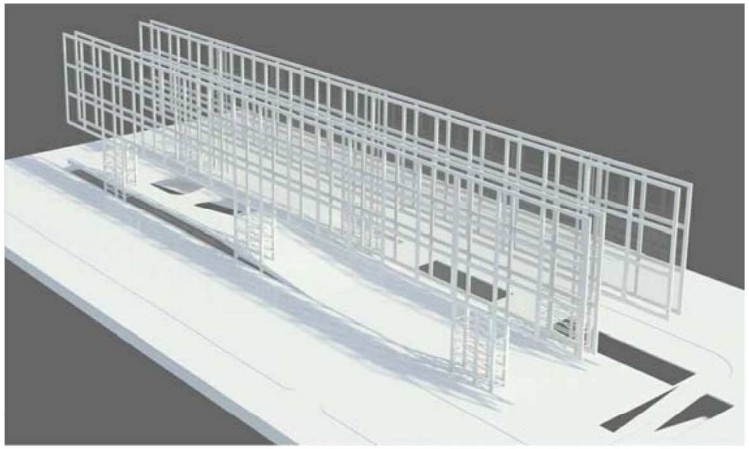
Units: GtCO2/year

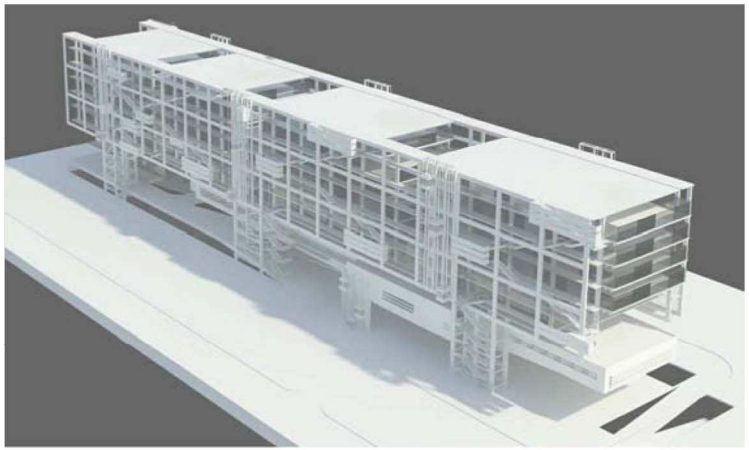
Sources: : Elaborated by Report authors on the base of IEA (2013); IPCC (2014)

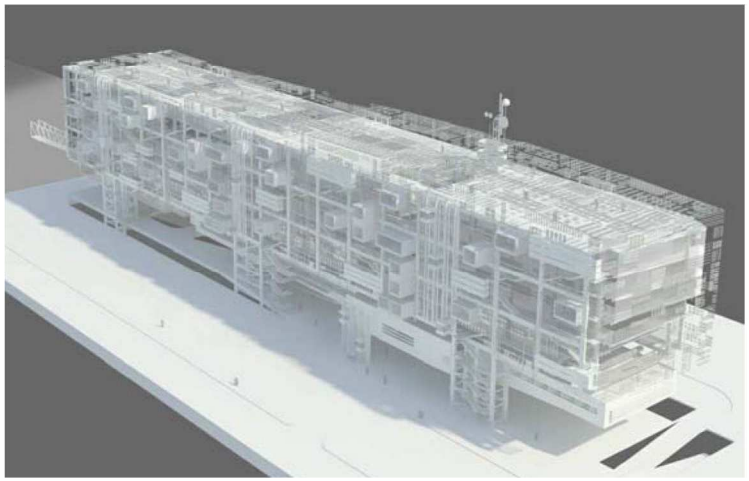
Note: 6DS and 2DS are different scenarios defined by IEA

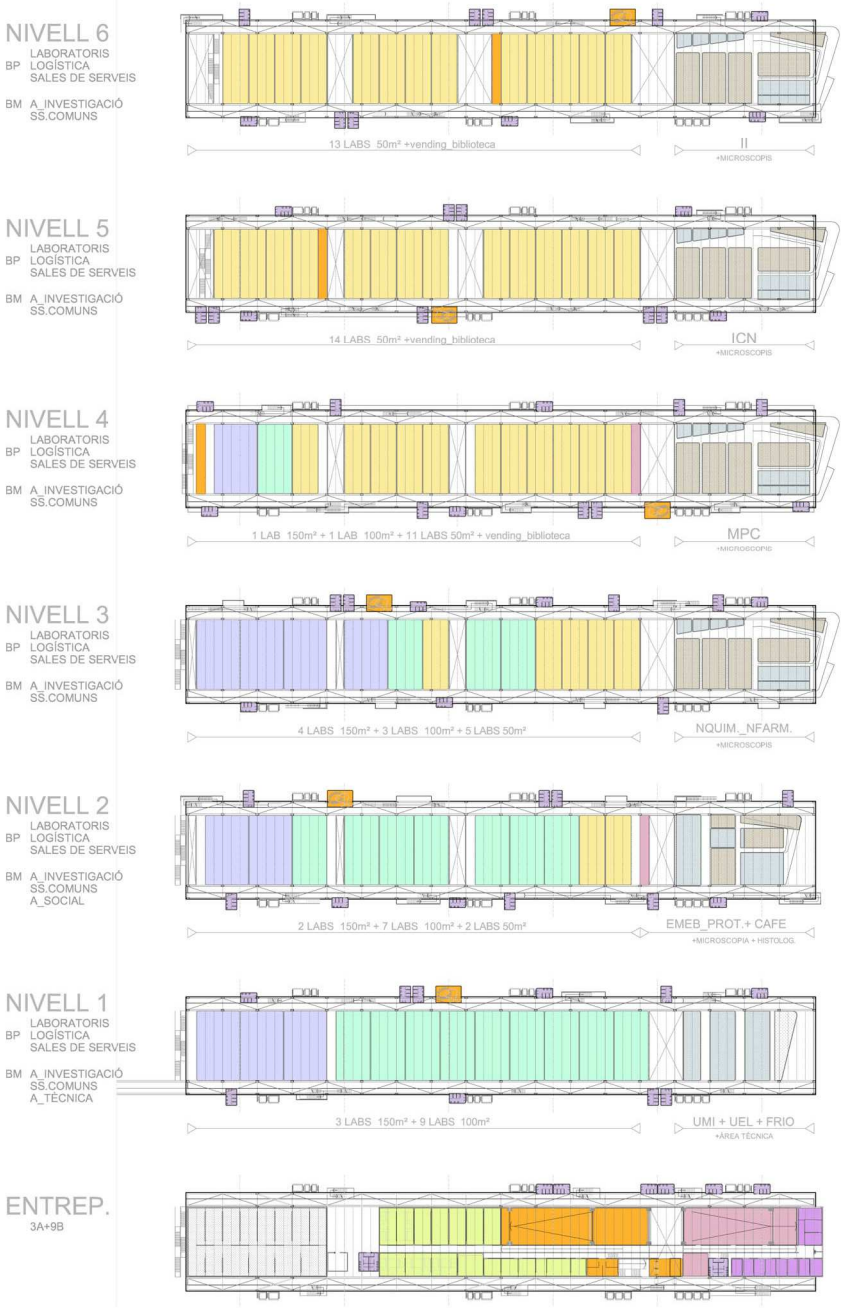

CLIMATE
RESOURCES
BIOCLIMATE
CONSTRUCTION
FACILITIES
LIFE CYCLE
SUN
AIR
MATERIALS
WATER
VEGETATION
WASTES
M
EDITERRANEAN
A
ATLANTICO
C
CONTINENTAL
CA
ARID
CONTINENTAL
W
WINTER
S
SUMMER
NL NATURAL LIGHT
SP SOLAR PROTECTION
NV NATURAL VENTILATION
CV CROSS VENTILATION
IS INTERSPACES
T THERMODYNAMICS
VF VENTILATED FACADE
I INSULATION
TI THERMAL INERTIA
IW INCORPORATION OF WATER
RWS RAINWATER STORAGE
IV INCORPORATION OF VEGETATION
IVS INCORP. VEGET. AS A SISTEM
EST ENERGY SOLAR TERMIC
ESP ENERGY SOLAR PHOTOVOLTAIC
HEF HIGH EFFICENCY FACILITIES
SF RADIANT FLOOR
D DOMOTICA
B BIOMASS
GE GEOTHERMAL ENERGY
CW CANADIAN WELLS
GR GREYWATER RECYCLING
REN RECYCLING WASTEWATER
IED INDUSTRIALIZATIO
R REHABILITATION REUSE
MR MATERIALS RECYCLED
OM OPTIMIZATION MATERIALS
RRW REDUCING WASTE IN THE USE
RRC CONSTRUCTION WASTE REDUCTION

Integració en el campus



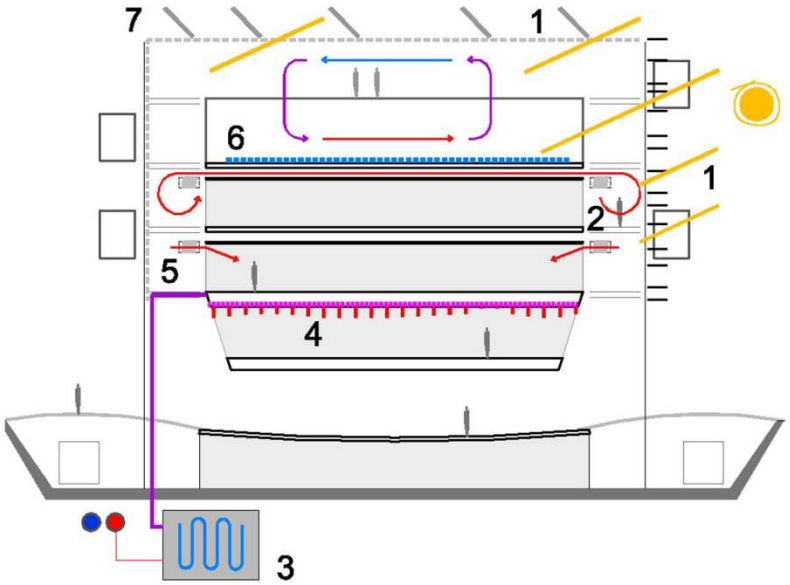





NIVELL 6
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
13 LABS 50m² +vending_biblioteca
II
+MICROSCOPIS
NIVELL 5
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
14 LABS 50m² +vending_biblioteca
ICN
+MICROSCOPIS
NIVELL 4
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
1 LAB 150m² + 1 LAB 100m² + 11 LABS 50m² + vending_biblioteca
MPC
+MICROSCOPIS
NIVELL 3
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
4 LABS 150m² + 3 LABS 100m² + 5 LABS 50m²
NQUIM._NFARM.
+MICROSCOPIS
NIVELL 2
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
A_SOCIAL
2 LABS 150m² + 7 LABS 100m² + 2 LABS 50m²
EMEB_PROT.+ CAFE
+MICROSCOPIA + HISTOLOG.
NIVELL 1
BP LABORATORIS
LOGÍSTICA
SALES DE SERVEIS
BM A_INVESTIGACIÓ
SS.COMUNS
A_TÈCNICA
3 LABS 150m² + 9 LABS 100m²
UMI + UEL + FRIO
+ÀREA TÈCNICA
ENTREP.
3A+9B

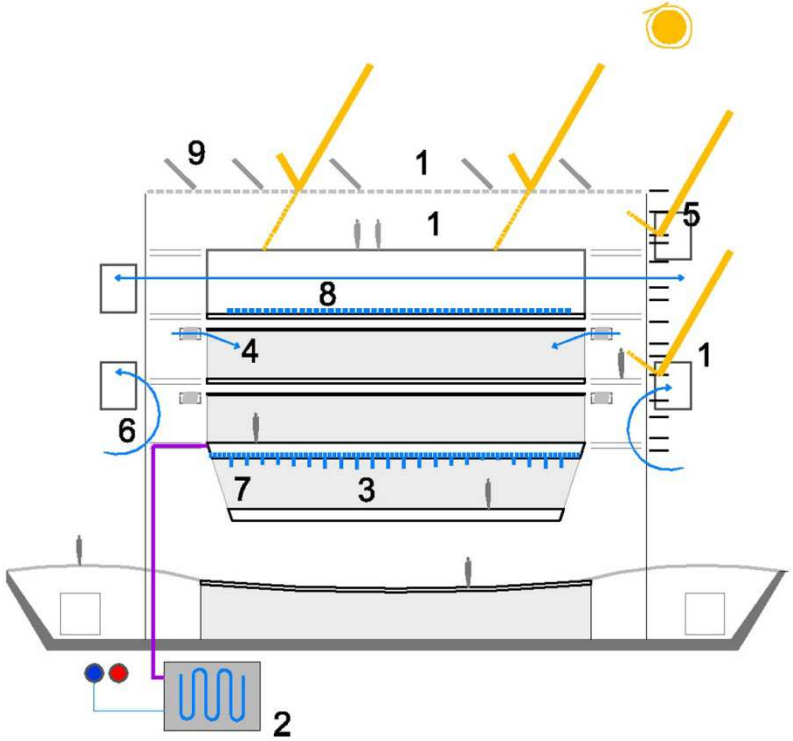
ALCAT SUREST E 1/500

SECCIÓ LONGITUDINAL E 1/500 0 5 10m



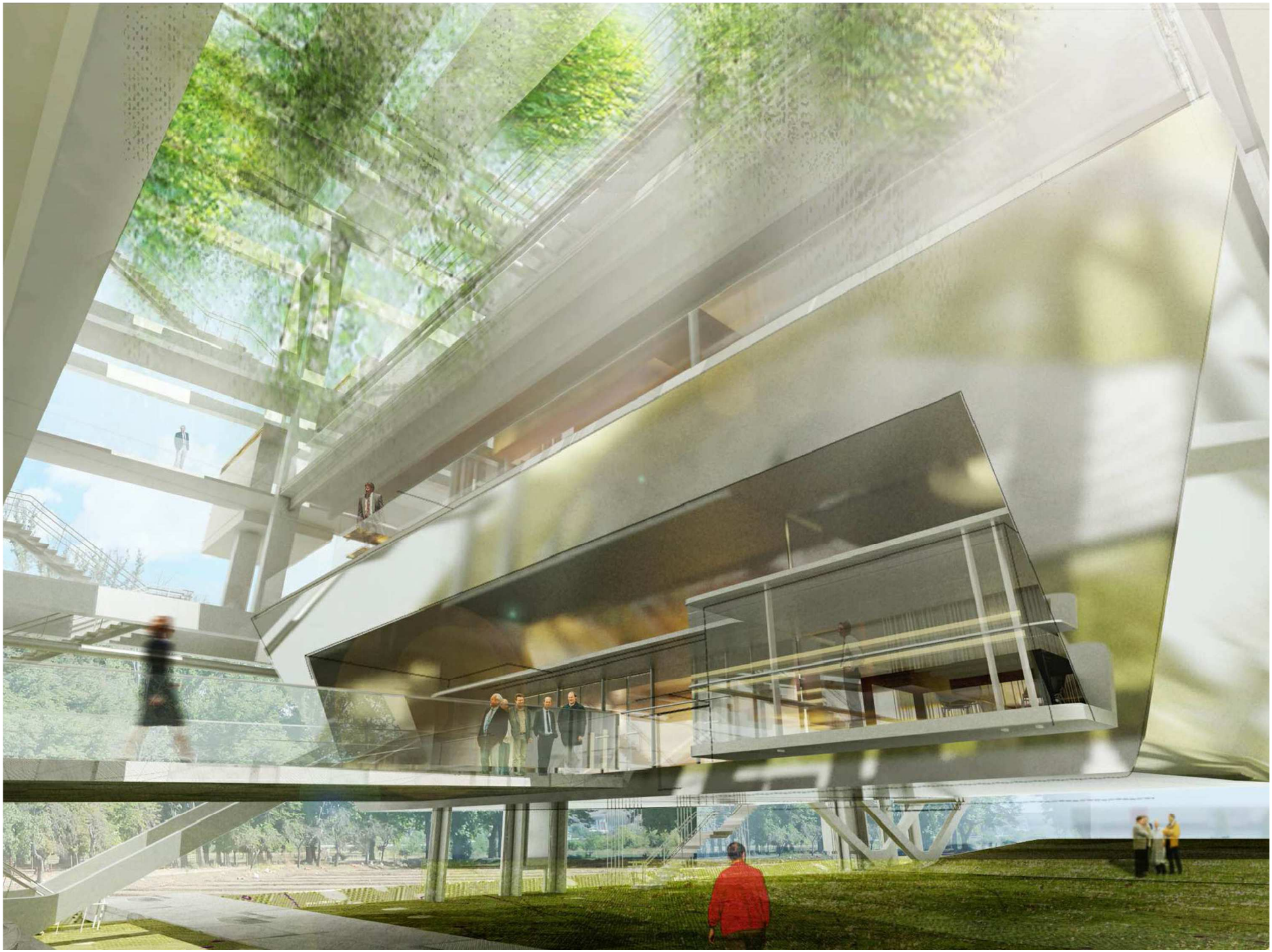
HIVERN

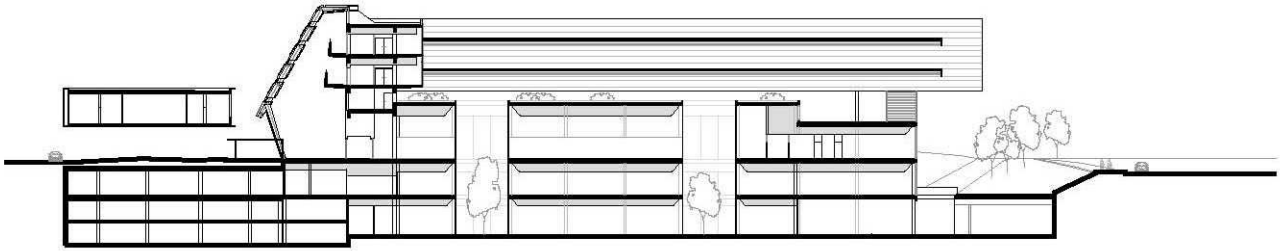
1. PELL TECNOLÒGICA QUE DEIXA PASSAR LA RADIACIÓ SOLAR DIRECTA.
2. GALERIA ACTIVA QUE ACUMULA RADIACIÓ I LA TRANSPORTA A LES ZONES FREDES.
3. CIRCUIT DE CLIMATITZACIÓ AMB INTERCANVIADOR APROFITANT EL NIVELL FREÀTIC I APORT SUPLEMENTARI D'ENERGIA DES DE LA XARXA DEL DISTRICT-HEATING.
4. CLIMATITZACIÓ INTERIOR MITJANÇANT FORJAT RADIANT.
5. RENOVACIÓ DE L'AIRE DES DE LA GALERIA ATEMPERADA MITJANÇANT CLIMATITZADORS DESCENTRALITZATS AMB RECUPERADOR DE ENERGIA.
6. COBERTA ALJUB COM A ESTABILITZADOR TÈRMIC
7. PLAQUES FOTOVOLTÀIQUES PER A ACONSEGUIR EL BALANÇ ENERGÈTIC 0 DE CLIMATITZACIÓ.

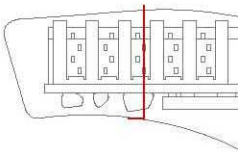


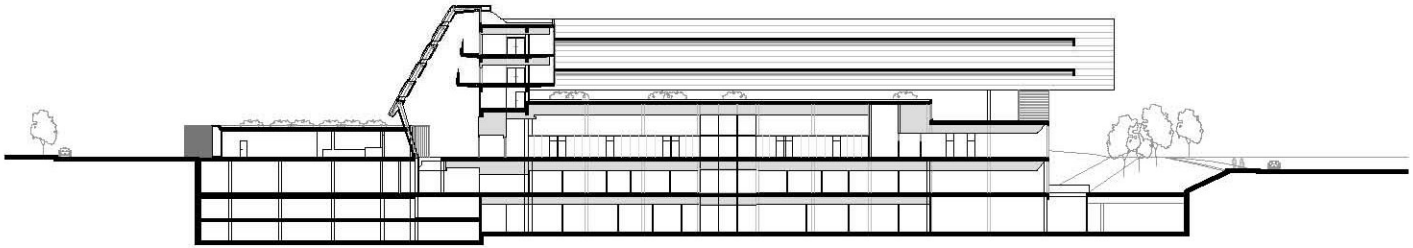
ESTIU

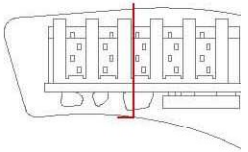
1. PELL TECNOLÒGICA QUE IMPEDEIX EL PAS DE RADIACIÓ SOLAR DIRECTA AMB APORT DE LLUM PER REFLEXIÓ.
2. CIRCUIT DE CLIMATITZACIÓ AMB INTERCAMBIADOR APROFITANT EL NIVELL FREÀTIC.
3. CLIMATITZACIÓ INTERIOR MITJANÇANT FORJAT RADIANT.
4. RENOVACIÓ DE L'AIRE DES DE LA GALERIA ATEMPERADA MITJANÇANT CLIMATITZADORS DESCENTRALITZATS AMB RECUPERADOR DE ENERGIA.
5. PLAQUES FOTOVOLTÀIQUES PER A ACONSEGUIR EL BALANÇ ENERGÈTIC 0 DE CLIMATITZACIÓ.
6. CIRCULACIÓ LLIURE D'AIRE A TRAVÉS DE LA PELL.
7. FREE COOLING A LA NIT MITJANÇANT LA VENTILACIÓ NATURAL I LA REFRIGERACIÓ PER FORJAT ACTIU CONNECTAT AL INTERCANVIADOR EN MODE FREÀTIC.
8. COBERTA ALJUB COM A ESTABILTIZADOR TÈRMIC.







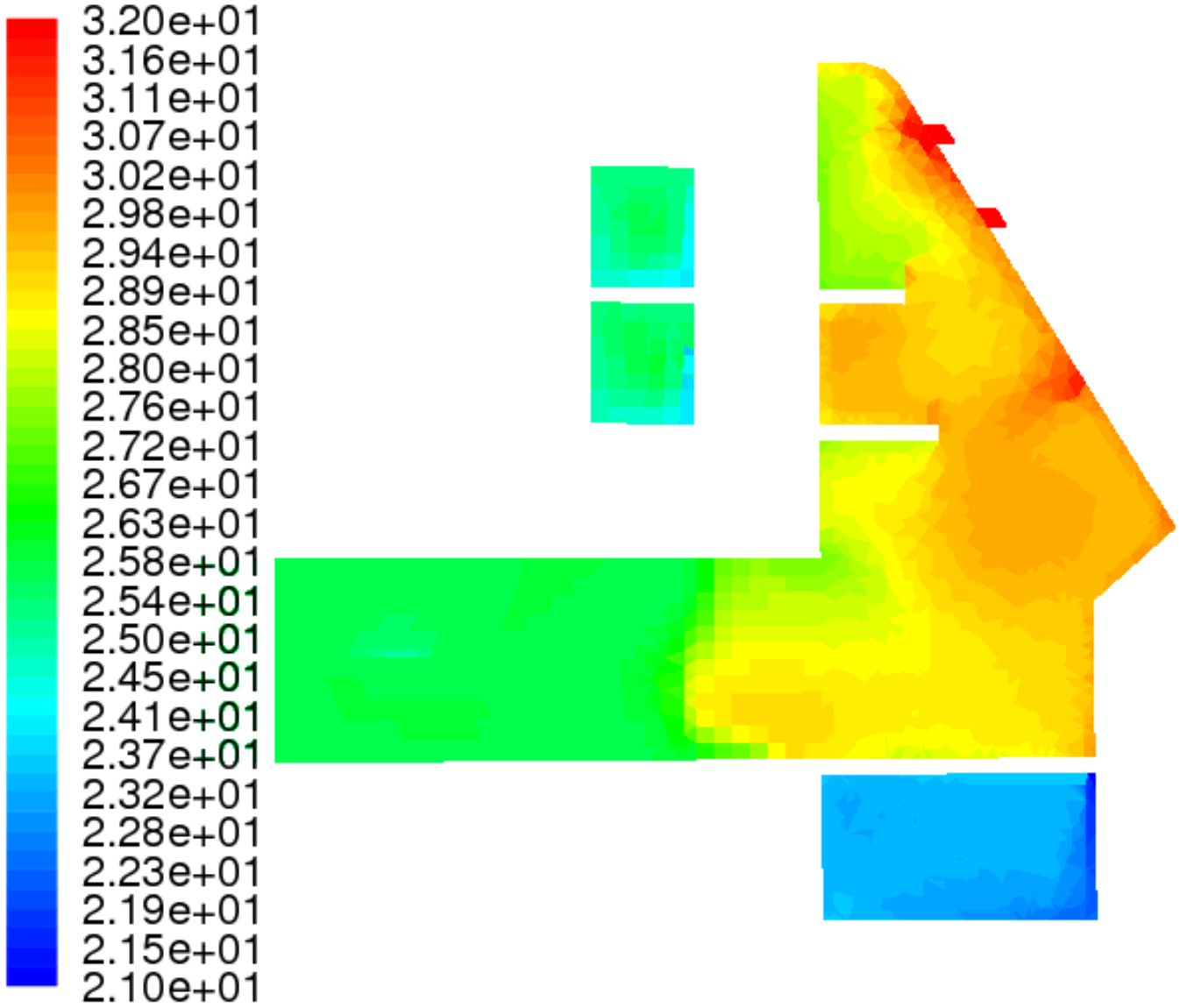




Secciones transversales

A3 - 1/1000

0m 10m 50m



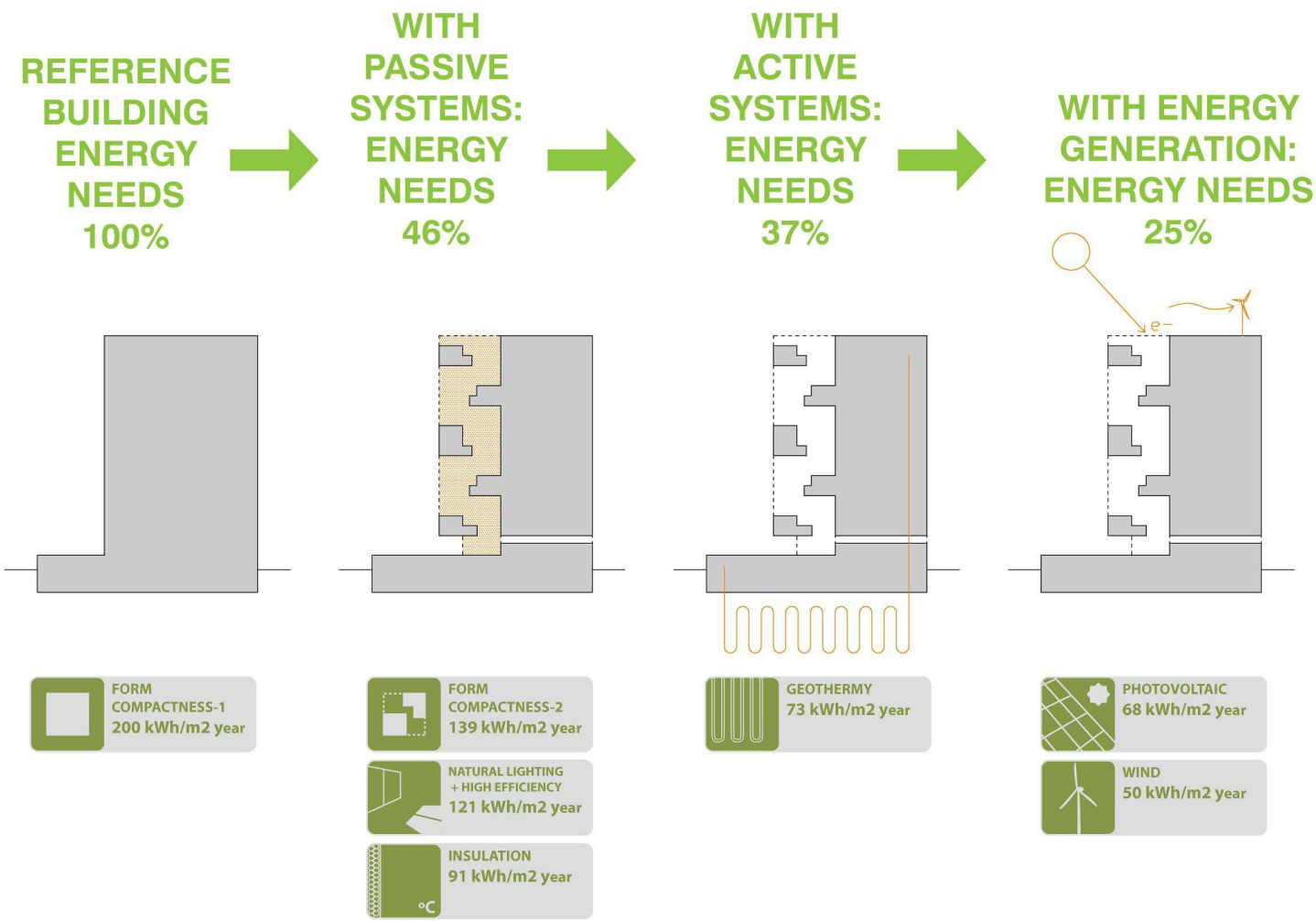
Temperatura (ºC) en un plano vertical que corta a las salas de espera de planta baja


Consultes
C1

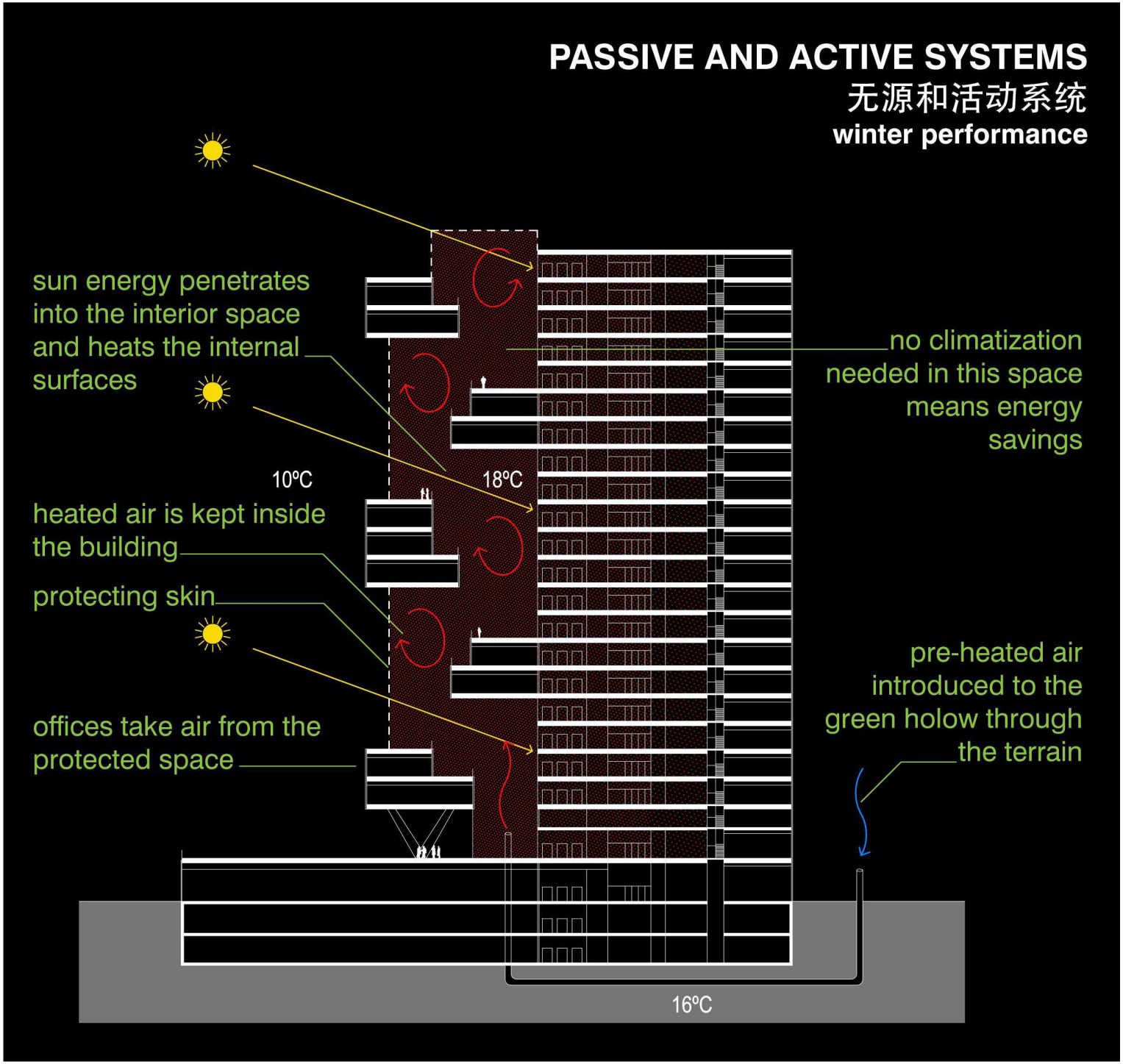
LOOKING FOR A NEW PARADIGM
之前

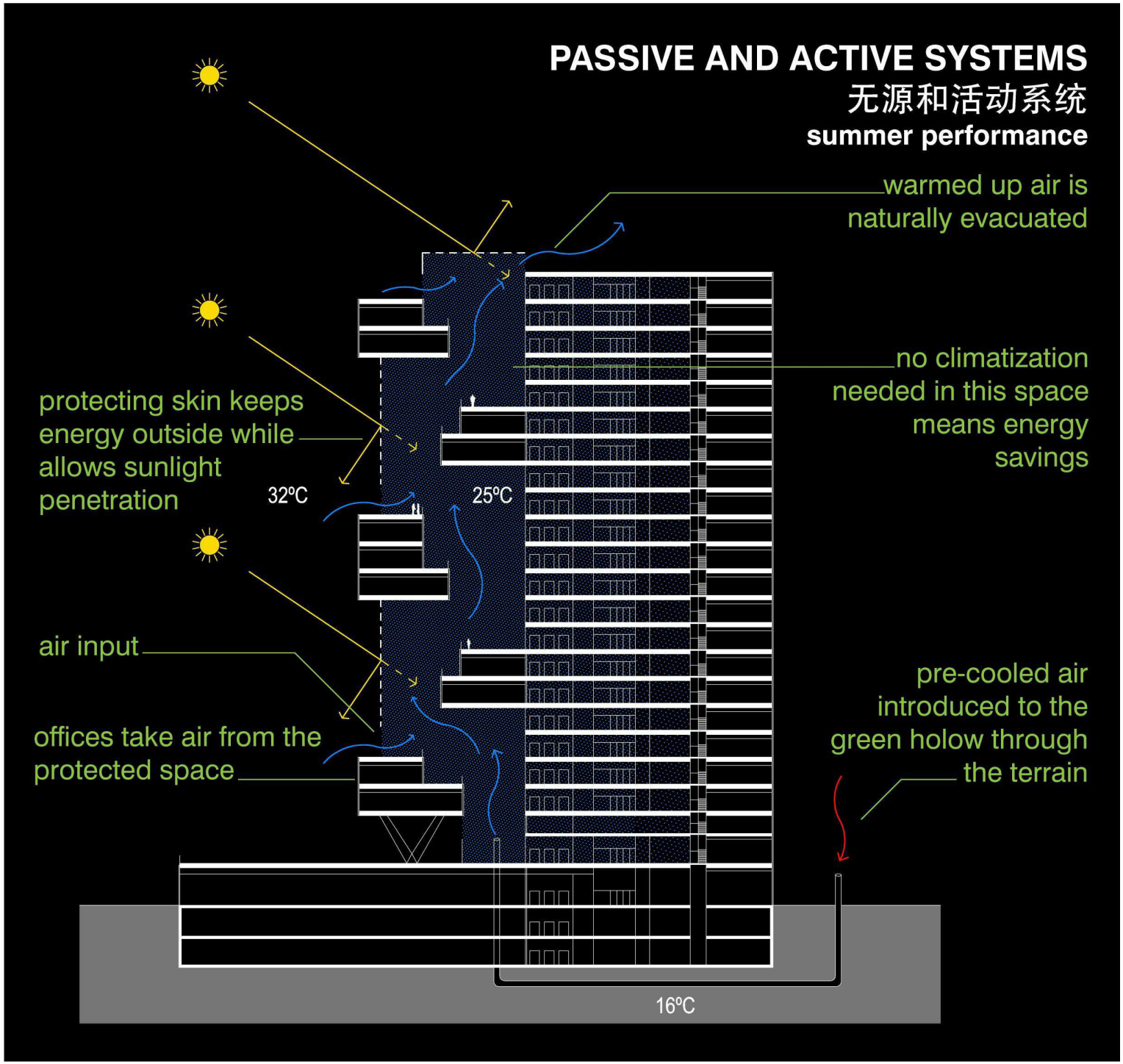
APPROACHING NATURAL LIFE TO WORK
目前

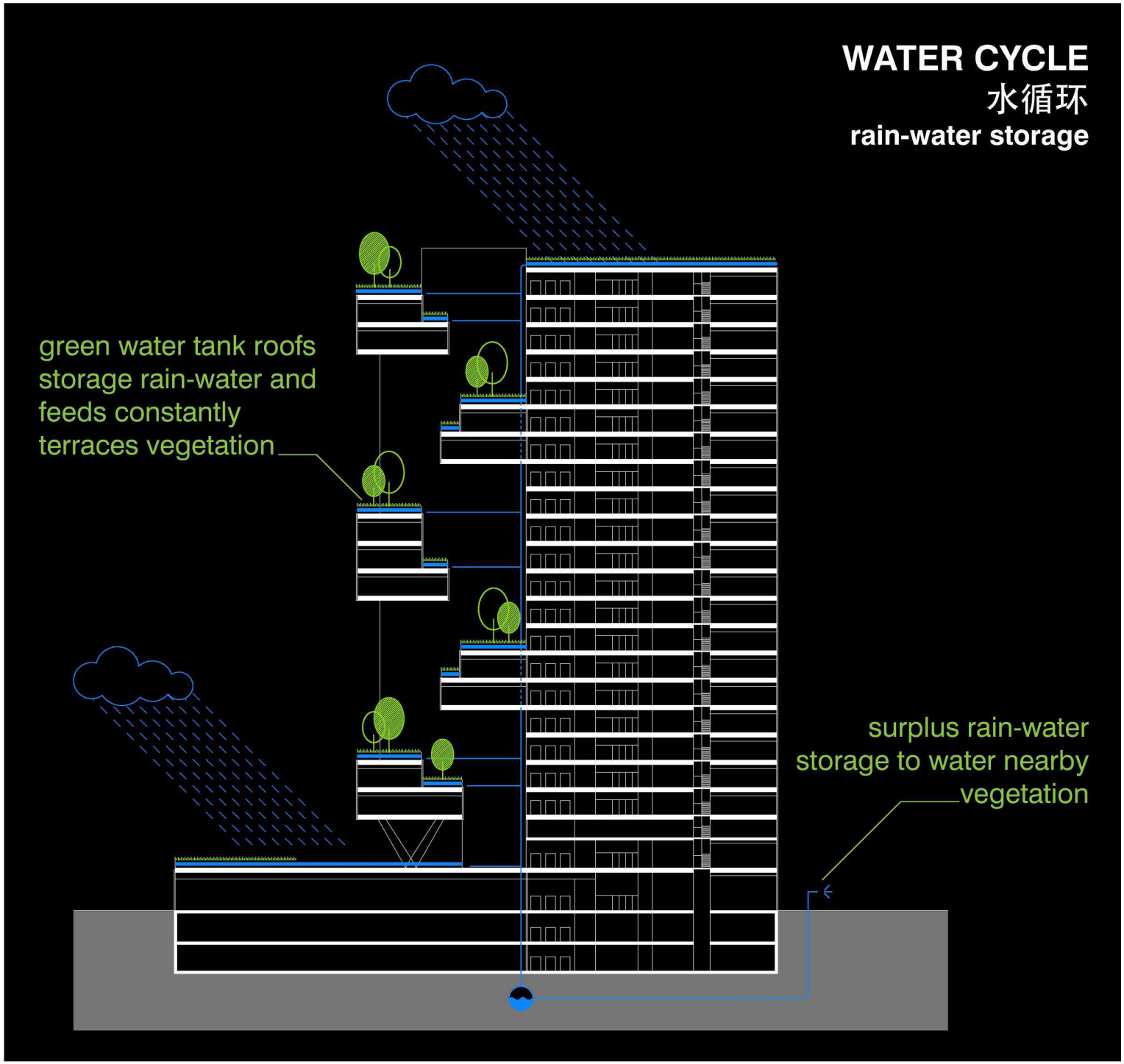
04_OBJECTIVE
目的

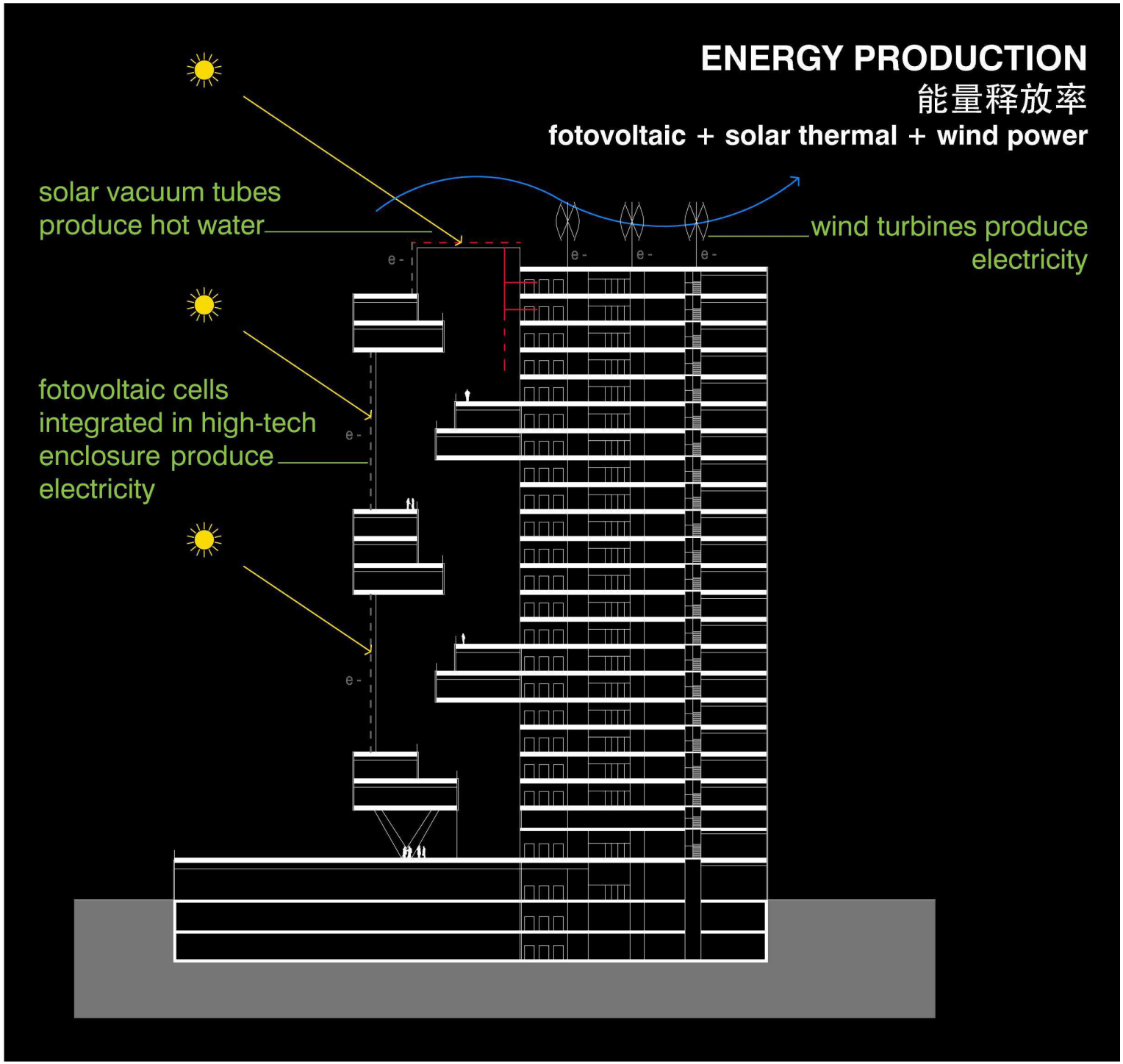


PASSIVE AND ACTIVE SYSTEMS
无源和活动系统
winter performance




PASSIVE AND ACTIVE SYSTEMS
无源和活动系统
summer performance
warmed up air is naturally evacuated
no climatization needed in this space means energy savings
protecting skin keeps energy outside while allows sunlight penetration
32ºC
25ºC
air input
offices take air from the protected space
pre-cooled air introduced to the green holow through the terrain
16ºC


WATER CYCLE
水循环
rain-water storage
green water tank roofs
storage rain-water and
feeds constantly
terraces vegetation
surplus rain-water
storage to water nearby
vegetation


ENERGY PRODUCTION
能量释放率
fotovoltaic + solar thermal + wind power
solar vacuum tubes
produce hot water
wind turbines produce
electricity
fotovoltaic cells
integrated in high-tech
enclosure produce
electricity
e-
e-
e-
e-
e-
e-

10_TOWER LAYOUT
塔楼设计

INTERIOR SPACE SECTION

NATURE TOWERS IN LAOSHAN

OSA Office for Sustainable Architecture. Barcelona

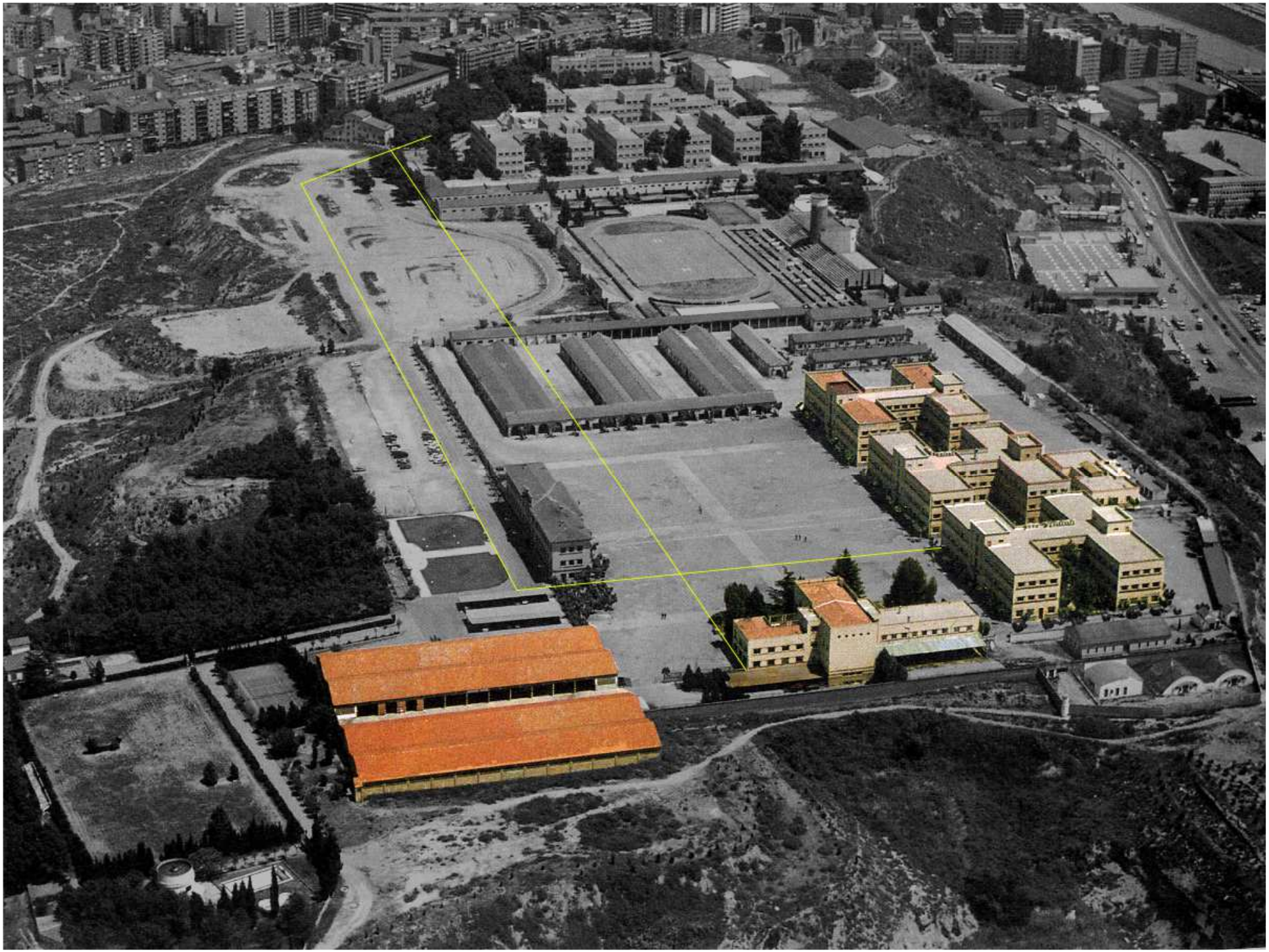
09_VIEWS
景观

NATURE TOWERS
大自然塔楼

NATURE TOWERS IN LAOSHAN

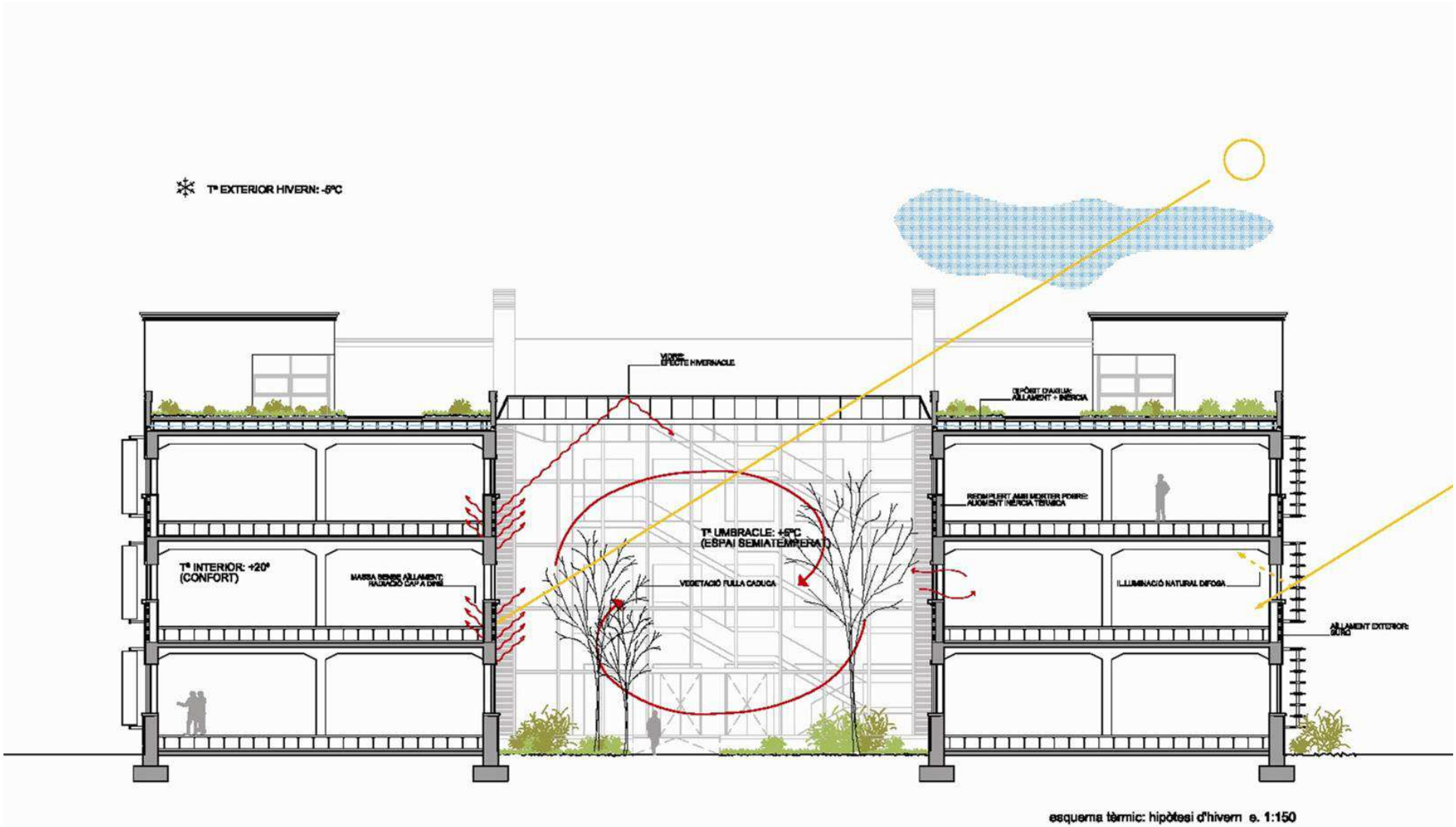
OSA Office for Sustainable Architecture. Barcelona

Infografías

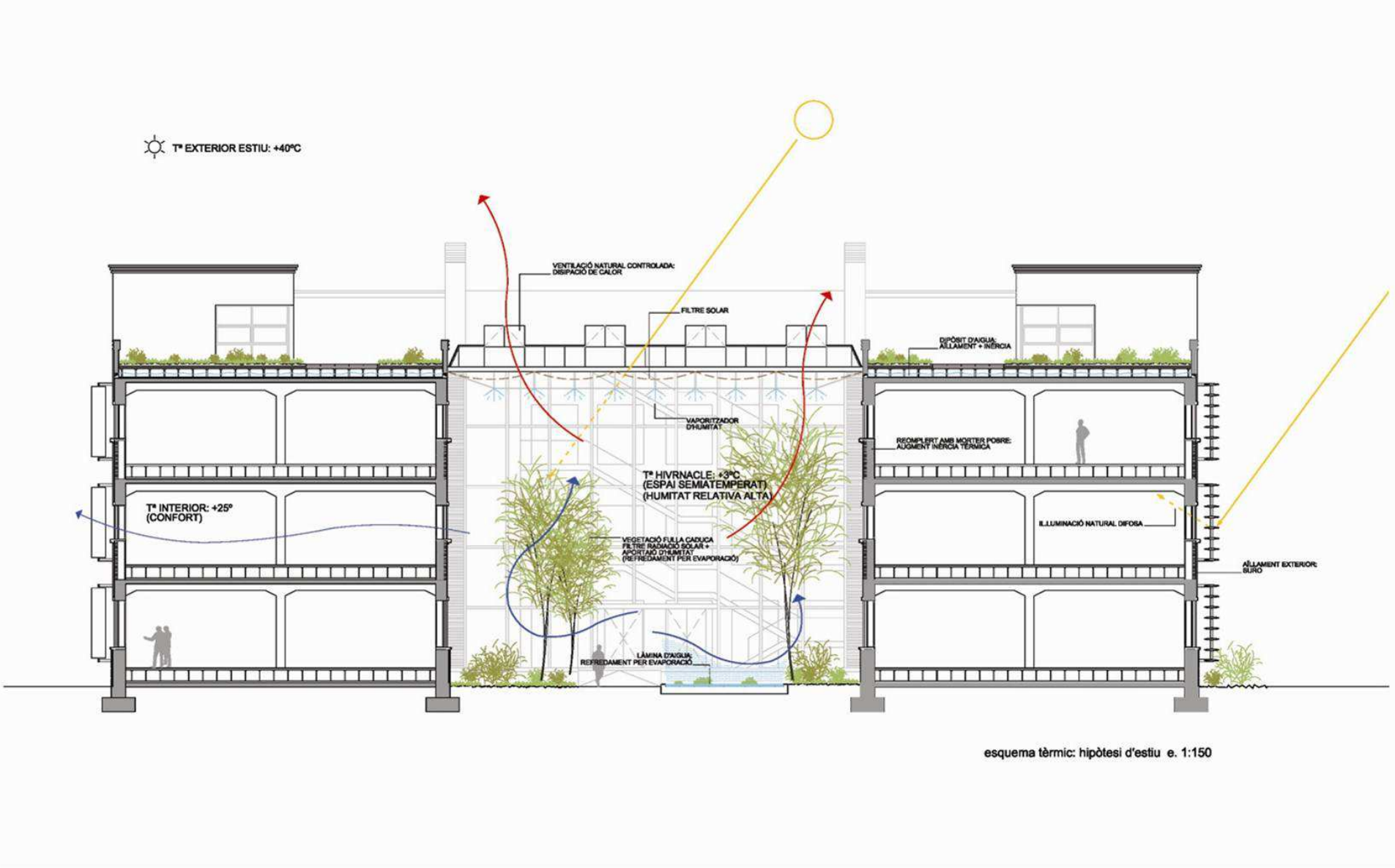



199.10
198.22
199.23
H1 CIÈNCIA
H2 TRANSFERÈNCIES DE TECNOLOGIA
H3 EMPRESES DE BASE TECNOLÒGICA
7.85
198.22
198.35
198.22
199.09
199.26
197.70
197.33
197.70
e. 1/500

Opció		SIMULACIÓ ECOTECT: Carrega aparells 60W/m2				Total estalvi	SIMULACIÓ ECOTECT: Carrega aparells 40W/m2				Total estalvi
		Calefacció	% estalvi	Refrigeració	% estalvi		Calefacció	% estalvi	Refrigeració	% estalvi	
O1	Edifici base	6,46 kWh/m2		140,63 kWh/m2			3,09 kWh/m2		125,14 kWh/m2		
O2	Base + aïllament	5,76 kWh/m2	**11%**	136,32 kWh/m2	**3%**	3%	0,17 kWh/m2	**94%**	103,94 kWh/m2	**17%**	29%
O3	Base + atrios	6,45 kWh/m2	**0%**	120,70 kWh/m2	**14%**	14%	2,47 kWh/m2	**20%**	88,58 kWh/m2	**29%**	38%
O4	Base + atrios+ millores (aïllam, lameles, coberta)	5,19kWh/m2	**20%**	105,93kWh/m2	**25%**	24%	1,15kWh/m2	**63%**	73,40kWh/m2	**41%**	49%
O5	O4 + protecció atrios estiu	5,19kWh/m2	**20%**	102,98kWh/m2	**27%**	26%	1,15kWh/m2	**63%**	66,34kWh/m2	**47%**	54%
O6	O4 + efecte arbres	5,19kWh/m2	**20%**	104,18kWh/m2	**26%**	26%	1,15kWh/m2	**63%**	71,52kWh/m2	**43%**	51%



esquema tèrmic: hipòtesi d'hivern e. 1:150



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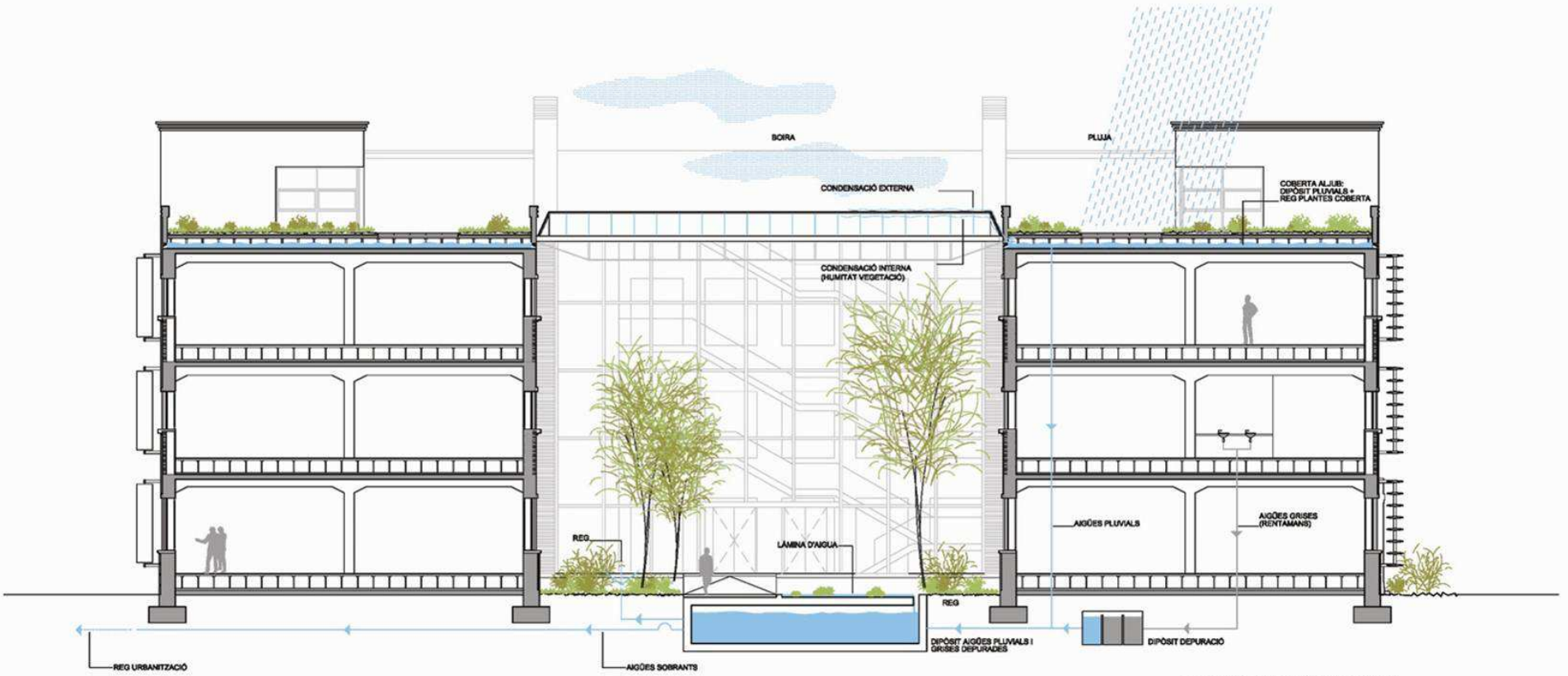
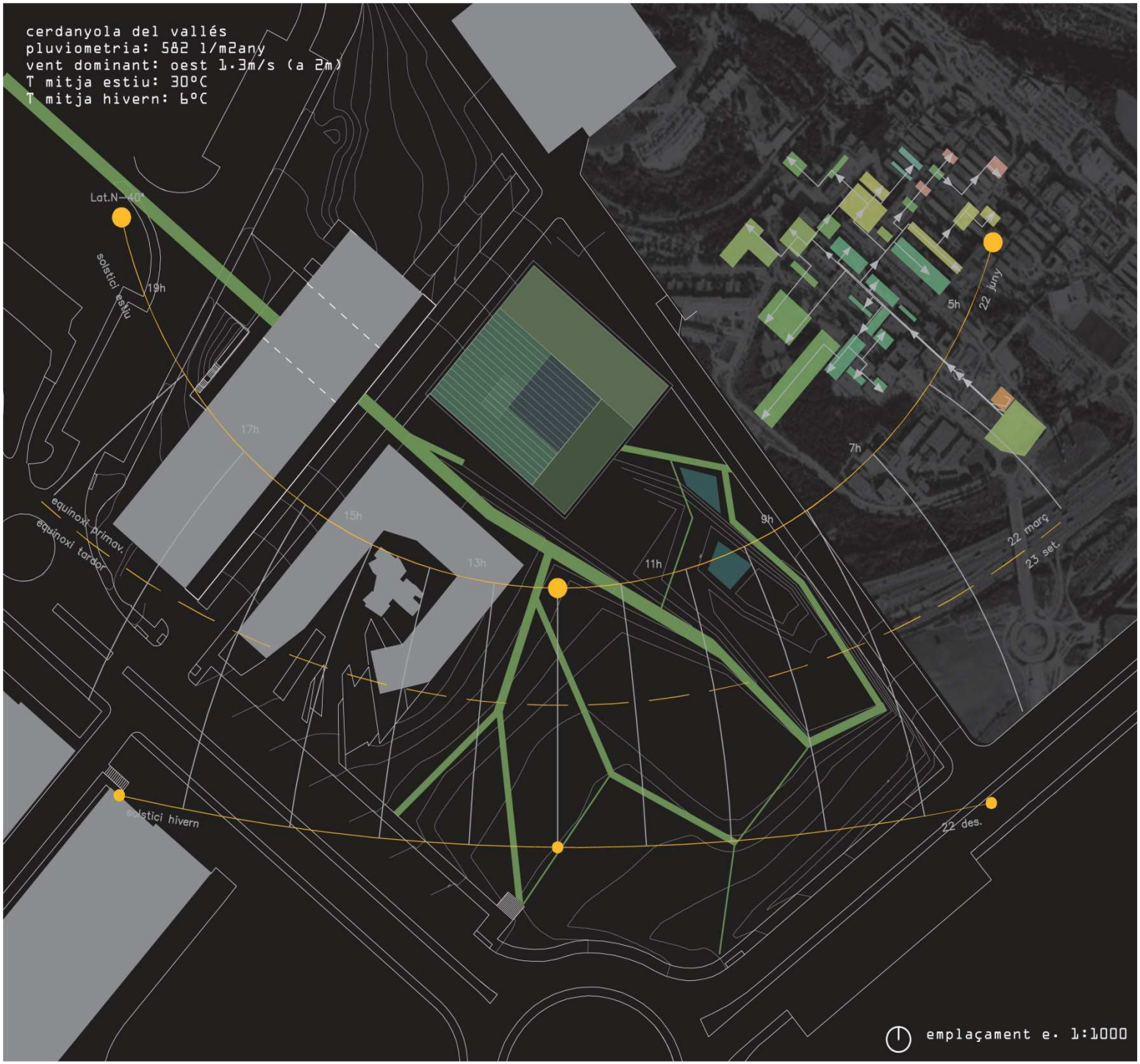


esquema i cicle de l'aigua e. 1:150


cerdanyola del vallés
pluviometria: 582 l/m2any
vent dominant: oest 1.3m/s (a 2m)
T mitja estiu: 30ºC
T mitja hivern: 6ºC
Lat.N=41º
solstici estiu
19h
17h
15h
13h
11h
9h
7h
5h
22 juny
22 març
23 set.
equinox. primav.
equinoxi tardor
solstici hivern
22 des.
emplaçament e. 1:1000


cap de grup
cap de grup
cap de grup
predocs
predocs
predocs
predocs
serveis
serveis
cap de grup
cap de grup
comunicació
projectes i patrocini
staff scientists
staff scientists
sala 3D
sala òptica
gerència i administració
preDocs
staff scientists
staff scientists
staff scientists
staff scientists
staff scientists
staff scientists
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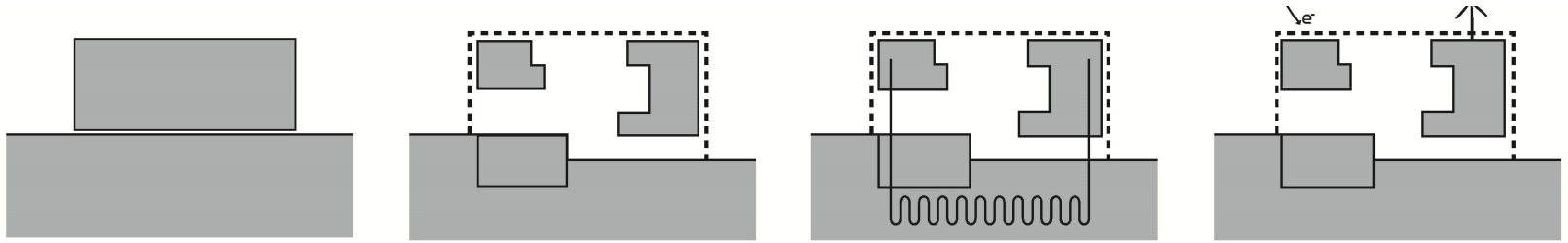


REFERANCE BUILDING | PASSIVE SYSTEM SOLUTIONS | ACTIVE SYSTEM SOLUTIONS | COMPENSATION FOR PROD.

REFERANS YAPI | PASIF SISTEM COZUMLERI | AKTIF SISTEM COZUMLERI | EK ENERJI URETIM SISTEMLERI

FORM COMPACTNESS-1
200 kWh/m2 year

FORM COMPACTNESS-2
139 kWh/m2 year

NATURAL LIGHTING + HIGH EFFICIENCY
121 kWh/m2 year

INSULATION
91 kWh/m2 year

GEOTHERMY
73 kWh/m2 year

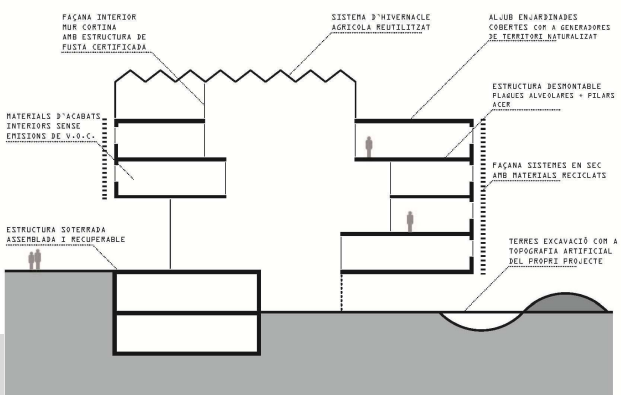
PHOTOVOLTAIC
68 kWh/m2 year

WIND
51 kWh/m2 year

EMBEDDED ENERGY
2.12 GJeq/m2
-70% REGARD. CONV. BUILDING

CO_2 EMISSION
0.21 tnCO_2eq/m2
-56% REGARD. CONV. BUILDING

MATERIALS & WELLBEING / MALZEME & WELLBEING



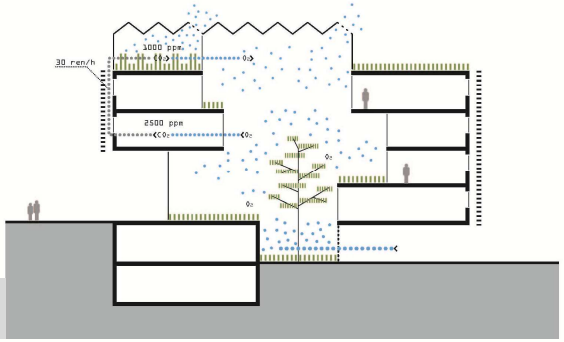
CULTIVATE GARDEN
4.5 tnCO_2/year
-15% REGARD. CONV. BUILDING

GREEN ROOF
0.34 tnCO_2/year
-1.1% REGARD. CONV. BUILDING

INTR. VEGETATION
1.5 tnCO_2/year
-5% REGARD. CONV. BUILDING

PRODUCTION
31.04 tnCO_2/year
-15% REGARD. CONV. BUILDING

AIR CYCLE / HAVA DÖNGÜSÜ



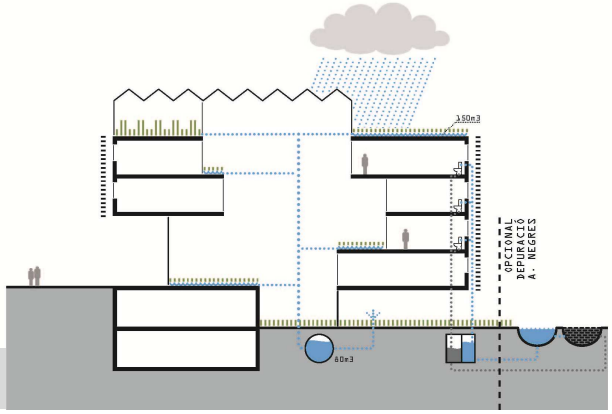
WATER COLLECT.
842 m2/year

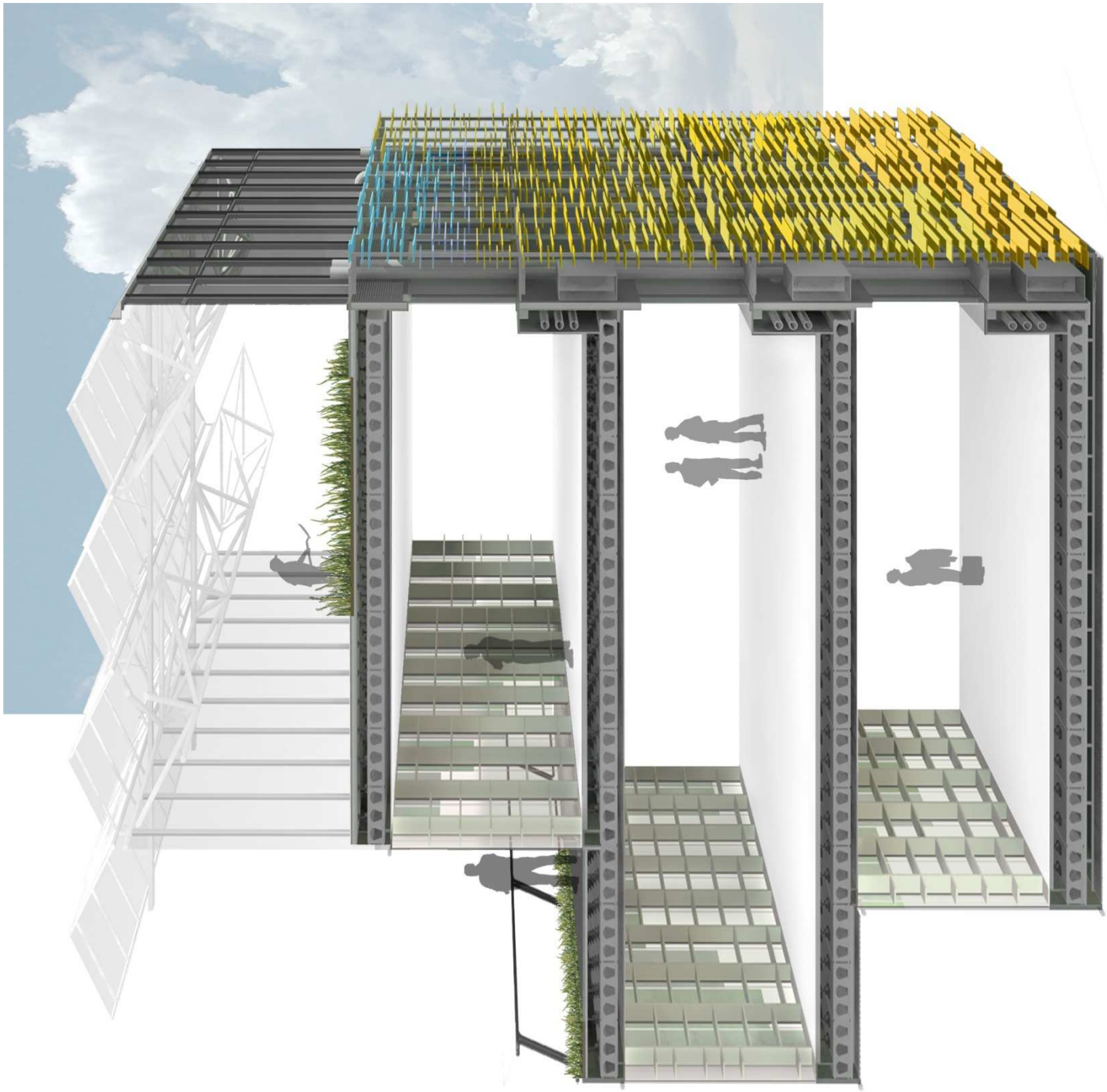
RAINFALL
585 L/m2 year

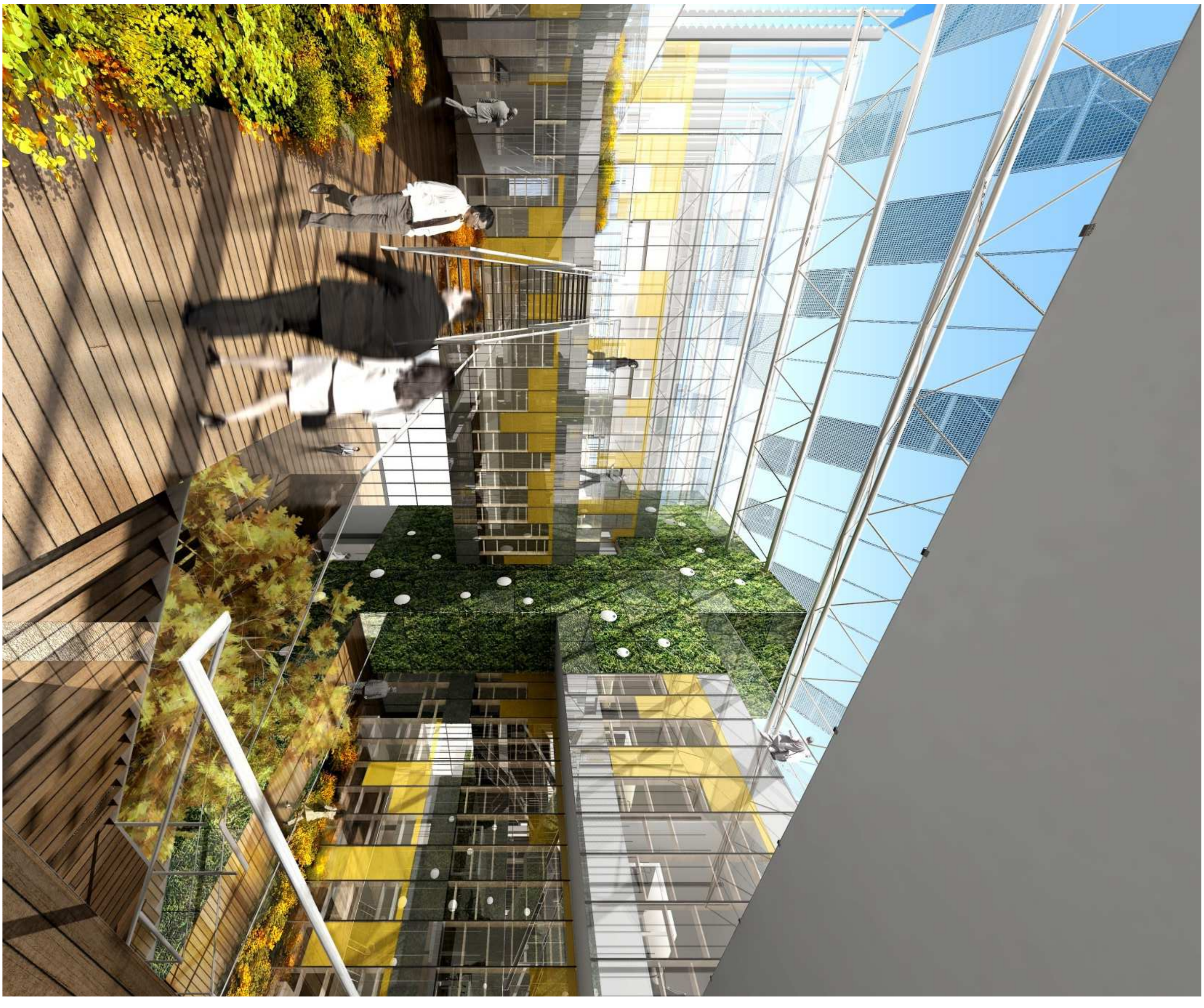
WATER STORAGE
492.57 L/m2 year

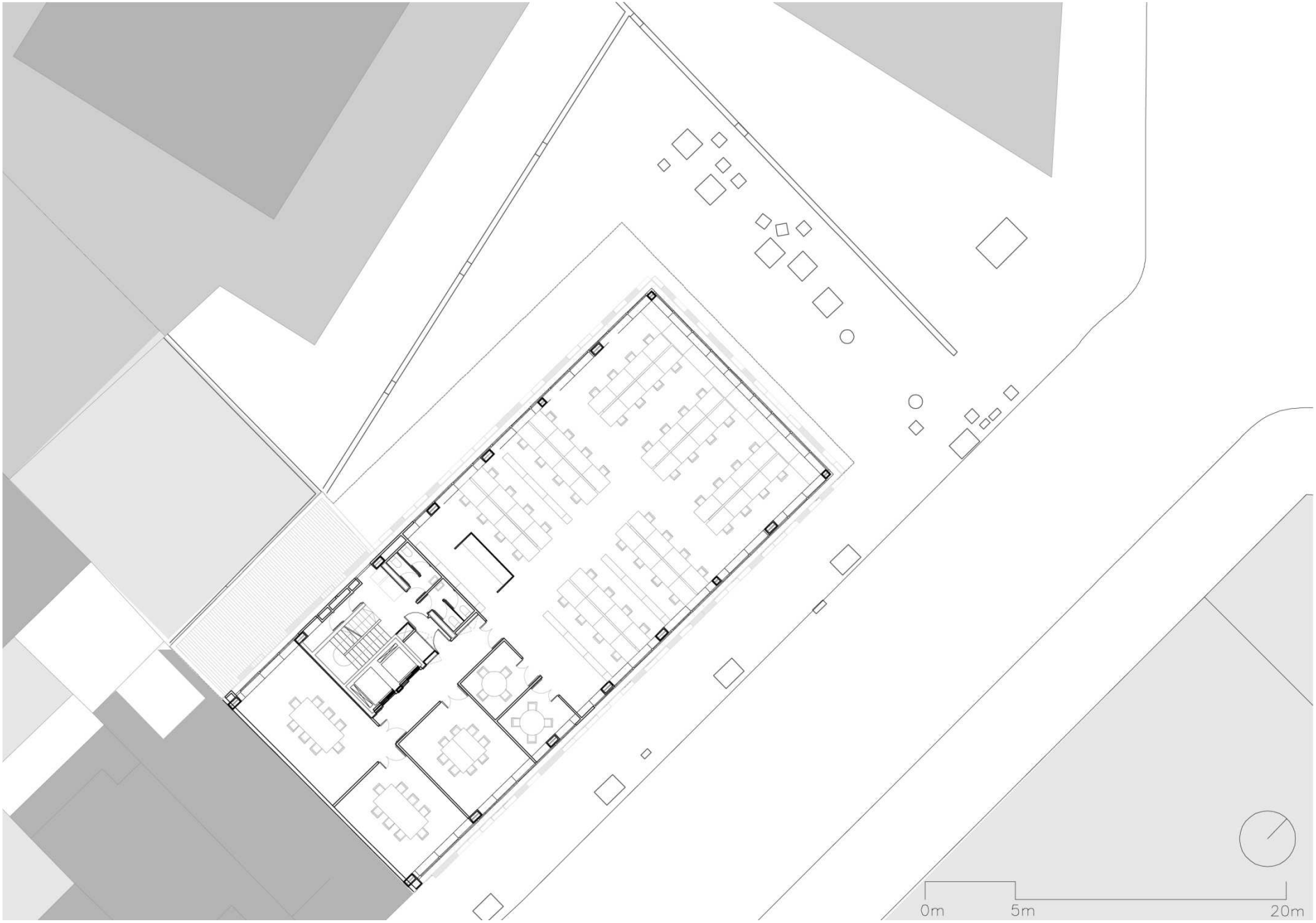
DIRTY WATER CONSMP.
0.13 m3/m2 year

WATER CYCLE / SU DÖNGÜSÜ





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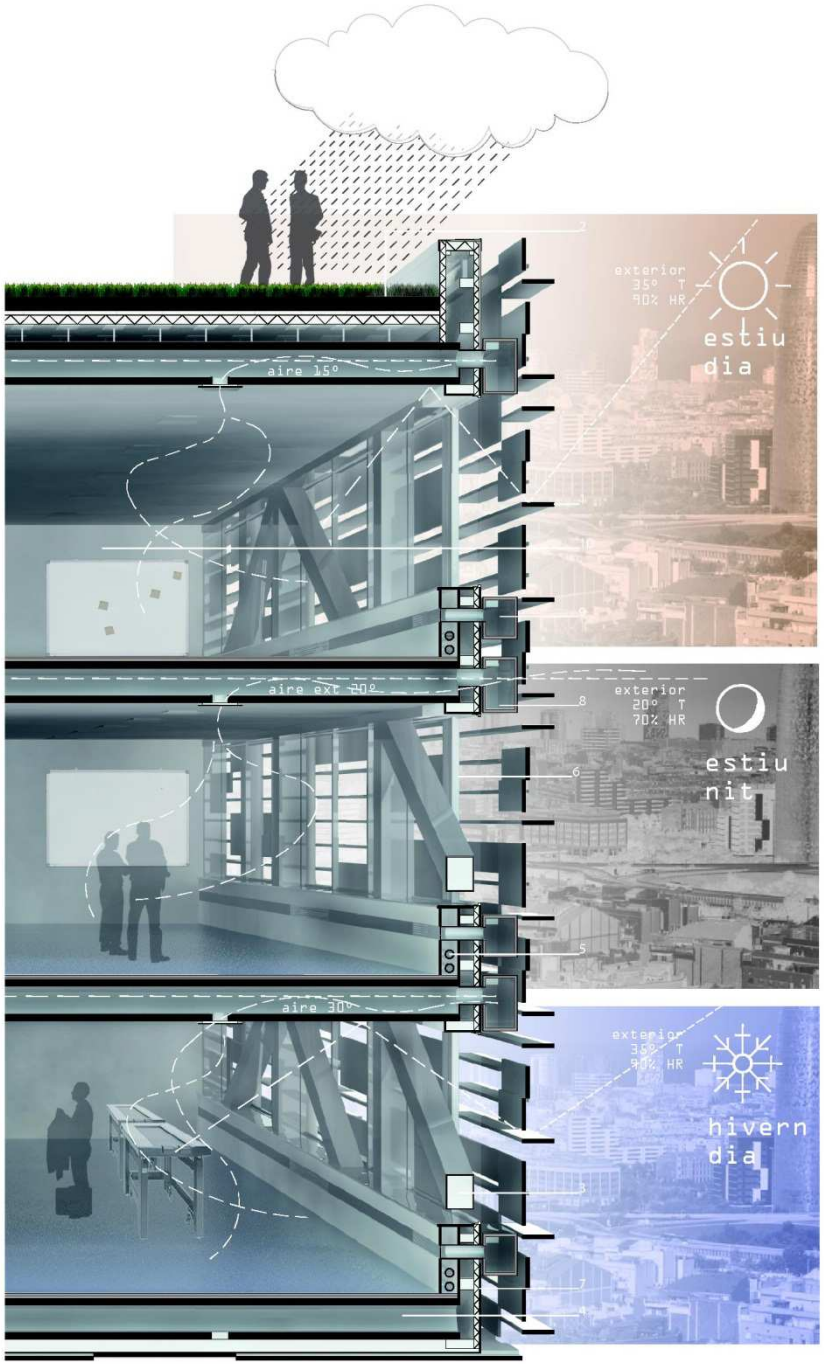
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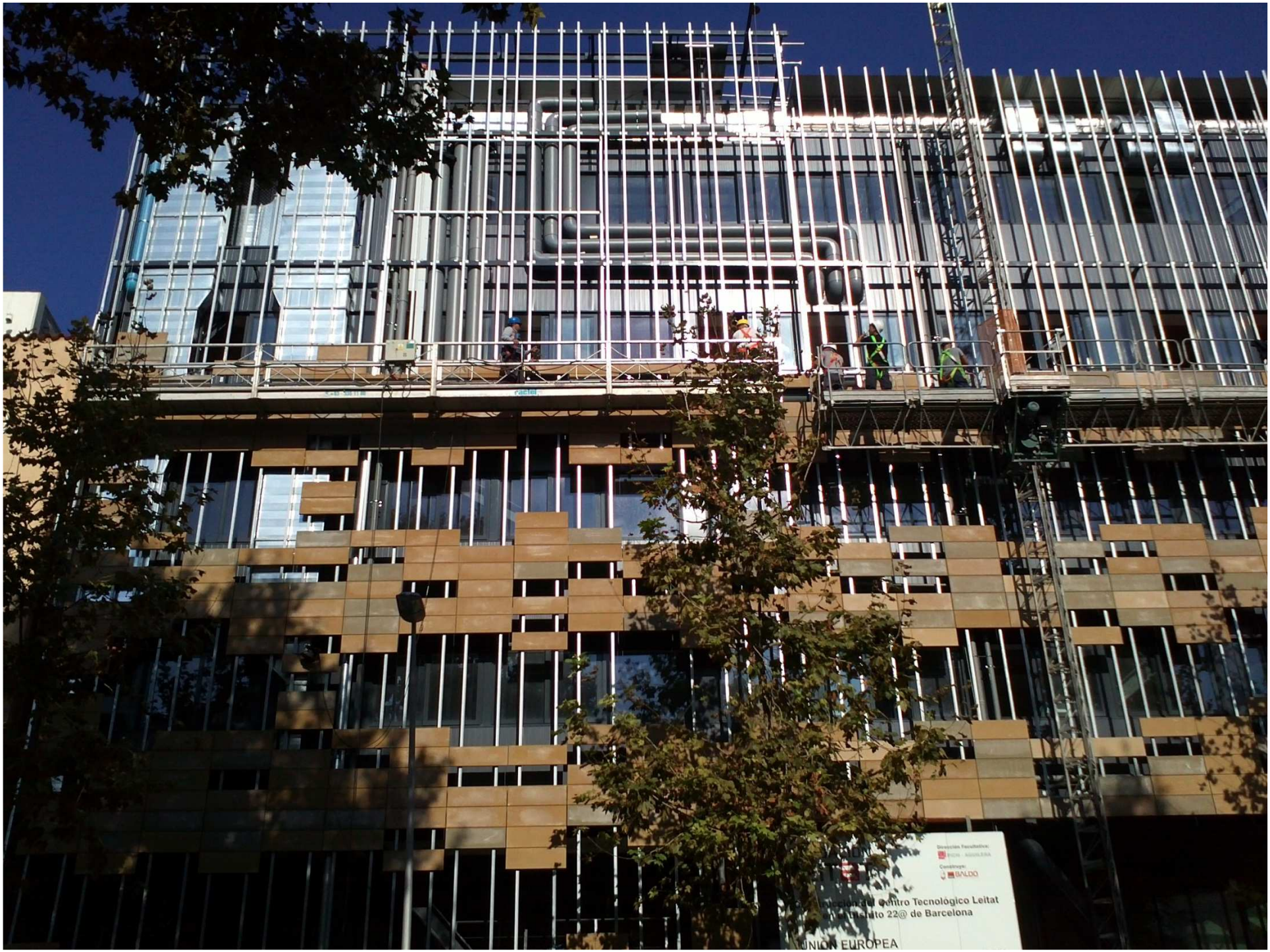
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Constructor:
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UNION EUROPEA


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EQUIP ARQUITECTURA

PICH - AGUILERA

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