

update from Belgium two Years into Passive building standards as national building code



MMA = A2M + FNA architects

Sebastian Moreno-Vacca

Architect, founding partner A2M
Professor at University of architecture ULB, BE
Director FAAST think tank
Vice-president GPBC

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Architect, partner A2M
Director be.passive

MMA (A2M-FNA)



Brussels Passivehouse process

A2M-FNA

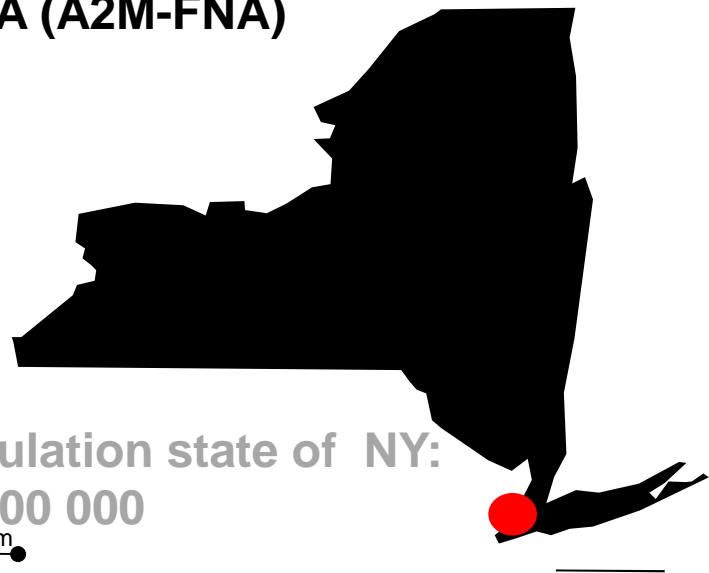
beyond

thanks Rem!

01

context

MMA (A2M-FNA)



Population state of NY:
19 600 000

100km
60 mi

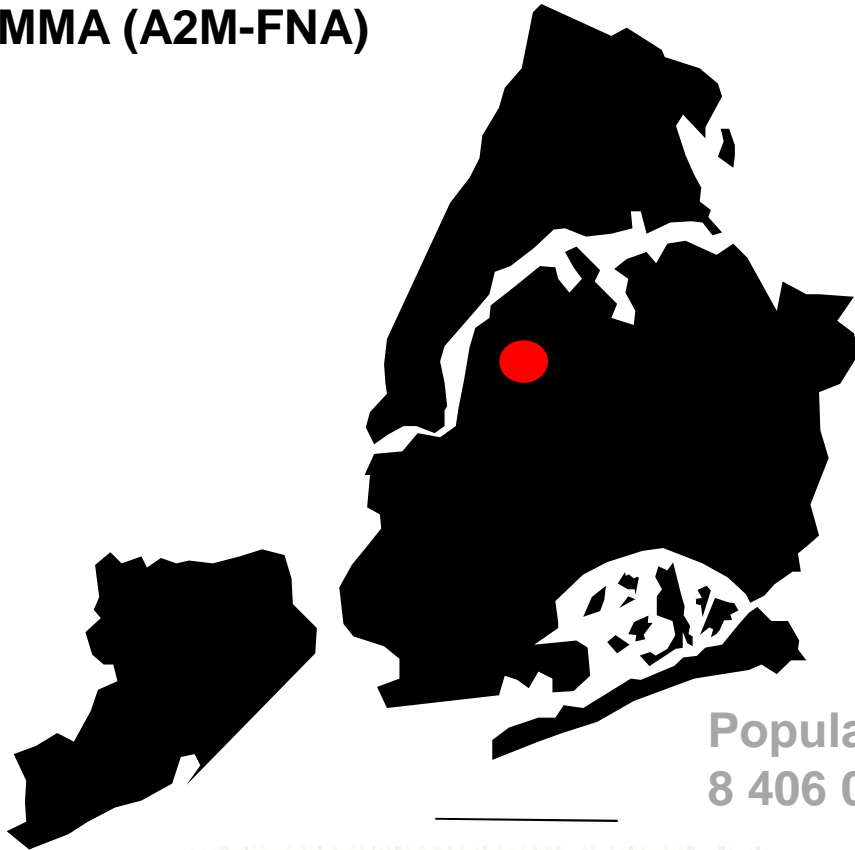


Population BE
11 000 000

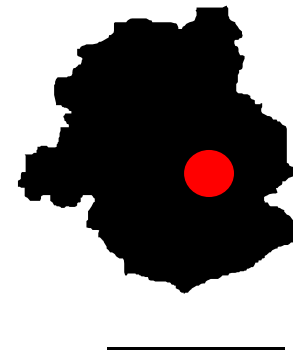
central region
(on 3)
Federal
Government



MMA (A2M-FNA)

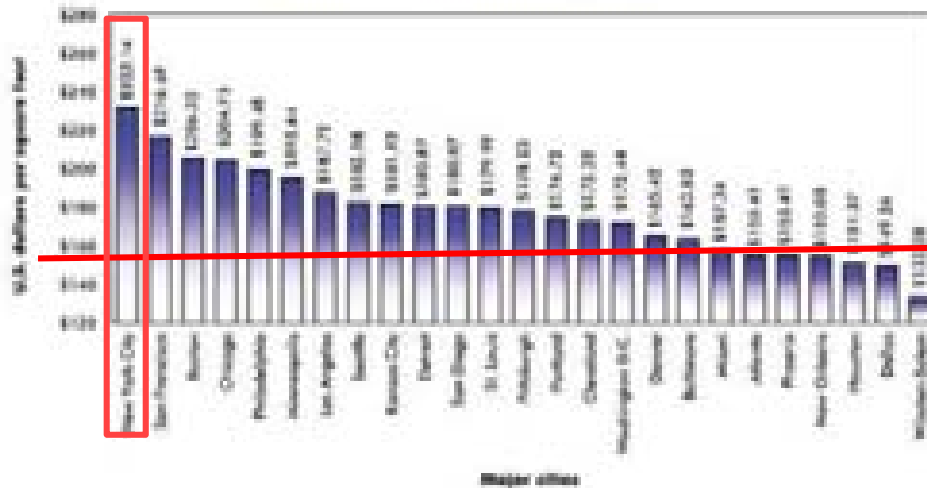


Population NYC:
8 406 000



Population Brussels
1 132 781

Apartment building (4 to 7 stories) construction cost:
May 2012 ranking of major U.S. cities

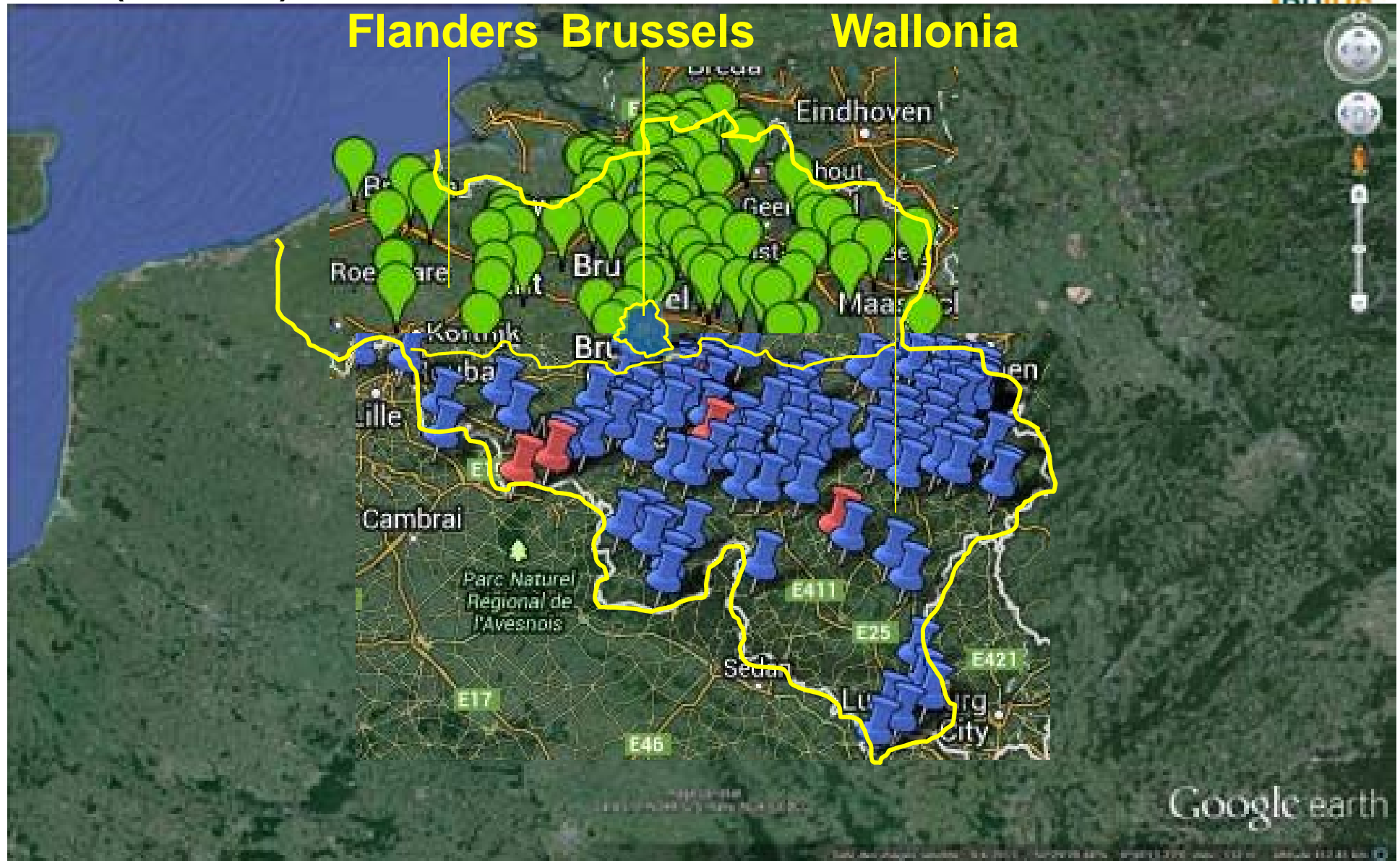


Brussels=
average construction cost:=
(gross m², excl TVA) 150\$/ft² (1 200 €/m²)

MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)

1
Develop
the local stock

2
Vote
strong energy
policy

the passivehouse
law is voted

Then the market
reacted...

2012



MMA (A2M-FNA)

1
**Develop
the local stock**
number of built passivehouse
buildings

Subsidy, incentives, yearly
RFP, 110 \$/sf

Stakeholders support
Training, guidance, etc
for FREE!

2006

2
**Vote
strong energy
policy**

the passivehouse
law is voted

Then the market
reacted...

- > 1y roundtable with
stakeholders
- > Passivehouse pact
- > 2y reinforce market

2011



MMA (A2M-FNA)



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Develop the local stock
number of built passivehouse buildings

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Training, guidance, etc
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2006

2
Vote strong energy policy
the passivehouse law is voted

Then the market reacted...

- > 1y roundtable with stakeholders
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- > 2y reinforce market

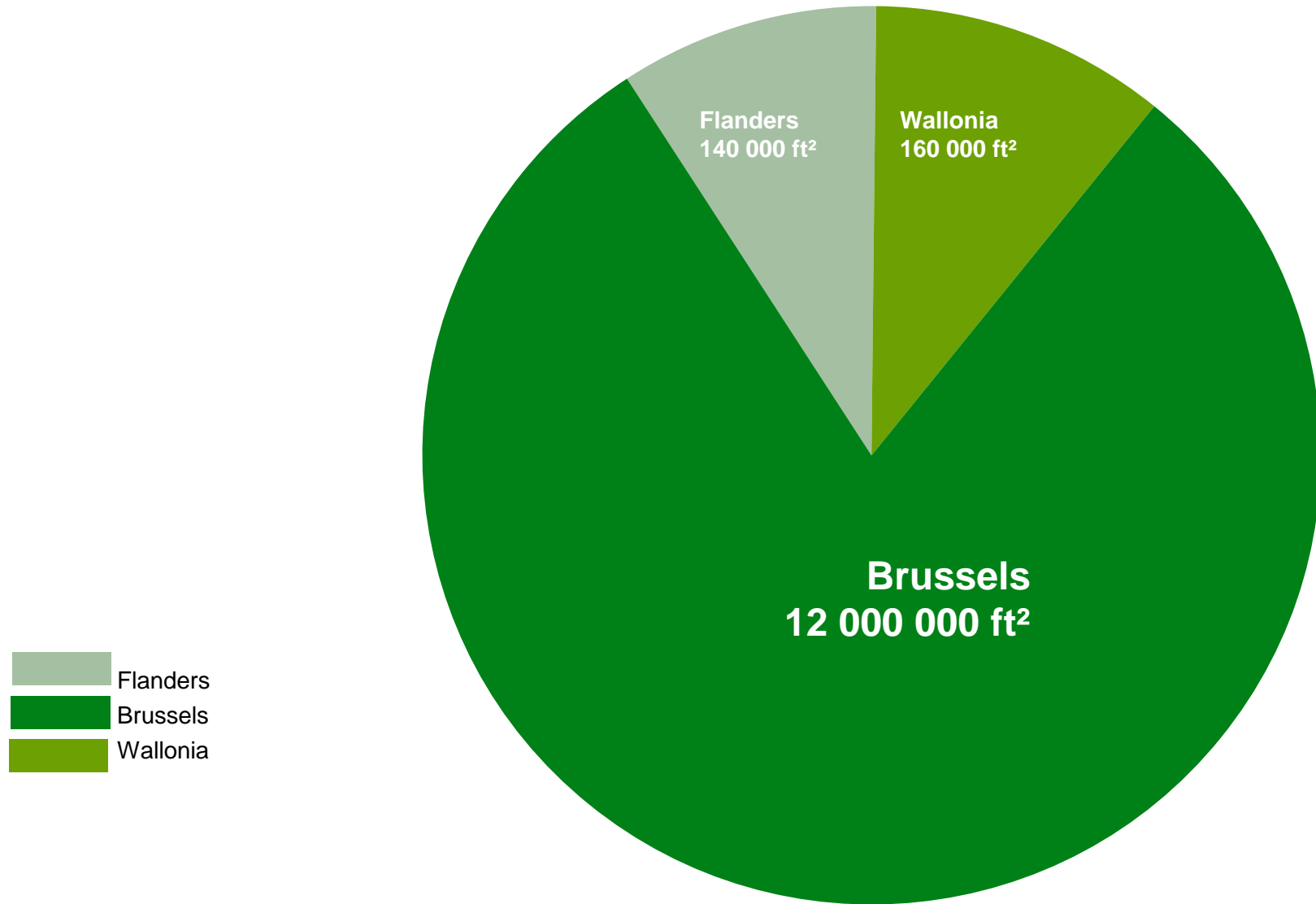
2011

3
The law has come into effect

2015

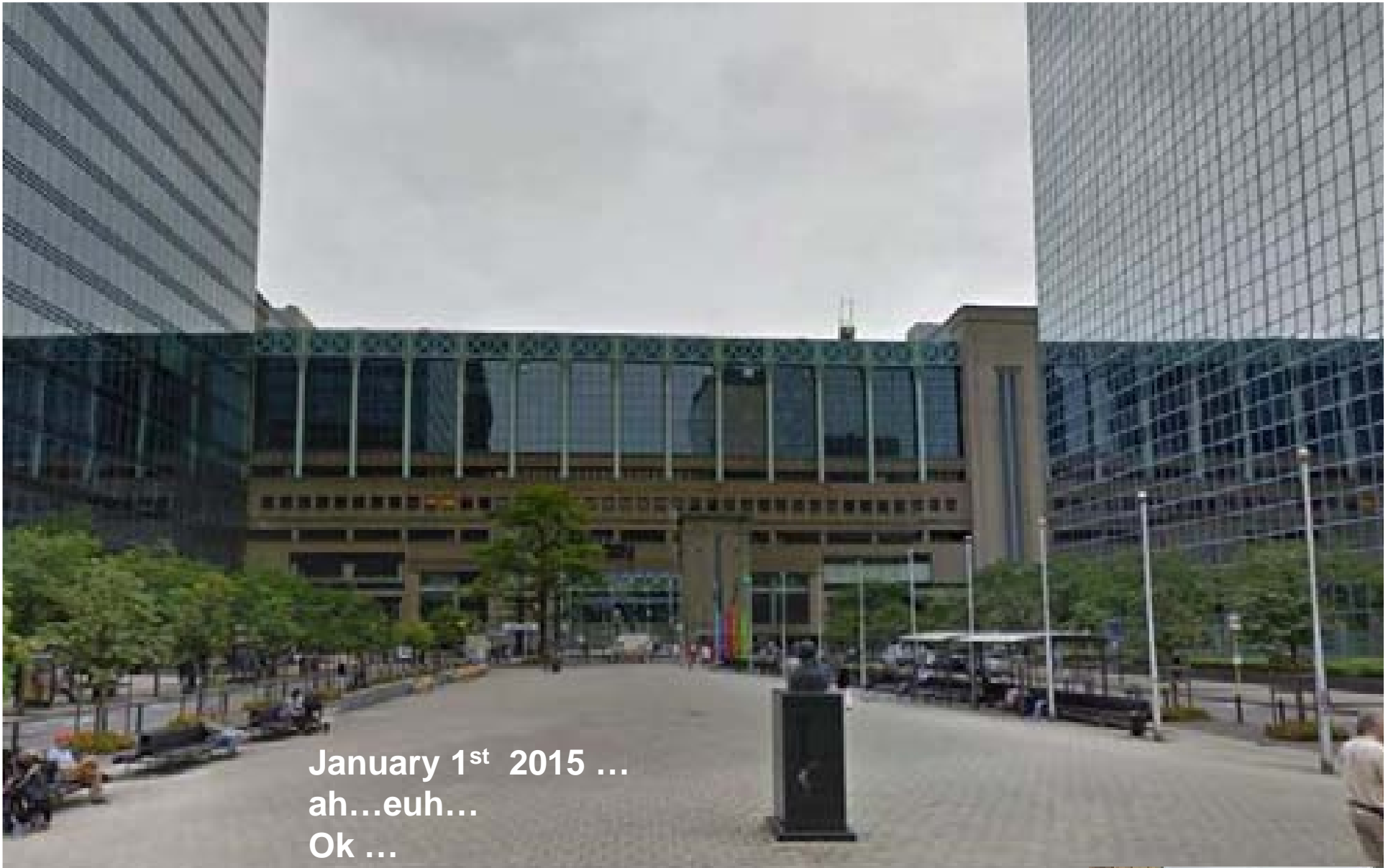


MMA (A2M-FNA)

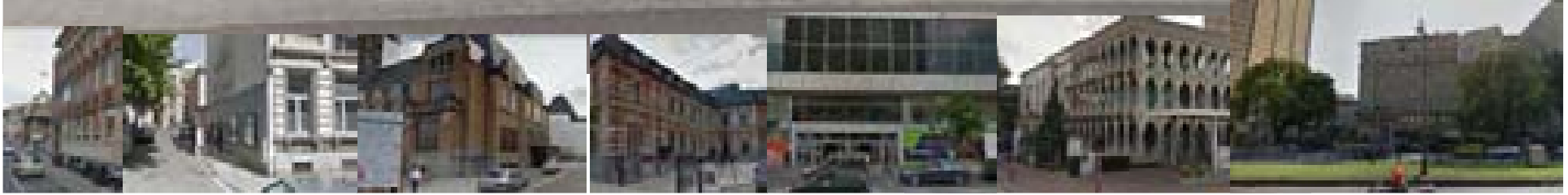


MMA





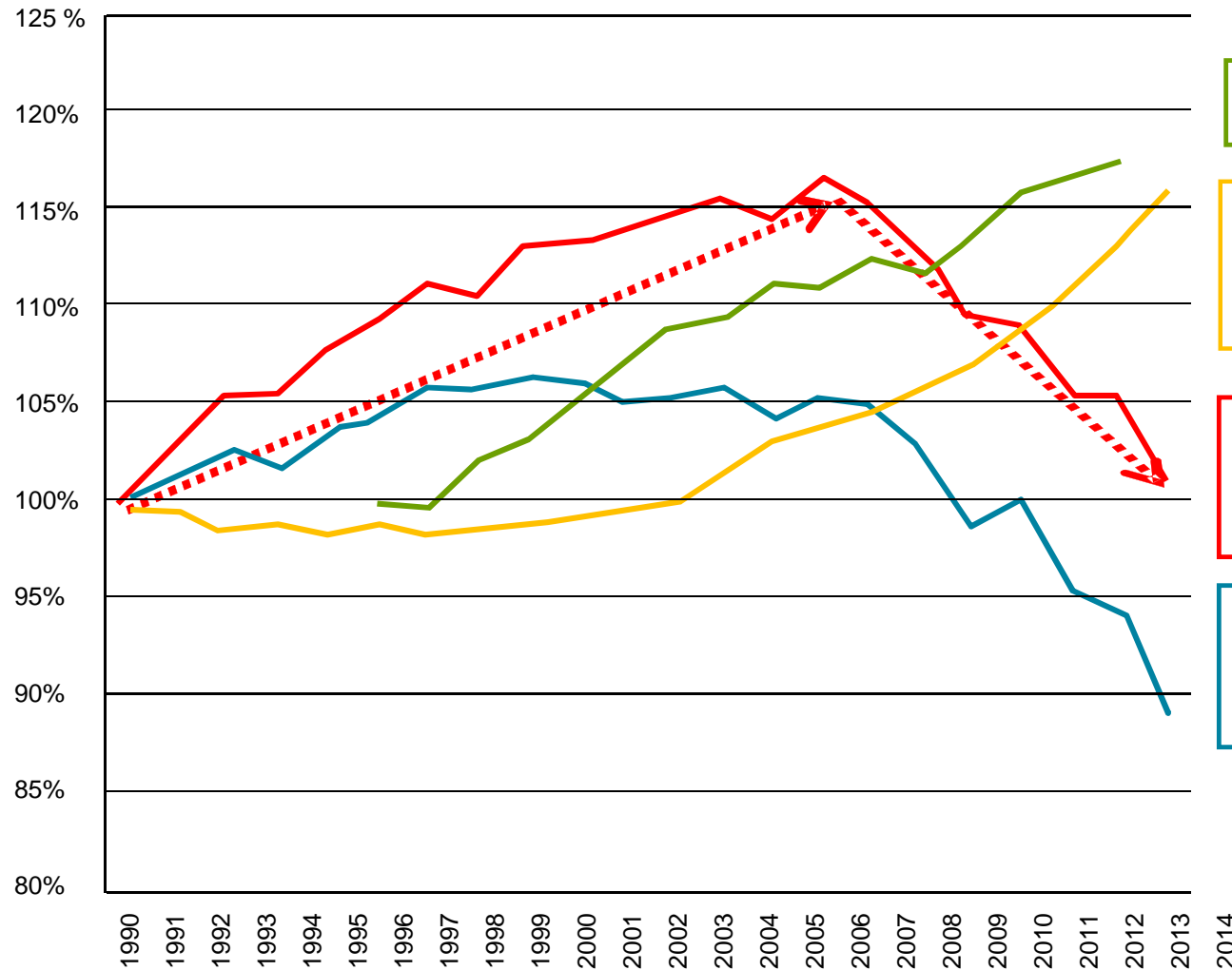
January 1st 2015 ...
ah...euh...
Ok ...



MMA (A2M-FNA)



**Energie consumption & Greenhouse Gas evolution in Brussels
(With Climate correction)**



Tertiary sector Jobs
1995 - 2010 : **+17%**

Population
1990 - 2011 : **+16%**
1990 - 2004 : **+4%**
2004 - 2011 : **+12%**

Energy consumption
1990 - 2011 : **+ 1 %**
1990 - 2004 : + 16%
2004 - 2011 : **- 15 %**

Greenhouse Gas (GHG)
1990 - 2011 : **- 11 %**
1990 - 2004 : **+ 5 %**
2004 - 2011 : **- 16 %**

-20%...

MMA (A2M-FNA)



PassReg

Passive House Regions with Renewable Energies

A unique opportunity to connect stakeholders together for the successful implementation of nearly zero energy building concepts in the Passive House Regions of Italy, France, Spain, and the United Kingdom. The project is supported by the European Union under the Horizon 2020 program.

Sign up with the PassReg network, free of charge, and be kept up to date on project progress and key outcomes. Benefits also include access to the forum of the International Passive House Association, a privilege enjoyed by over 2,000 professionals across 50 countries.

PassReg Structure: Defining the Nearly Zero Energy Building

Passive House is a revolution. Discover how and the way.



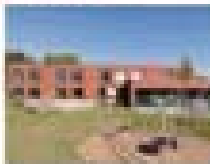
At the heart of the PassReg project is the creation of an enabling international network. The mission of the PassReg project is to support the development of the building industry and to provide a platform for the exchange of information and resources. The project is supported by the European Union under the Horizon 2020 program.

News and Events

Recent News & Events

PassReg website news

Passive House Regions



PHIUS Building House Award

Join the winners and finalists of the PHIUS Building House Award

Passive House Institute

A network of local and national PHIs

Upcoming Events

PHIUS Building House Award 2023

PHIUS Building House Conference 2023

Passive House Institute

Passive House Institute US

Passive House Institute

Passive House Institute US

www.passreg.eu



cool?



MMA (A2M-FNA)



02

A2M-FNA



A 2 M



MMA (A2M-FNA)



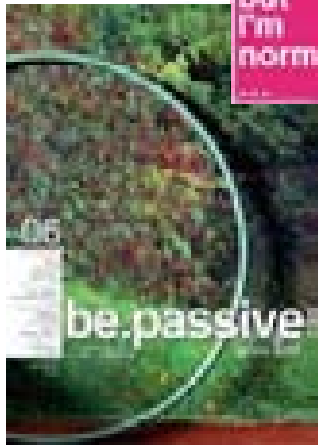
R & B

D & B

R & D

A 2 M

I live in a passive house but I'm normal





R & B

D & B

R & D

A2M

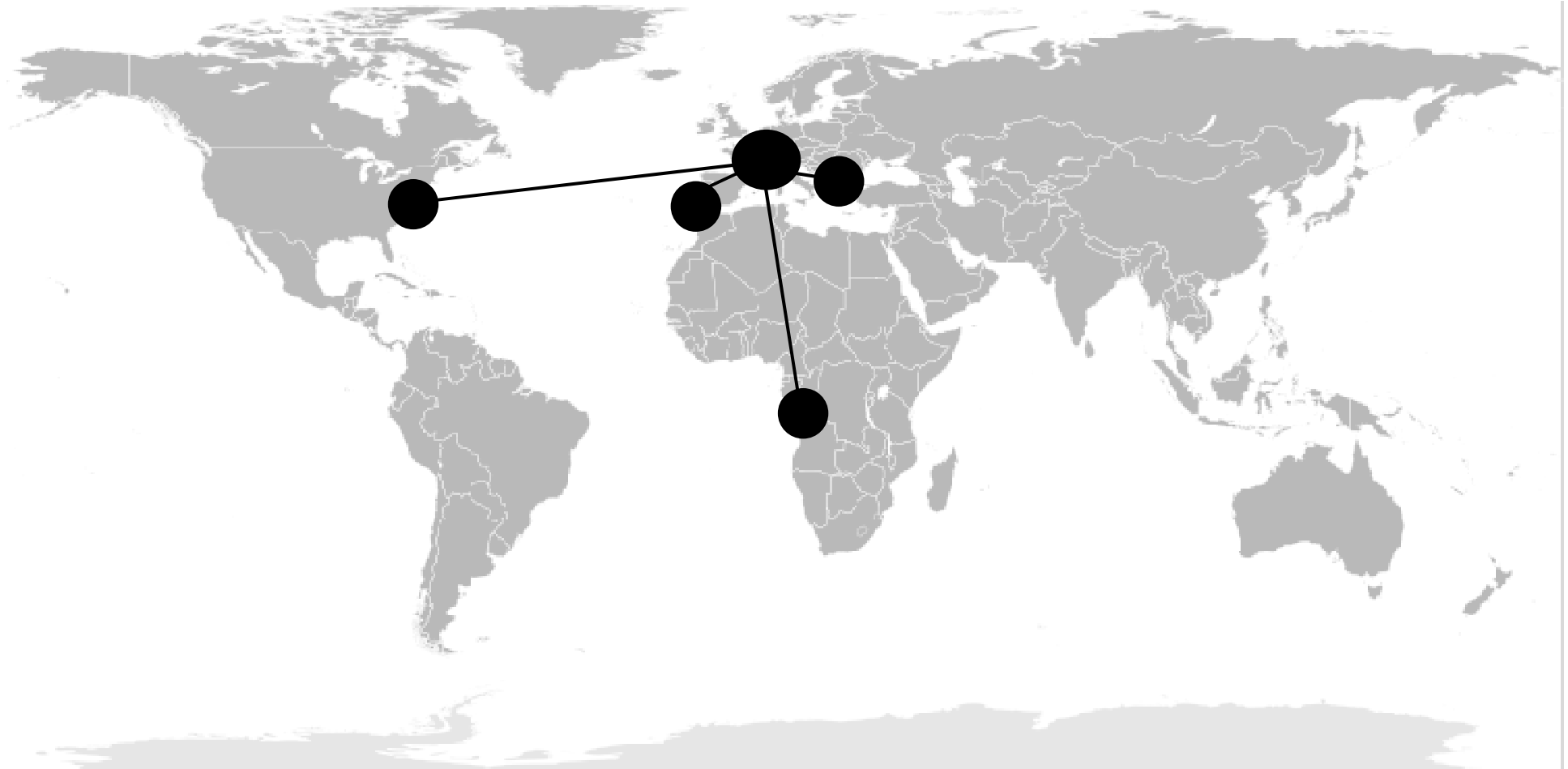
MMA (A2M-FNA)



MMA (A2M-FNA)

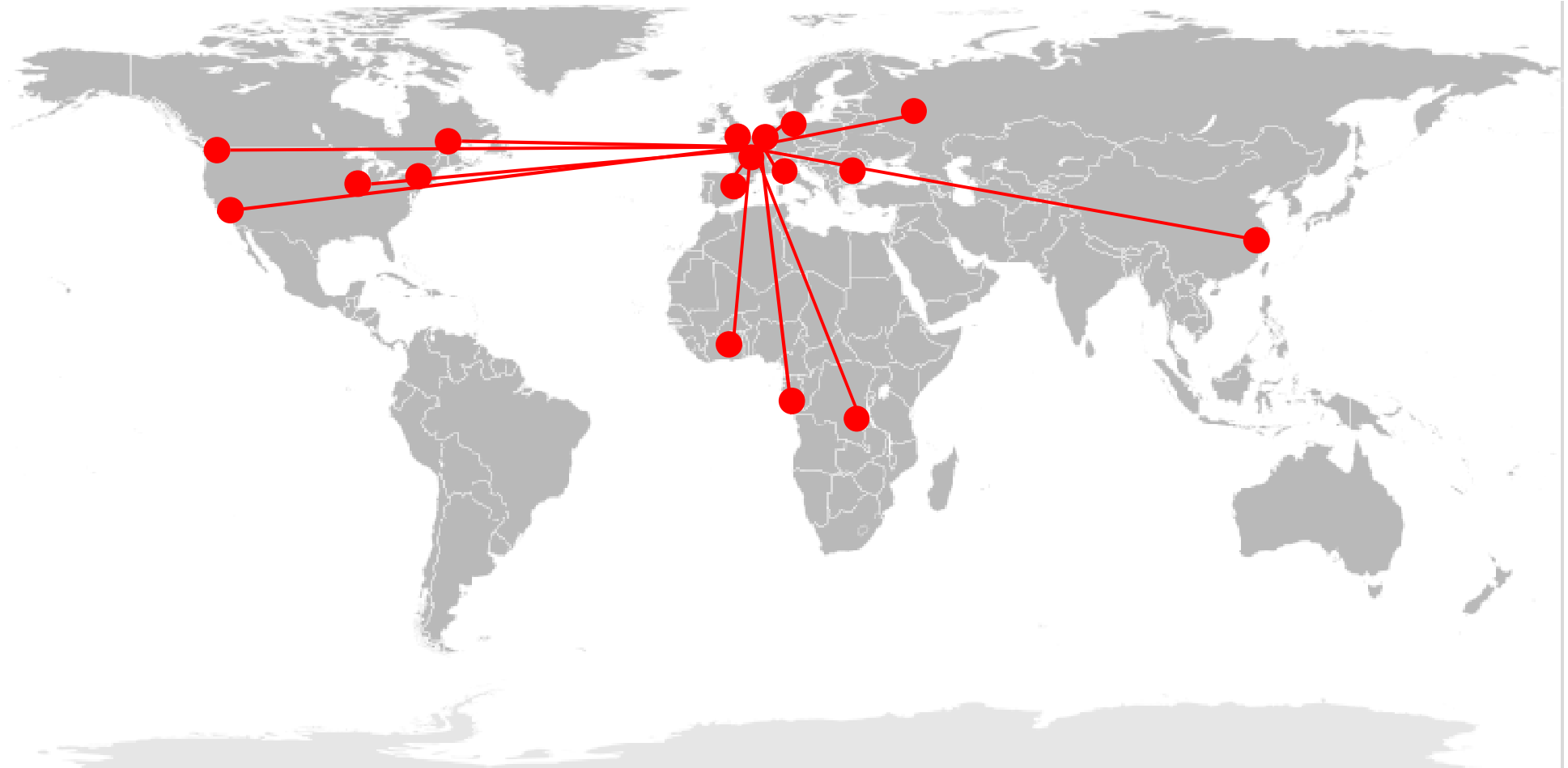


we build



MMA (A2M-FNA)

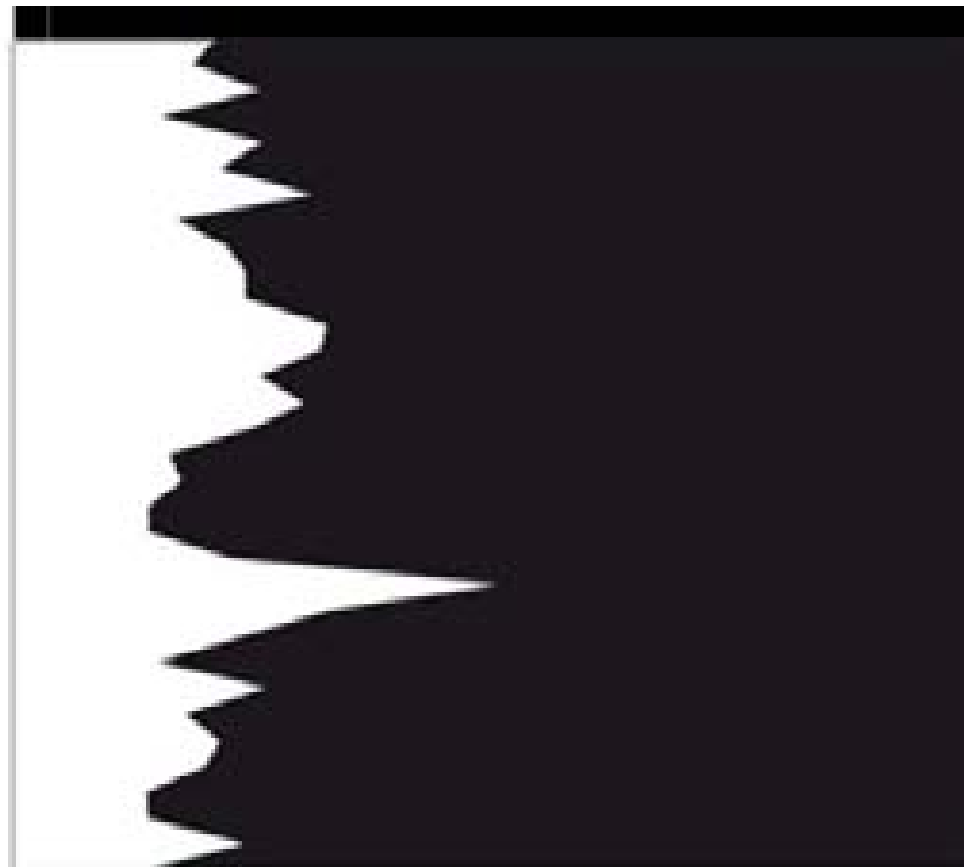
we share



MMA (A2M-FNA)

Gross surface m² / Liters of coffee

present
LINNE-PLANTES
HAREN 03
ANVERS-SIMONS
PAL V
LES HAUTS DE BELLEVUE
CRÈCHE ILE AUX OISEAUX
BELLE VUE HOTEL
PENICHE
MOL04
FOREST02
IFAM
IPFC DE NIVELLES
CIT BLATON
CRAS FOREST
FEZ FSE (marly)
BONTE
BAGECI
LOURSE 120
MARLOT
MAISON DU PORT
ECO-OFFICE
L'ILE AUX OISEAUX
EXLO1
JETTE
CARROSSE
LOCO
LES GRAND MOULINS
COTE-A-COTE
HAREN 02
T&T
BYHHR
NEMO33
ICE CHALLENGE



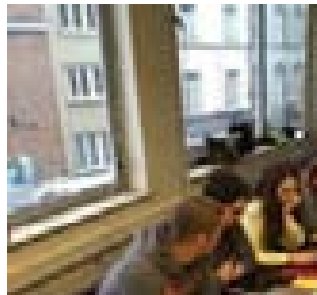
MMA (A2M-FNA)

10 yrs:

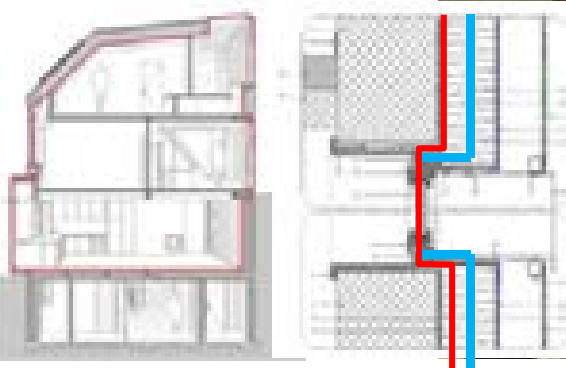
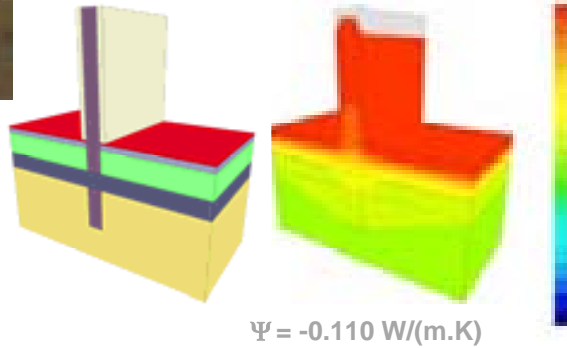
University

master class in ELU UK

ULB in BE



in common cursus
2016: > 190 students
Results: 100%



MMA (A2M-FNA)

10 yrs:

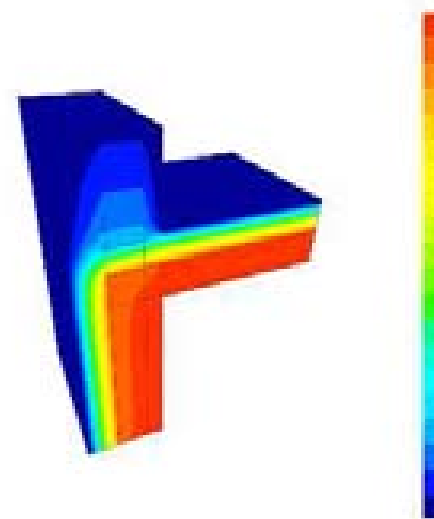
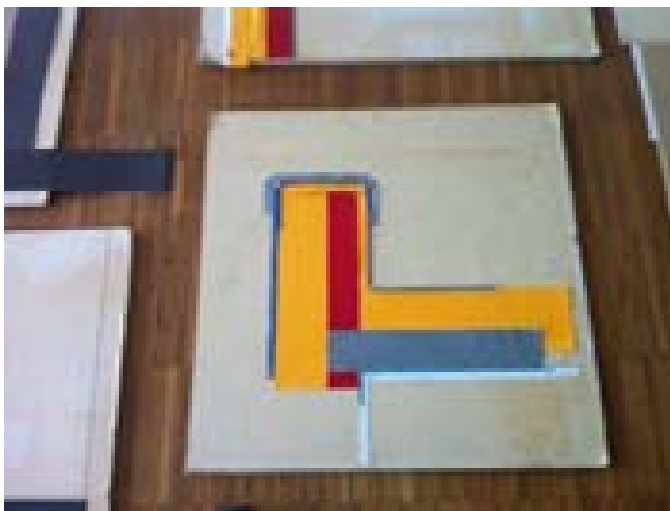
Trainings for the sector:

builders federations and Unions

architects and engineers associations

Not only in Be but, UK, FR, RDC, BU...

more than 1 500 people



MMA (A2M-FNA)

5 yrs:

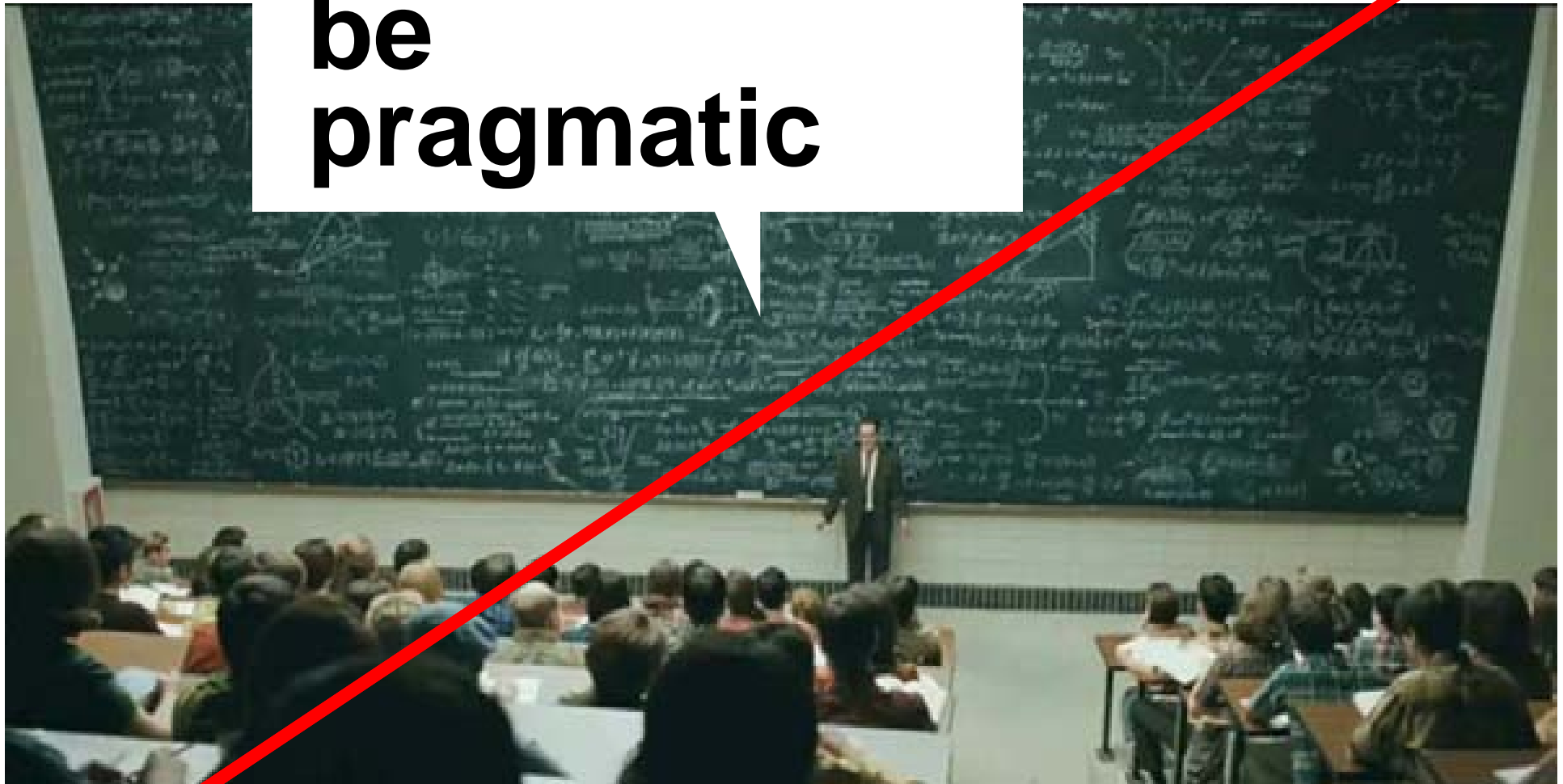
Quarterly magazine

Book 2015 > 400 pages

> 2 500 pages (projects, feedback, from all the sectors, do and don't, tips & tricks...
> 144 000 downloads free details, issues



**let's
be
pragmatic**



03

**Now
What ?**

MMA (A2M-FNA)



Q&A

**did
you
say
NO
extra
cost?**

MMA (A2M-FNA)

extra cost ? 150 \$ / ft²
no extra cost

extra cost



170 \$/ft²



150 \$/ft²



120 \$/ft²



108 \$/ft²



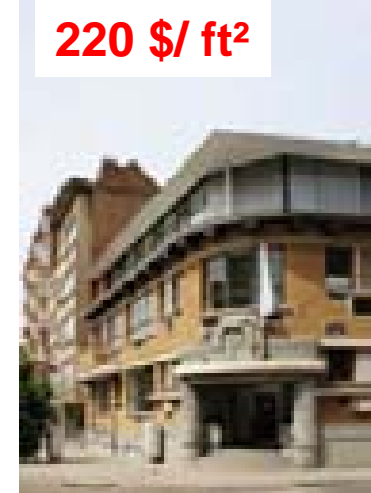
350 \$/ft²



320 \$/ft²



220 \$/ft²



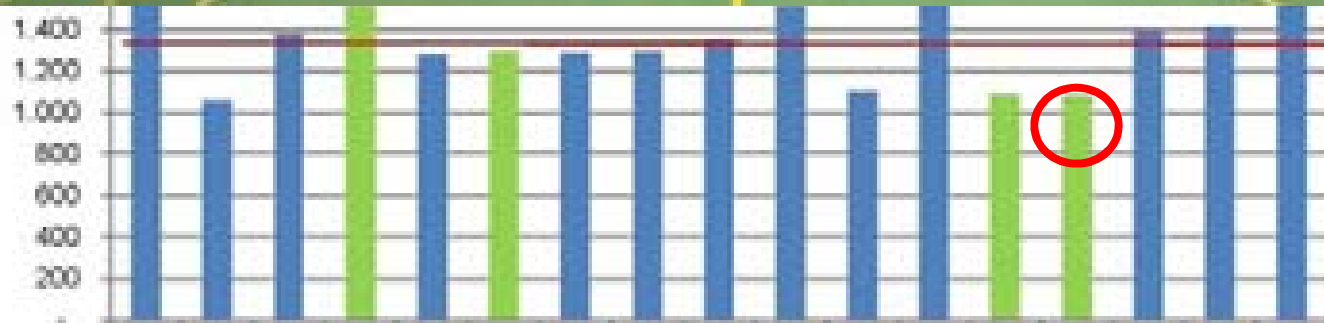
190 \$/ft²



**our very first PH
cost = 95% compare
to standard!
2003**



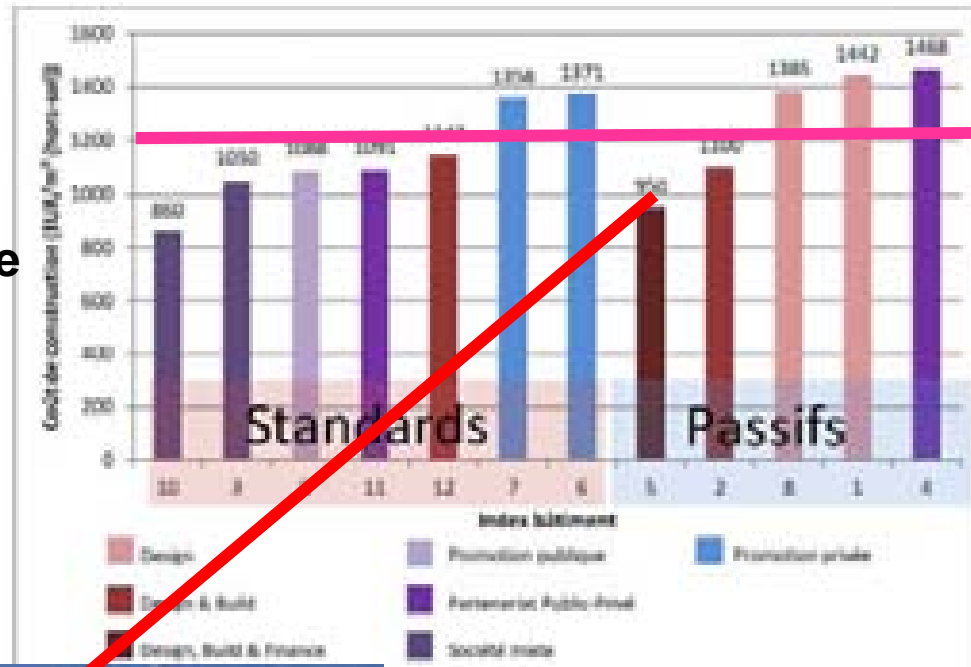
MMA (A2M-FNA)



MMA (A2M-FNA)



Study about social /affordable
passivehouse (pmp)
12 buildings
=> 50 projects



MMA (A2M-FNA)

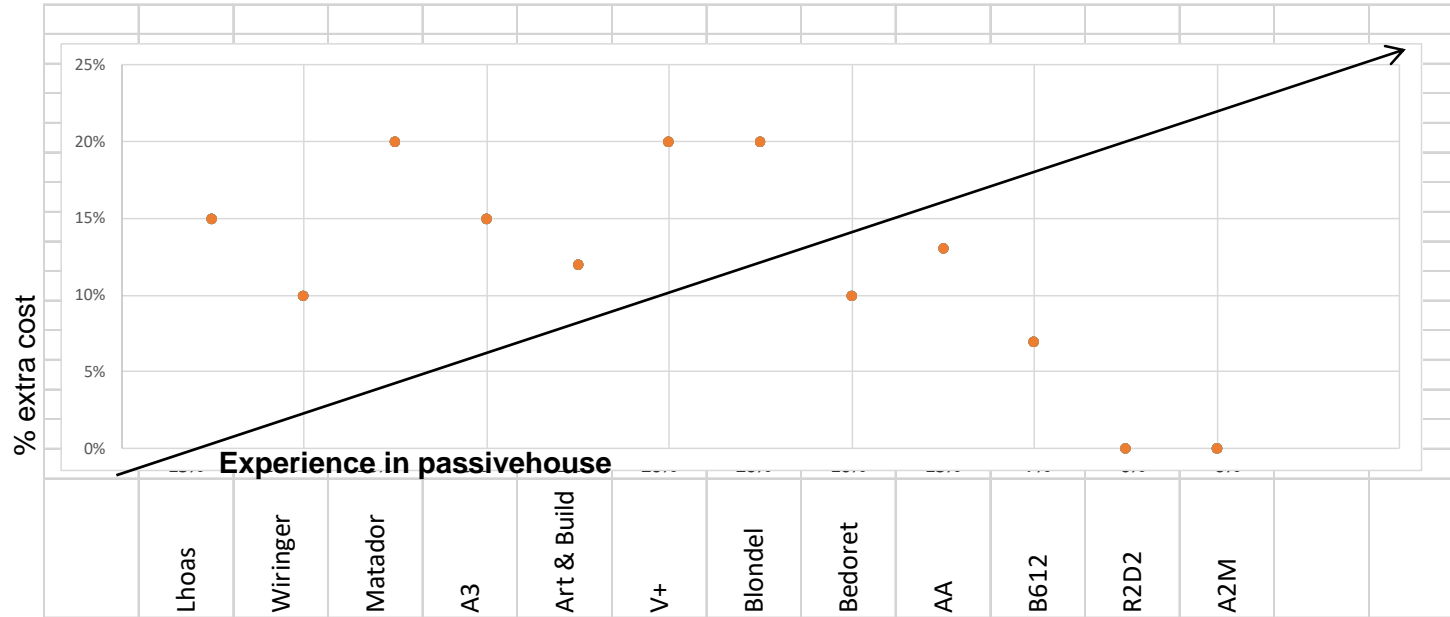


Q&A

how
is
nowadays?

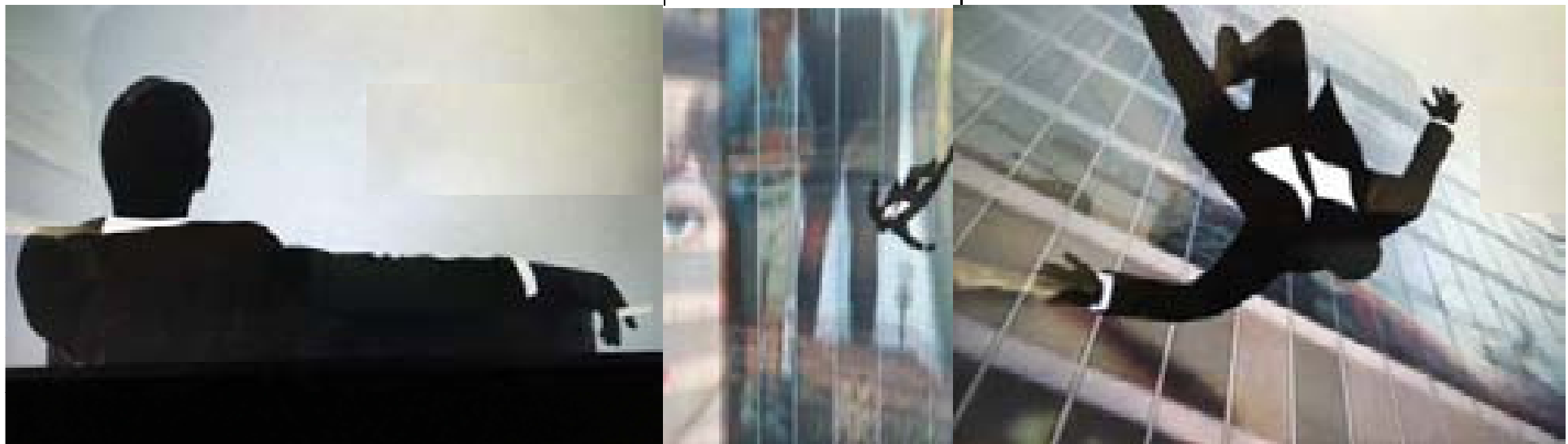
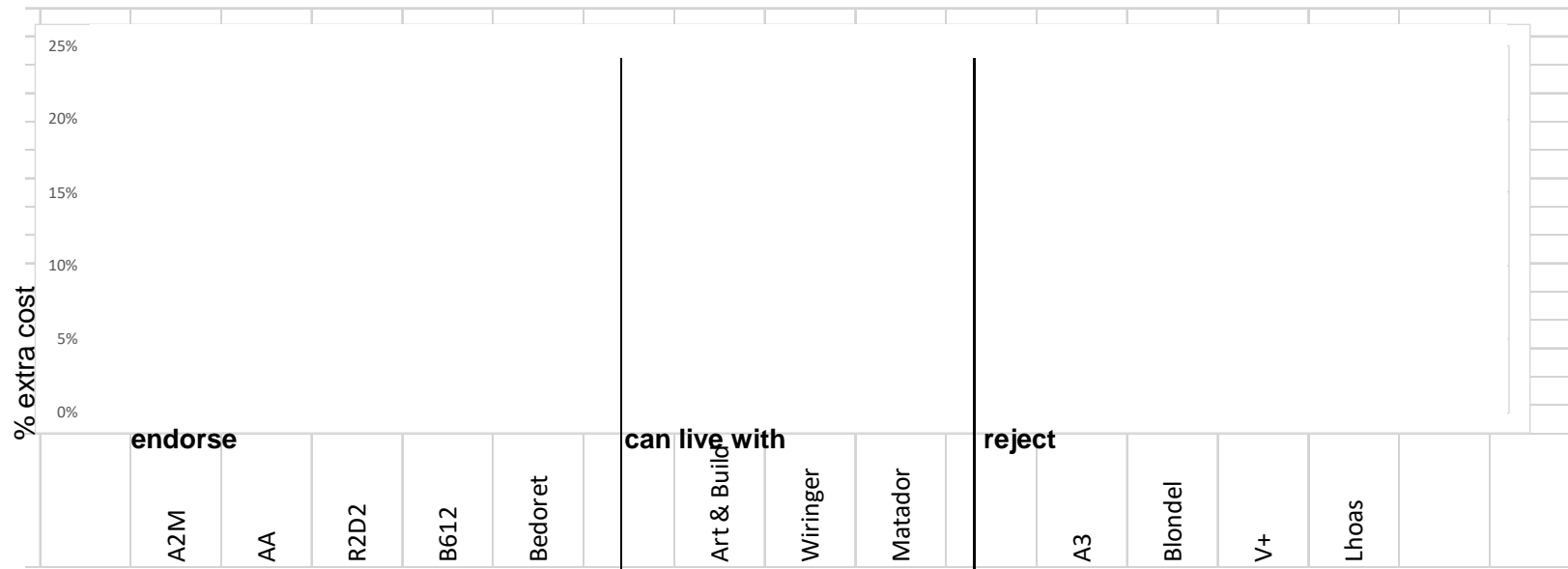
MMA (A2M-FNA)

some things
do not
change...



MMA (A2M-FNA)

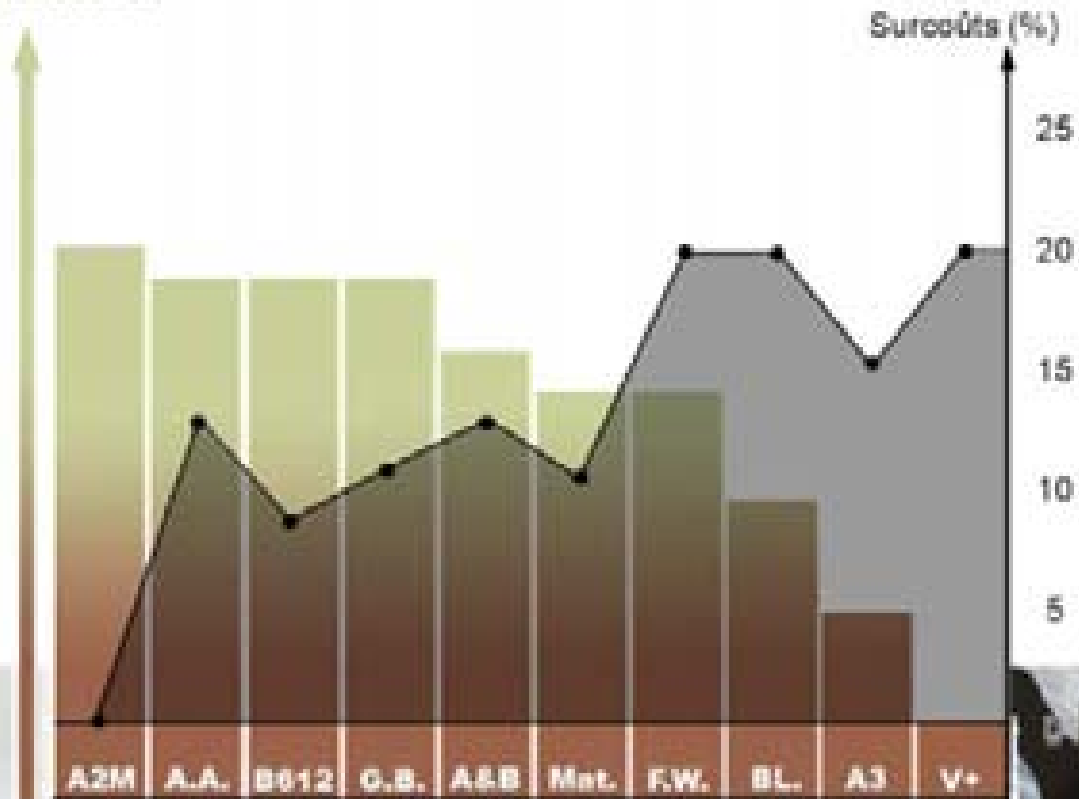
some things
do not
change...



MMA (A2M-FNA)

some things
do not
change... Accommodation

some things
do
change...



MMA (A2M-FNA)

some things
do
change...



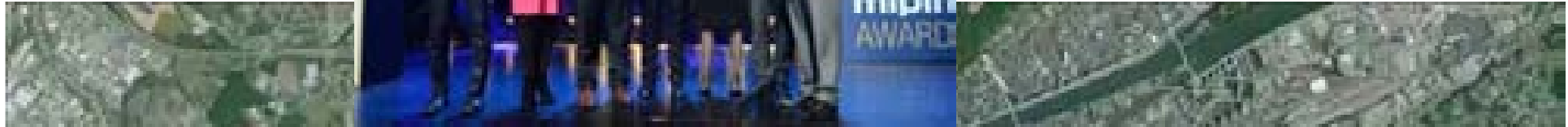
MMA (A2M-FNA)

some things
do
change...



MMA (A2M-FNA)

**some things
do
change...**



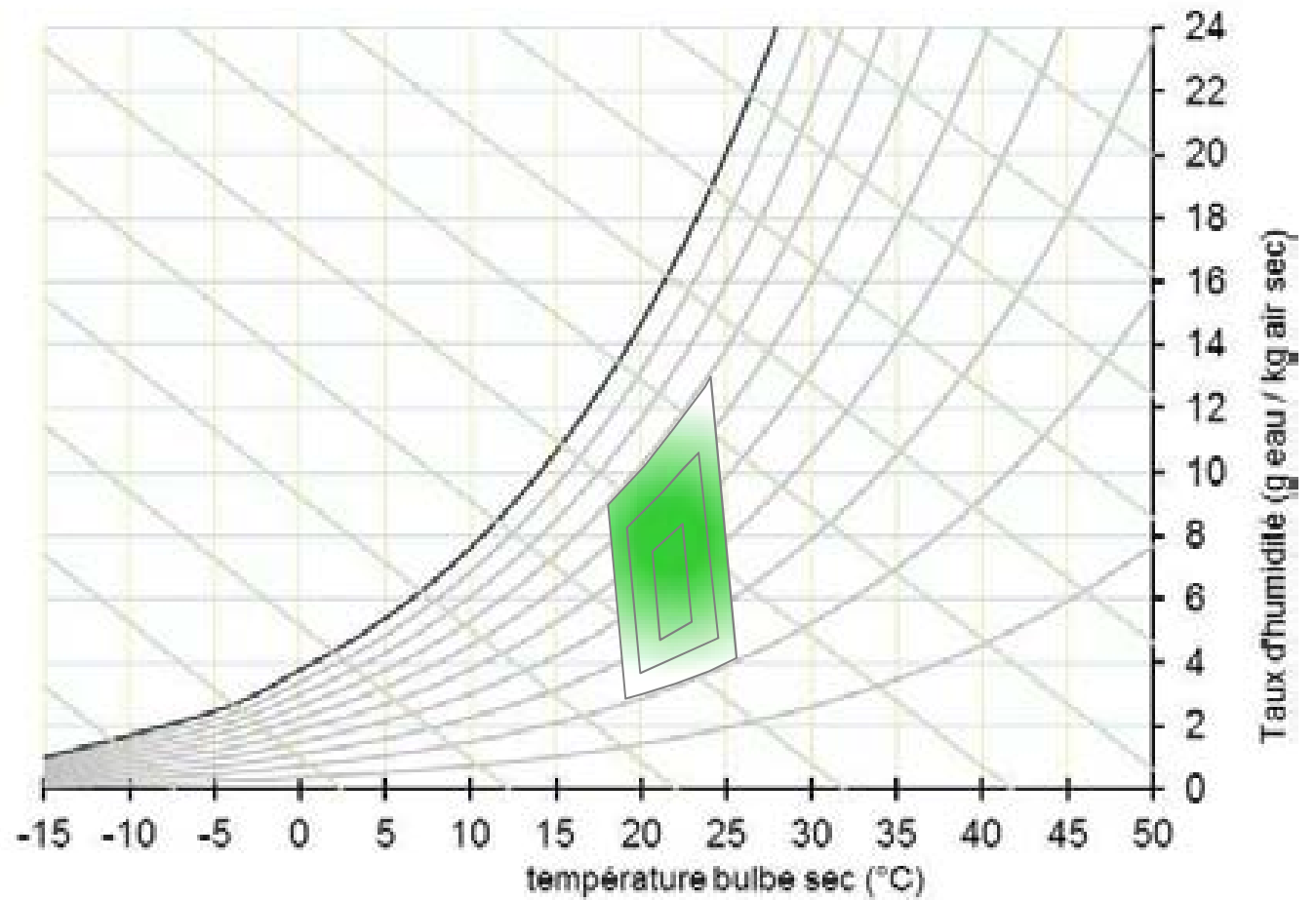
MMA (A2M-FNA)



**Ok,
but NYC
is hot and
humid in summer
and very cold
in winter...**

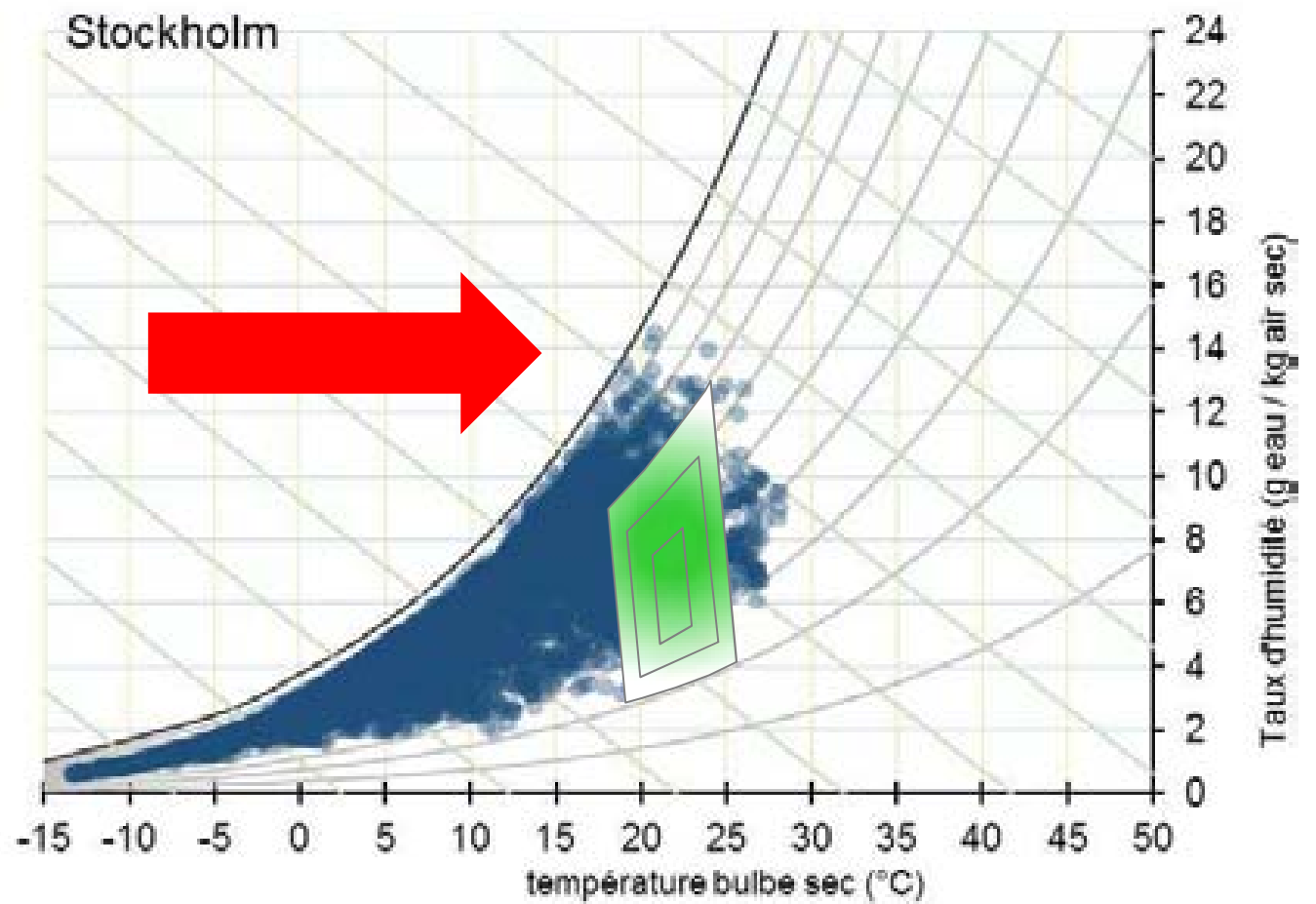
MMA (A2M-FNA)

Hygrothermic
COMFORT



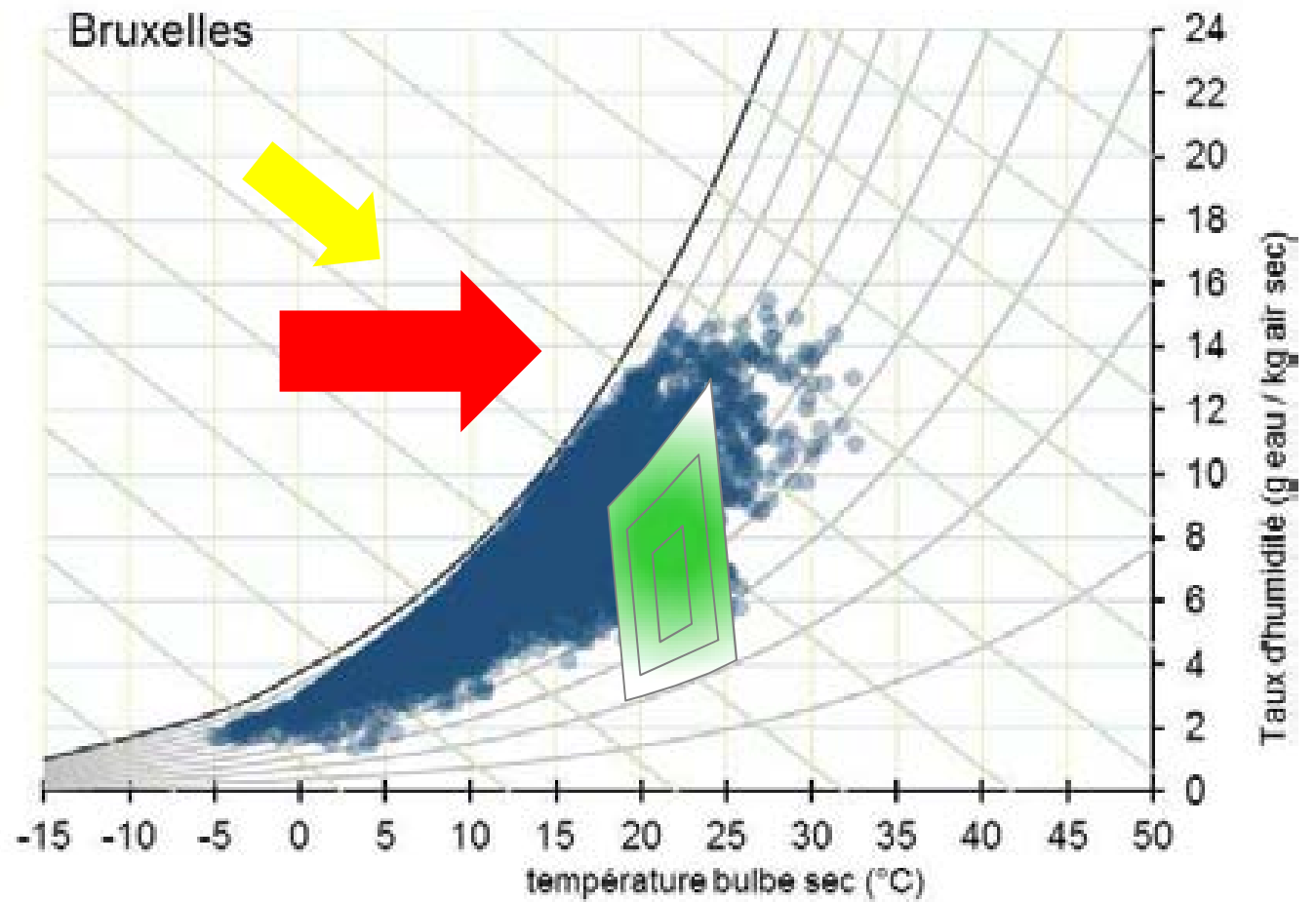
MMA (A2M-FNA)

Hygrothermic
COMFORT



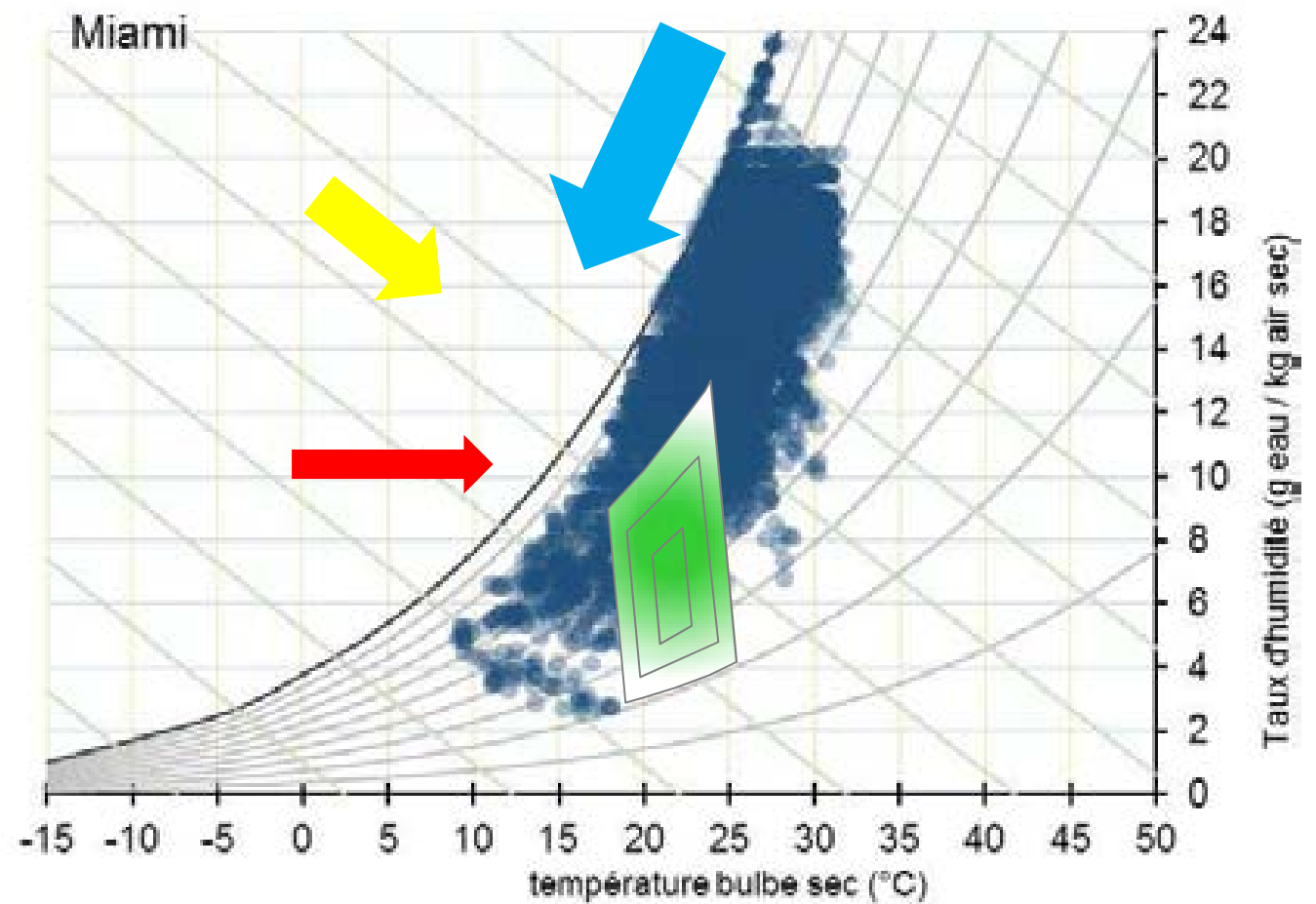
MMA (A2M-FNA)

Hygrothermic
COMFORT



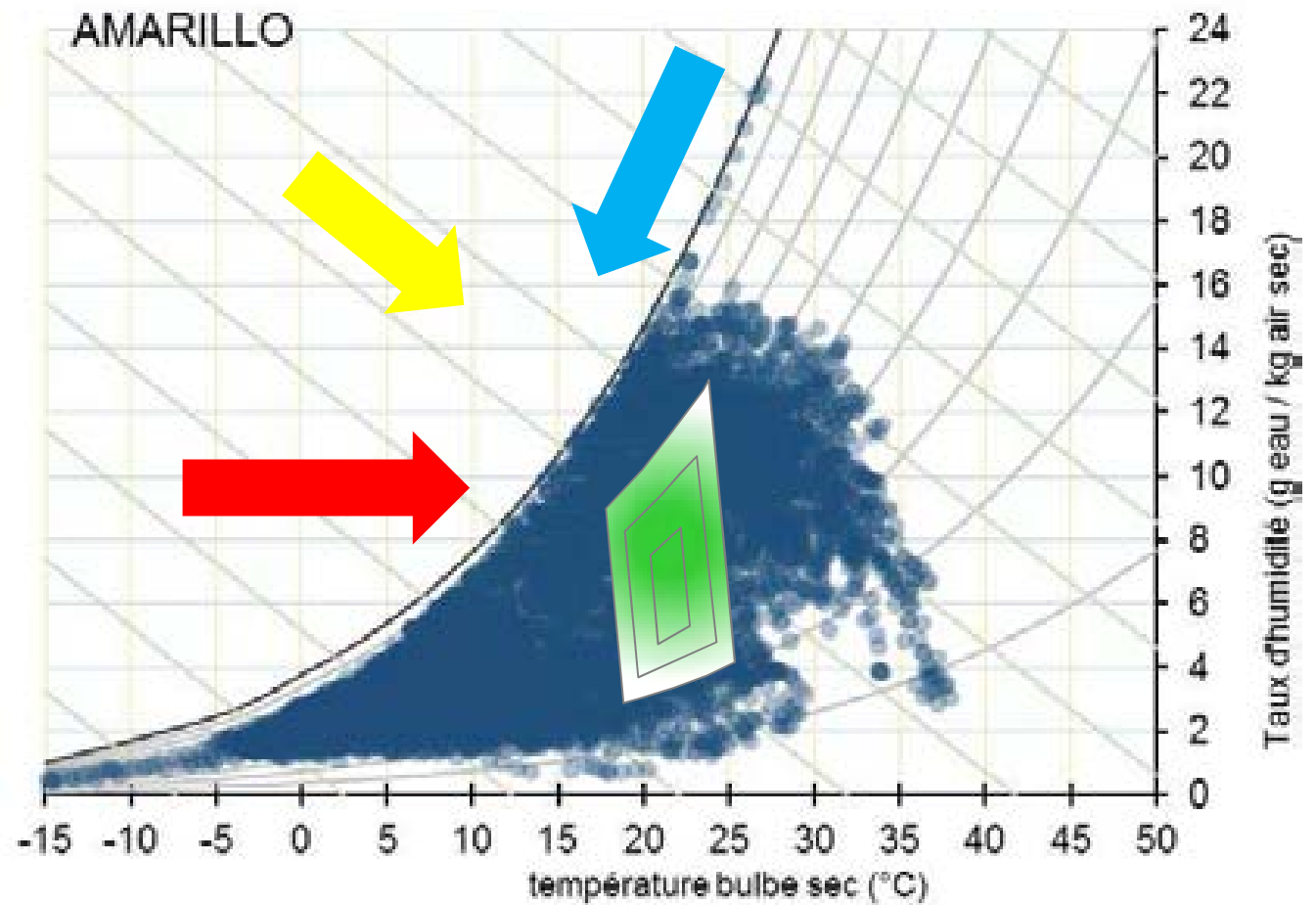
MMA (A2M-FNA)

Hygrothermic
COMFORT



MMA (A2M-FNA)

Hygrothermic
COMFORT



Af

climat tropical

Climat humide, précipi

Pour A : climat de la fo

Pour C et D : pas de sa

Cfb

climat tempéré

chaud sans saison sèche (océanique

Température moyenne du mois le plus chaud :

Températures moyennes des 4 mois les plus chauds > 10 °C

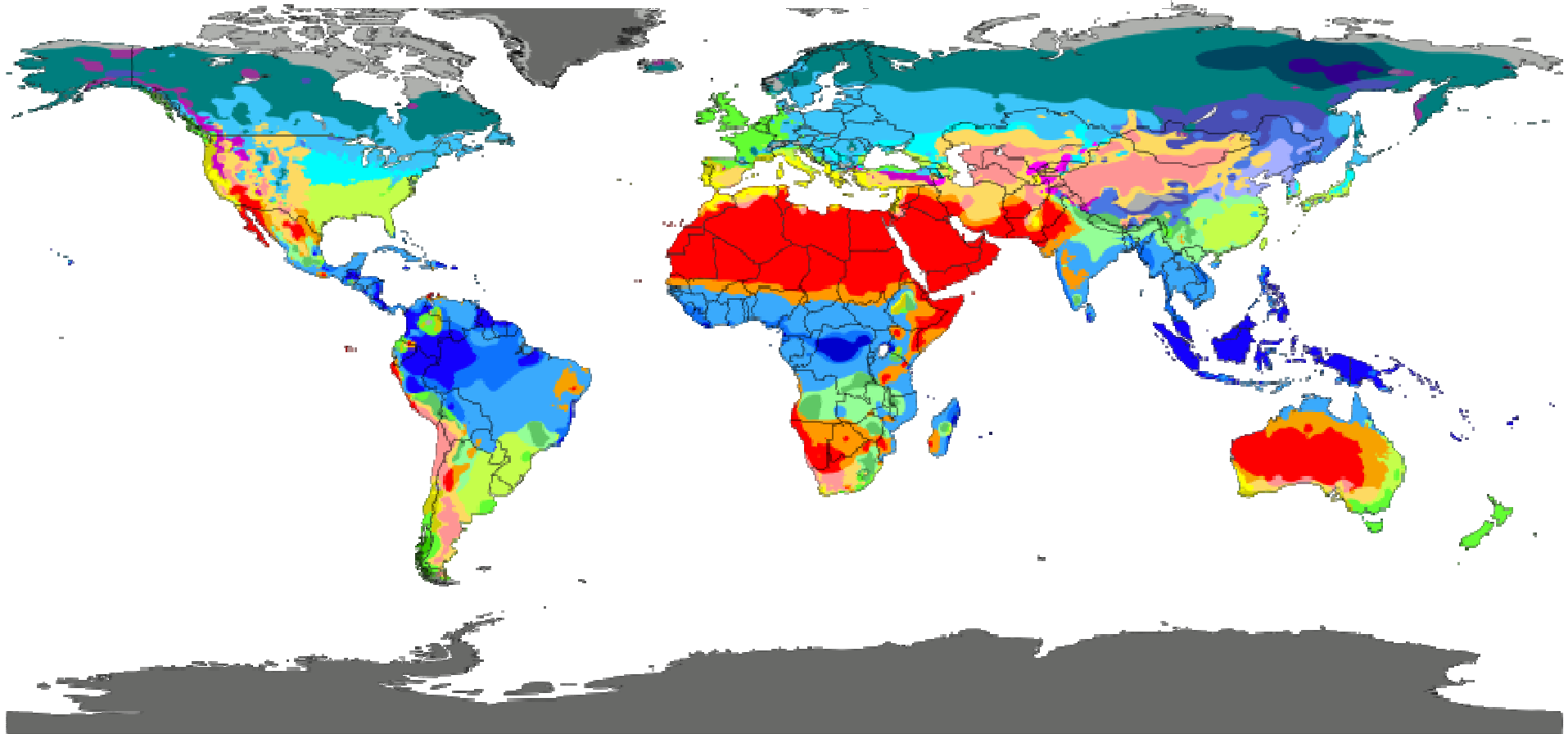
Csa

climat tempéré

chaud avec été sec (méditerranéen)

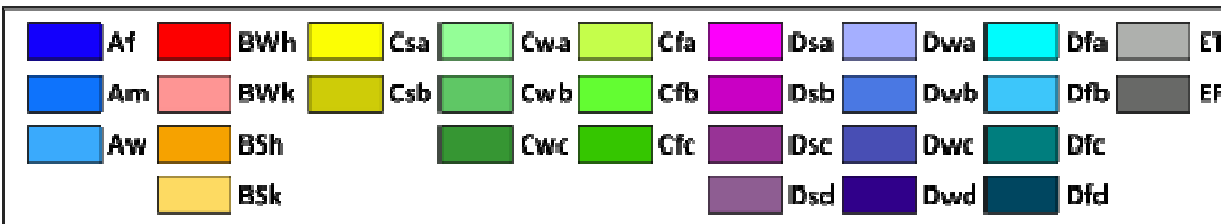
Température moyenne du mois le plus chaud > 22 °C

Températures moyennes des 4 mois les plus chauds > 10 °C

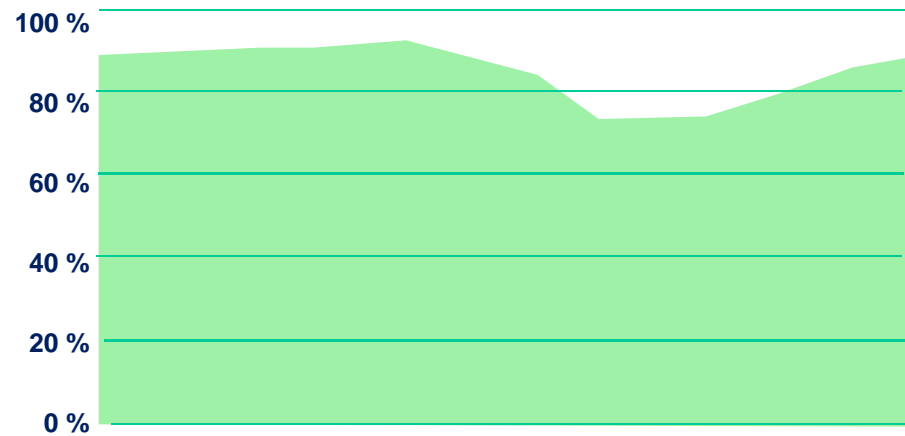
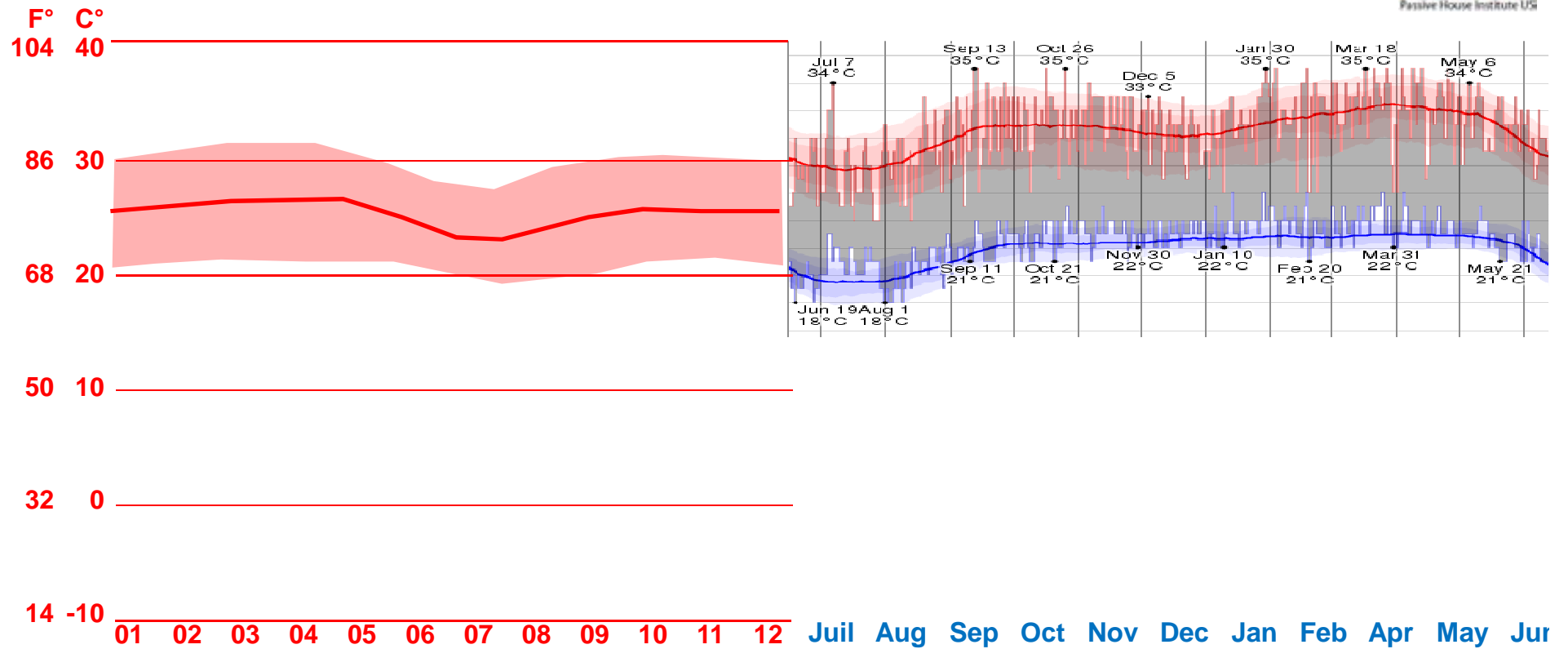


Peel, M. C. and Finlayson, B. L. and McMahon, T. A. (2007) [University of Melbourne]

Vectorization by : Ali Zifan



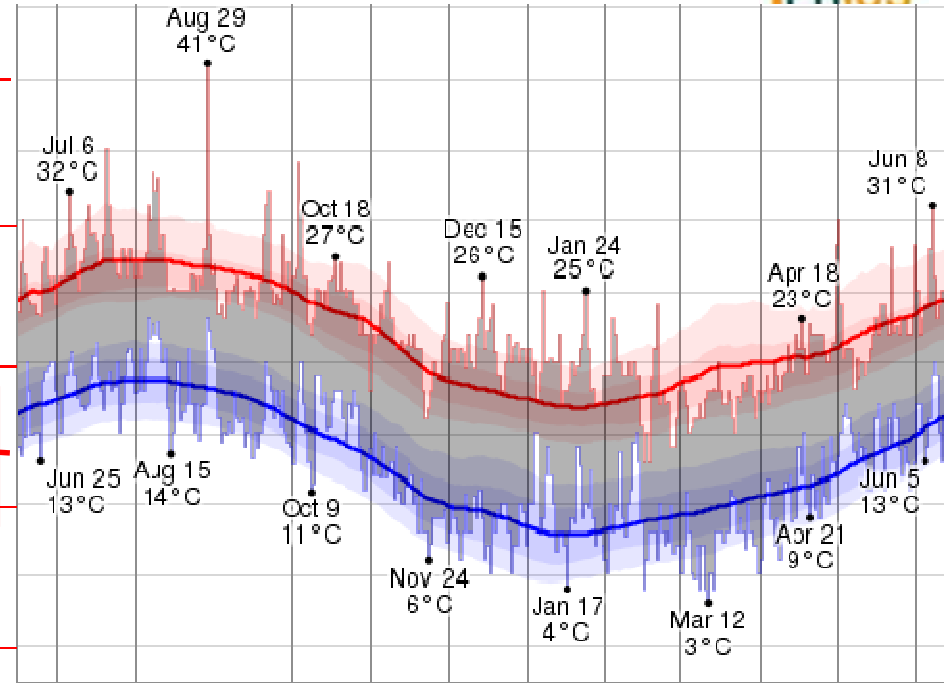
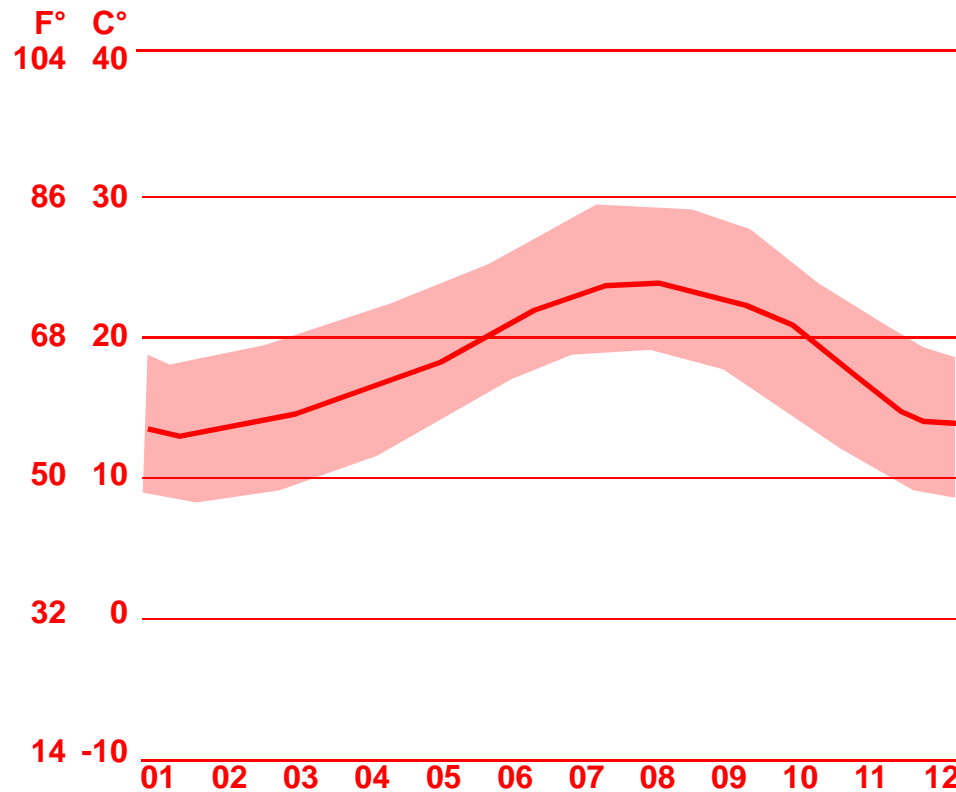
MMA (A2M-FNA)



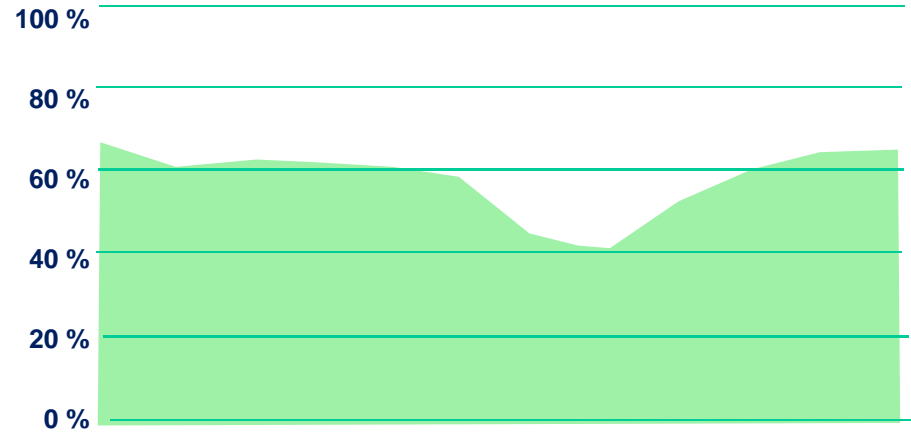
Kinshasa



MMA (A2M-FNA)



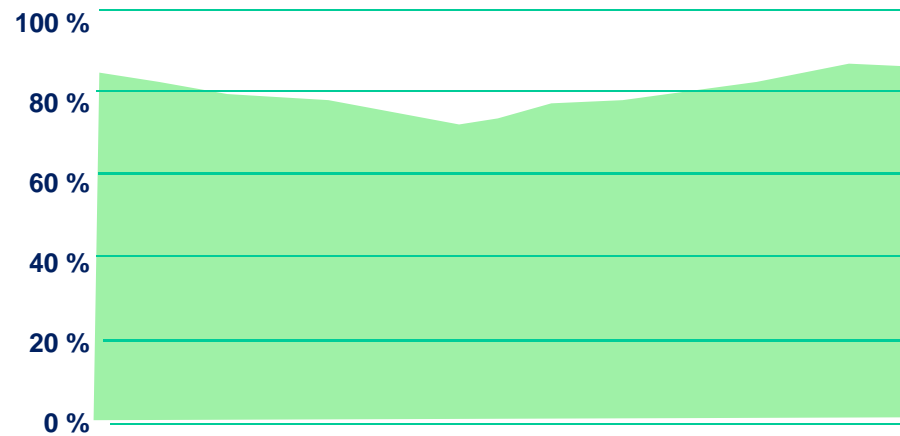
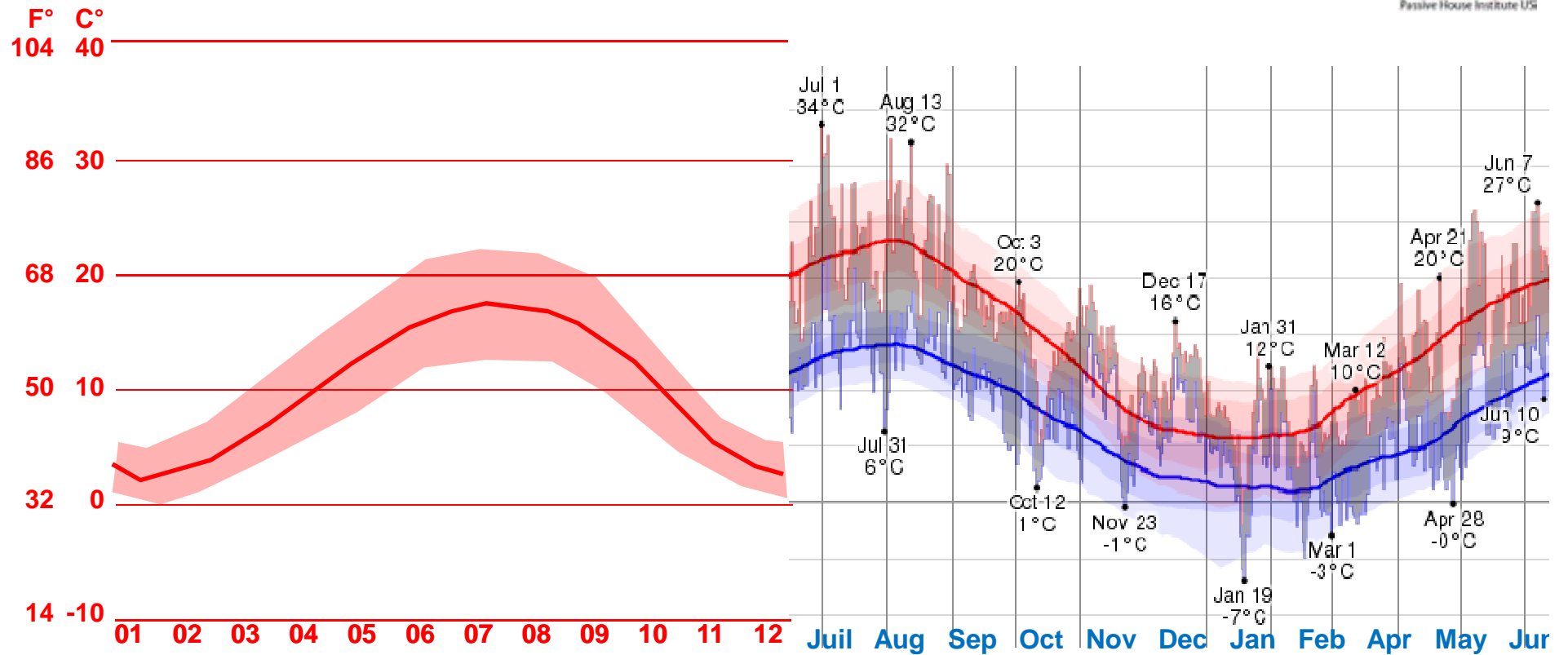
14 -10 01 02 03 04 05 06 07 08 09 10 11 12 Jul Aug Sep Oct Nov Dec Jan Feb Apr May Jun



Rabat

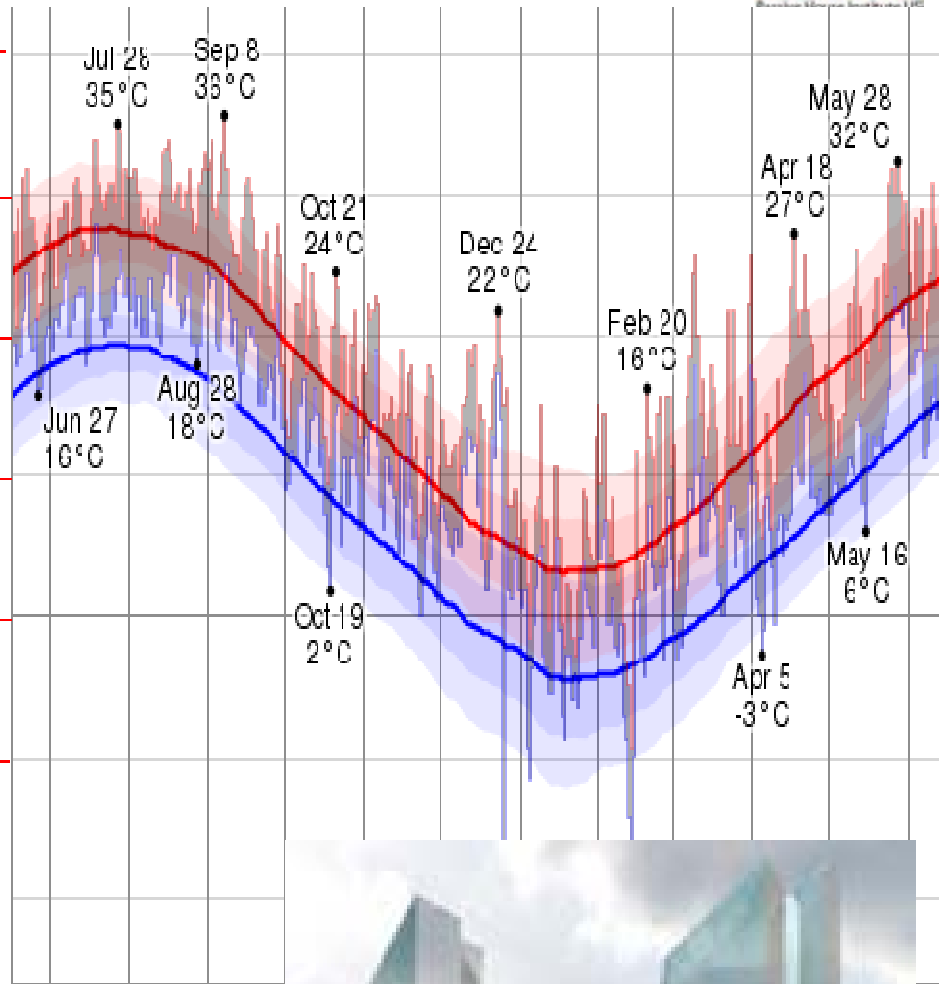
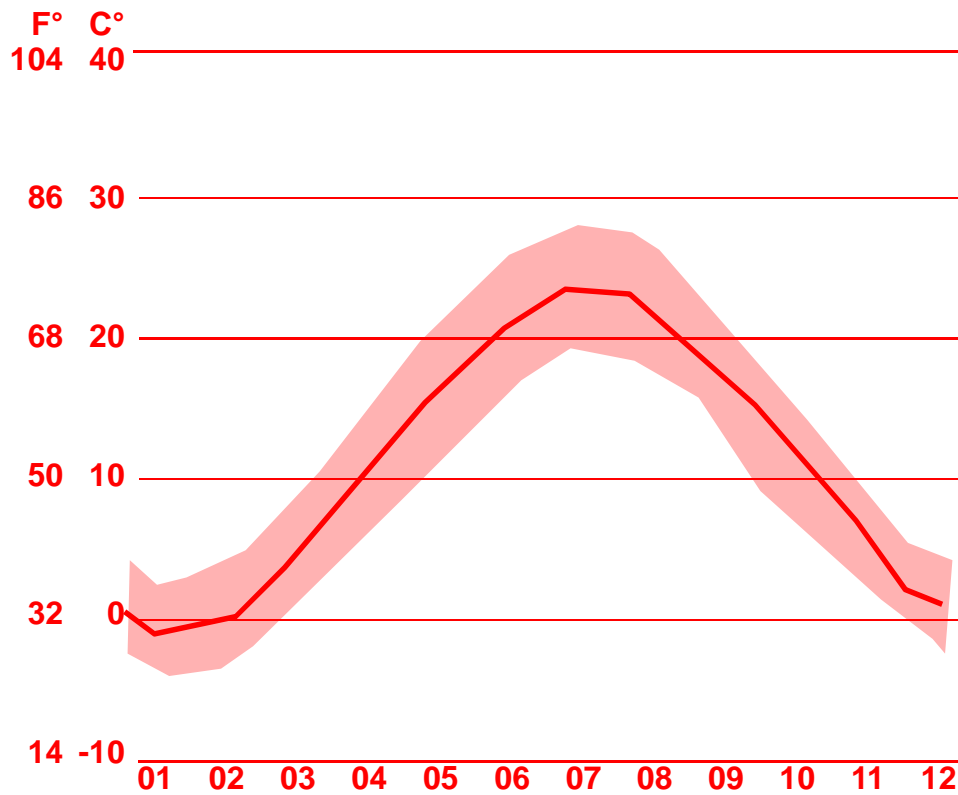


MMA (A2M-FNA)



Brussels

MMA (A2M-FNA)



Jul Aug Sep

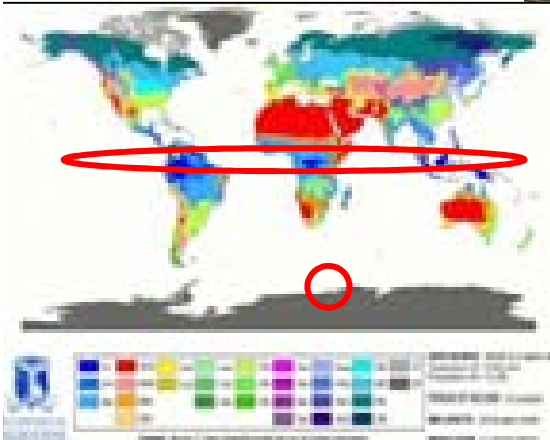
J

New York



MMA (A2M-FNA)

sky
is
the
limit



Belgian & Netherland embassy
Kinshasa – RDC => tropical climate

A2M



Samyn & partners
3E

Elizabeth Polar station (BE)

Antartica **Zero emission**

The coldest place on earth => -89.2°C - $128,6^{\circ}\text{F}$



MMA (A2M-FNA)



**passivehouse
for
largescale?
and
high
design?**



From 1958 to 2017

Client: Brussels Region

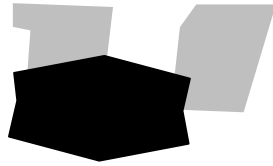
65 000 ft²

A2M architects

From 160 kWh/m² a to 8 kWh/m² a



MMA (A2M-FNA)



From 1974 to 2016

Client: Luri 1 + Luri 2

382 200 ft²

Altiplan + studio lamella architects
From 170 kWh/m².a to 13 kWh/m².a
15 kWh/m².a (cooling demand)
TPE: 61 kWh/m².a



MMA (A2M-FNA)

Jean Nouvel
Mdw arch



MMA (A2M-FNA)



BNP Paribas

95 000m² 1 000 000 ft²

**Architect Baumschlager & Eberle -
Styfhal**



MMA (A2M-FNA)

Provincie huis Antwerpen
28 250 m² 300 000 ft²
Architect XDGA



MMA (A2M-FNA)

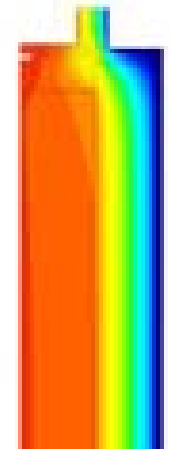
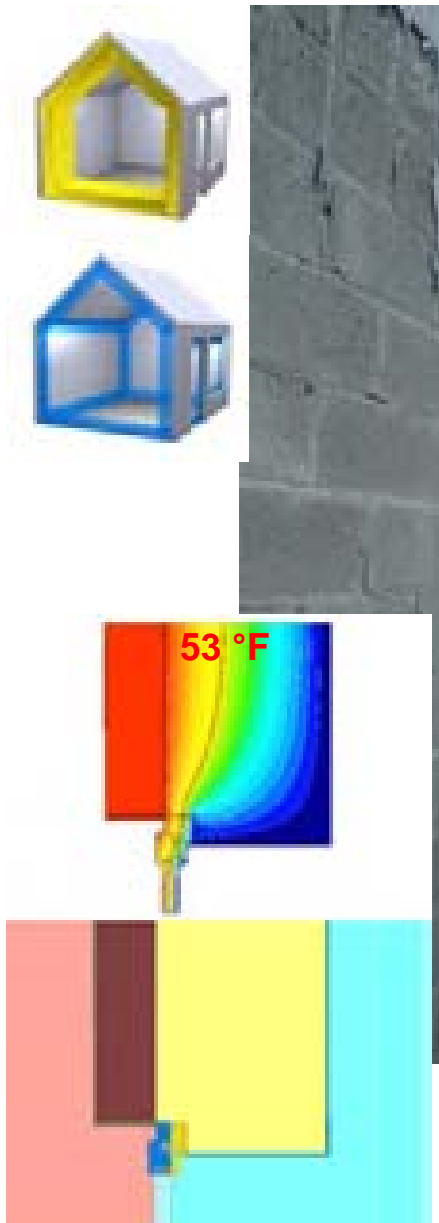
**BE embassy in
Marocco
More than PH
= complete zero**



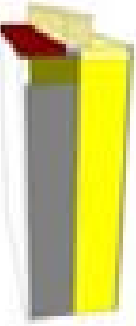
MMA (A2M-FNA)



**our builders...
our architects...
and the users...
all these new tech...**



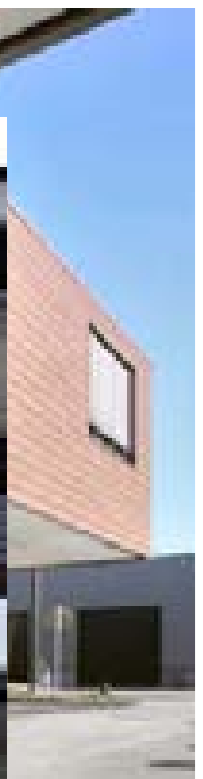
Besoin de chaleur de chauffage annuel:	15	kWh/(m ² a)
Résultat du test d'infiltrométrie:	0.6	h ⁻¹
Besoin en énergie primaire (eau chaude sanitaire, chauffage, électricité auxiliaire et domestique):	85	kWh/(m ² a)
Besoin en énergie primaire (eau chaude sanitaire, chauffage et électricité auxiliaire):	30	kWh/(m ² a)
Besoin en énergie primaire économisée par la production d'électricité photovoltaïque:		kWh/(m ² a)
Puissance de chauffage:	11	W/m ²
Surchauffe estivale:	21	%
Besoin de refroidissement annuel:		kWh/(m ² a)
Puissance de refroidissement:		W/m ²



$\Psi = 0.027 \text{ W/mK}$

$\Psi = 0.032 \text{ W/mK}$

difficult...



MMA (A2M-FNA)



MMA (A2M-FNA)

Municipality Office building

3 100 m² 31 000 ft²

1400 €/m² (average = 1200 €/m²) 140 \$/ft²

Passivehouse + R&D



MMA (A2M-FNA)

0%!

< 5 % !

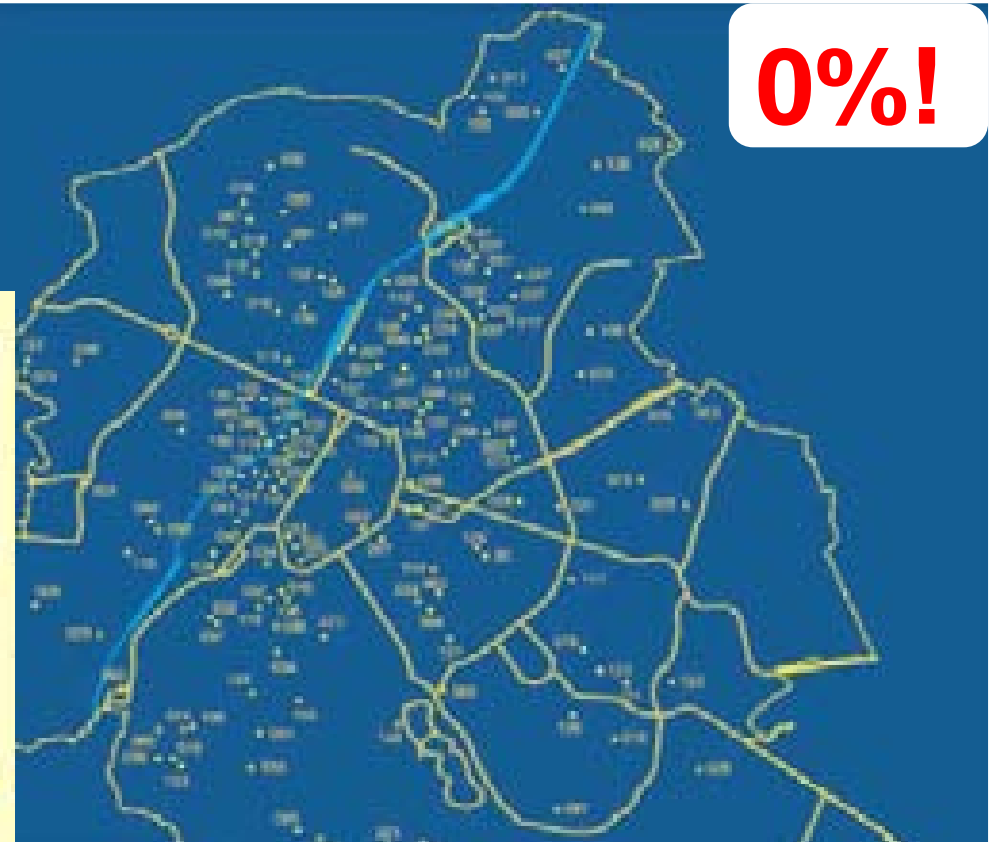
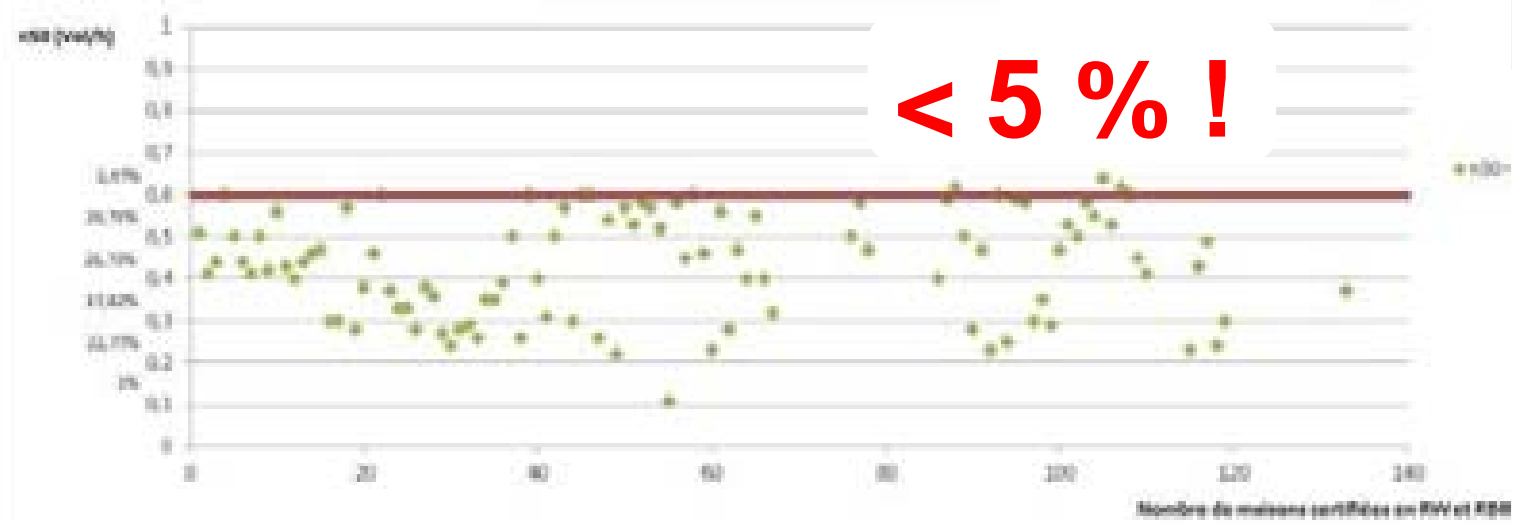
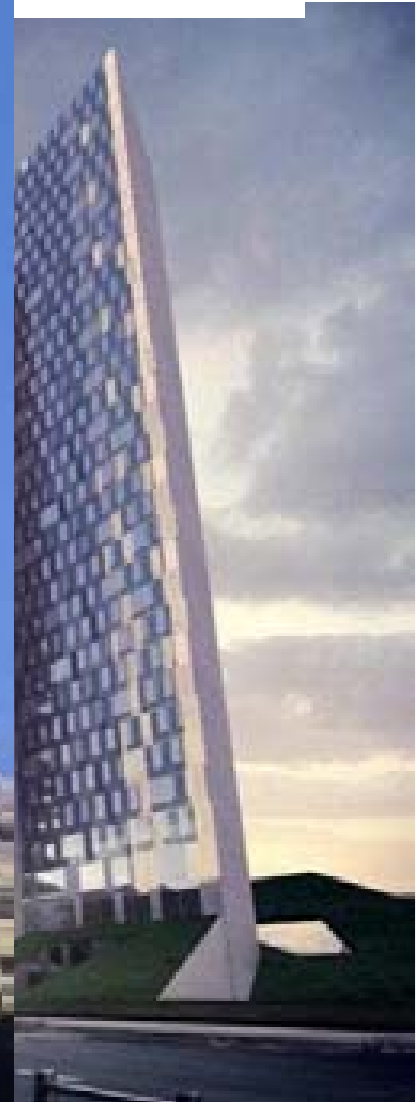
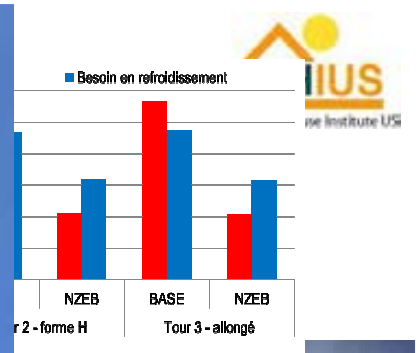
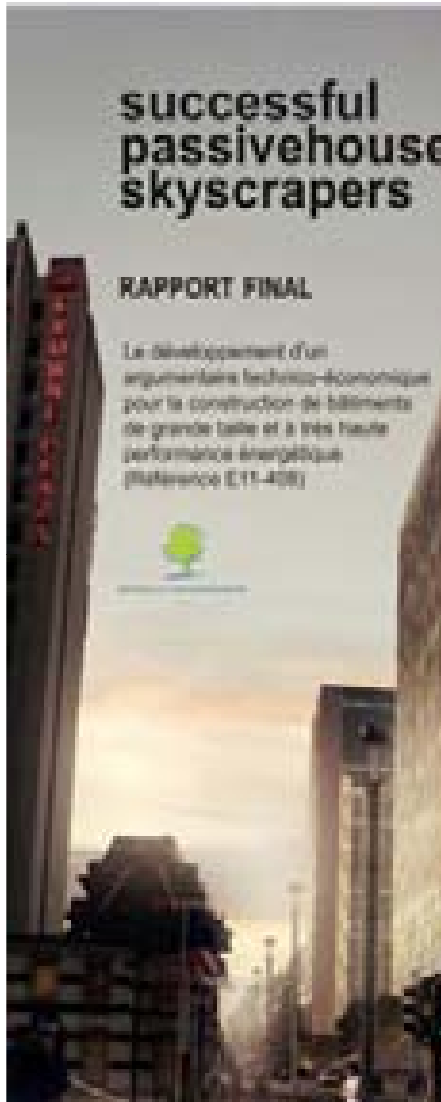


Tableau récapitulatif des n50



MMA (A2M-FNA)

2 200 000 Ft²
EU

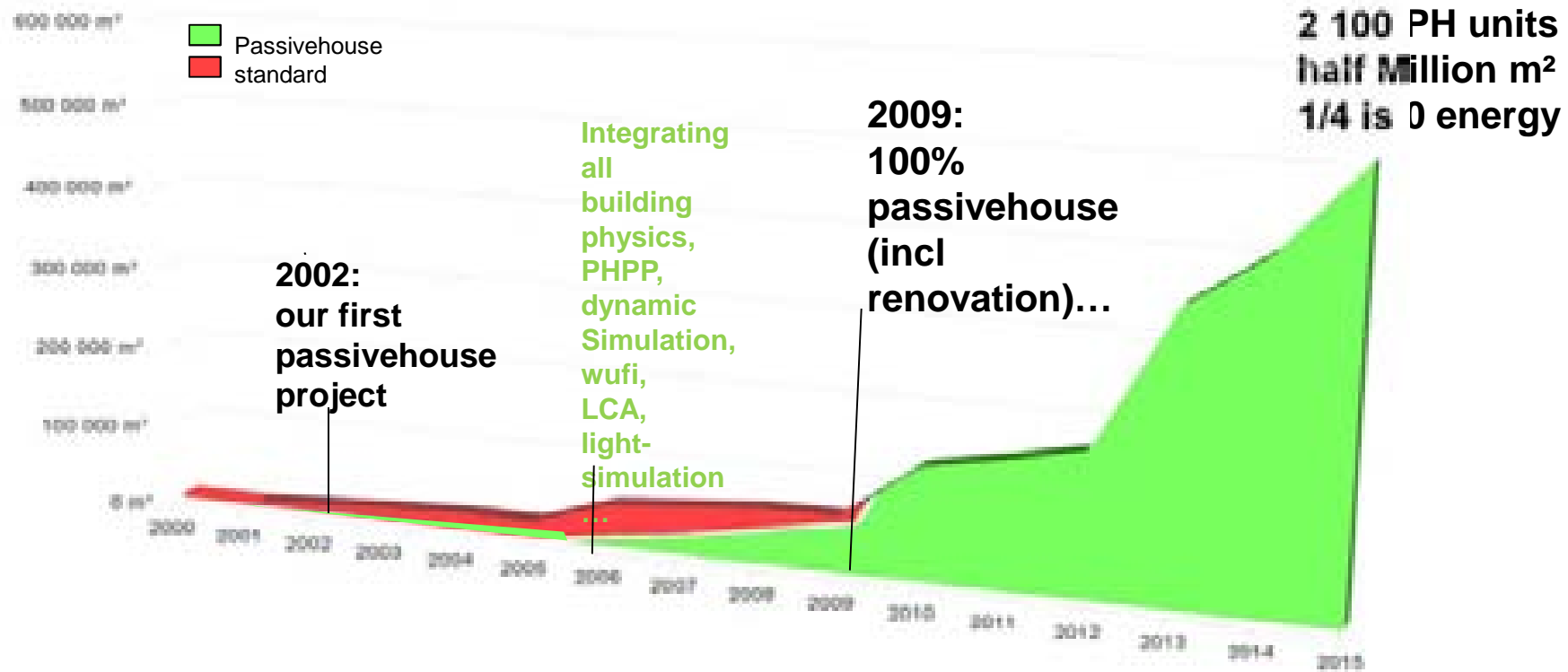


in such
a context

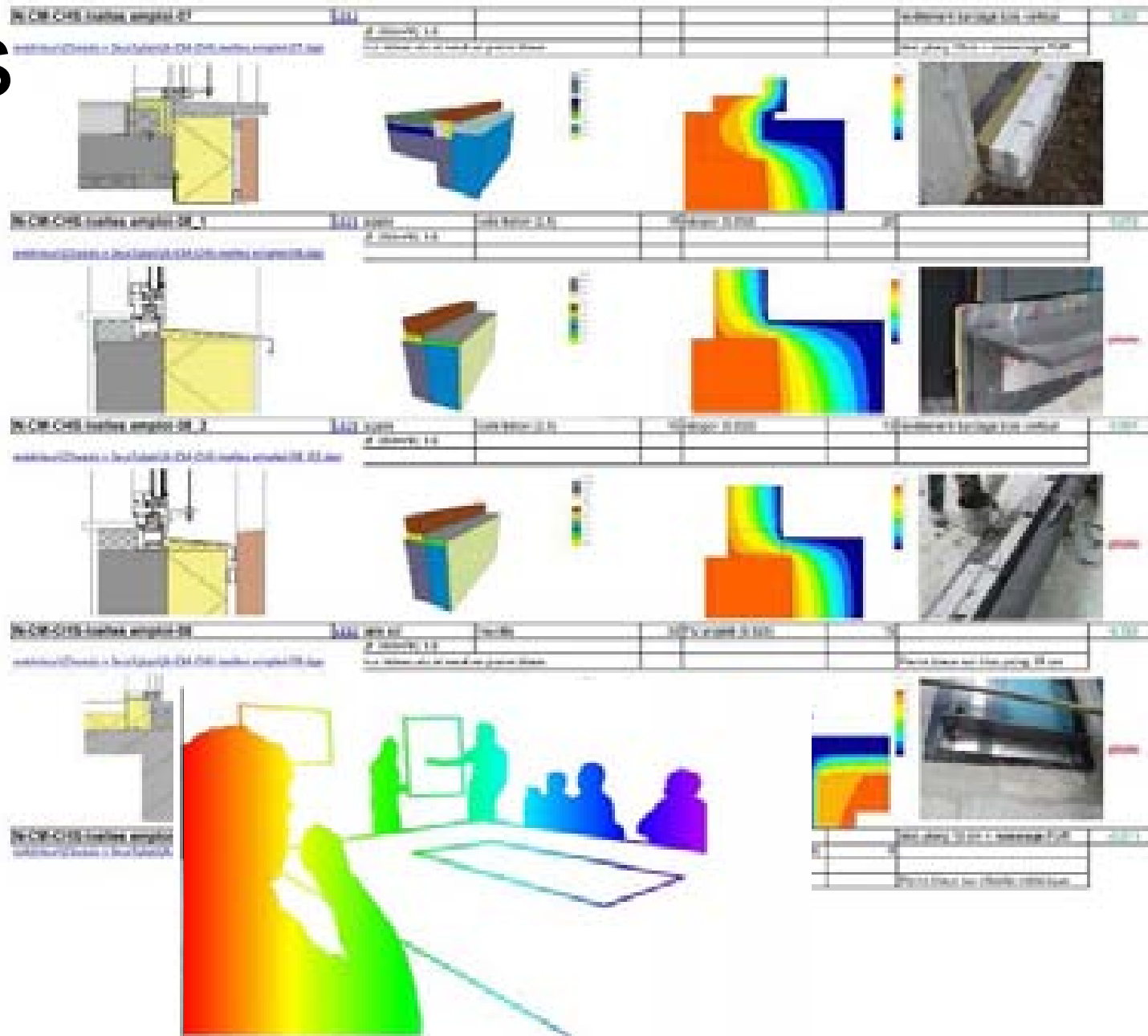
what's
beyond?

*what's
after
euclidean
geometry?
from
« zero impact »
building
to
regenerative
architecture?*

MMA (A2M-FNA)



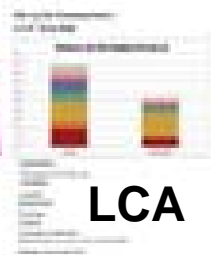
tools



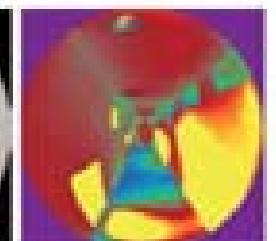
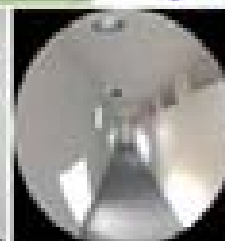
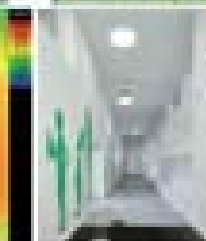
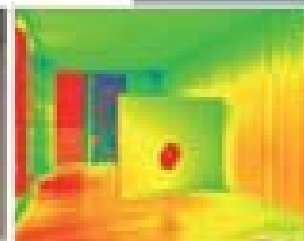
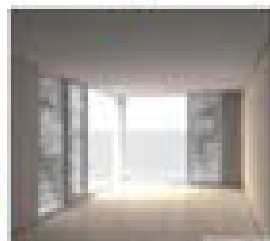
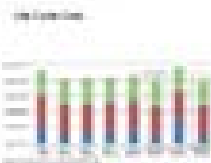
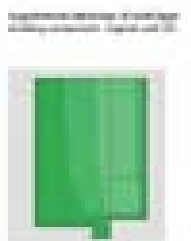
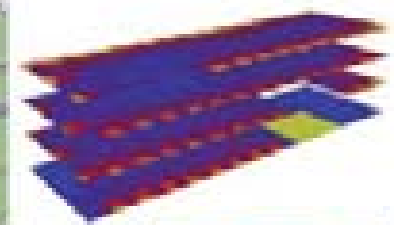
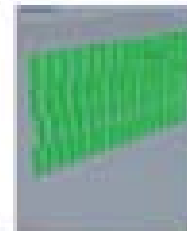
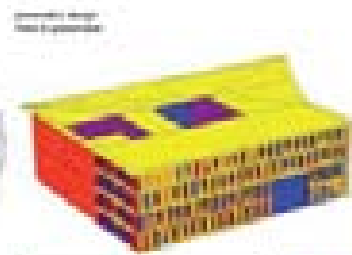
tools



PHPP BREEAM



LCA



WUFI 2D

LCC

DA GS

reality match

Form Follows Function

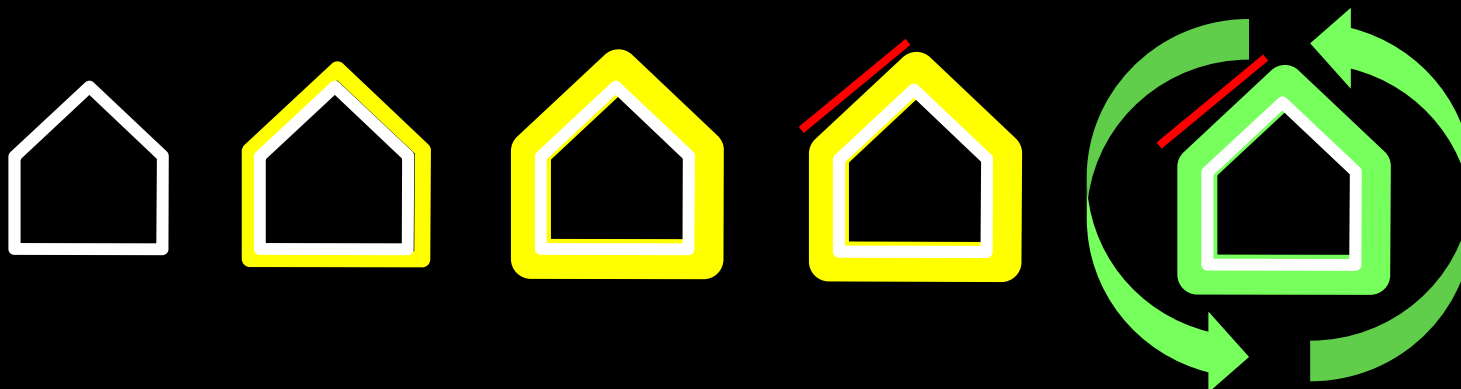
Louis Sullivan

Function Follows Form

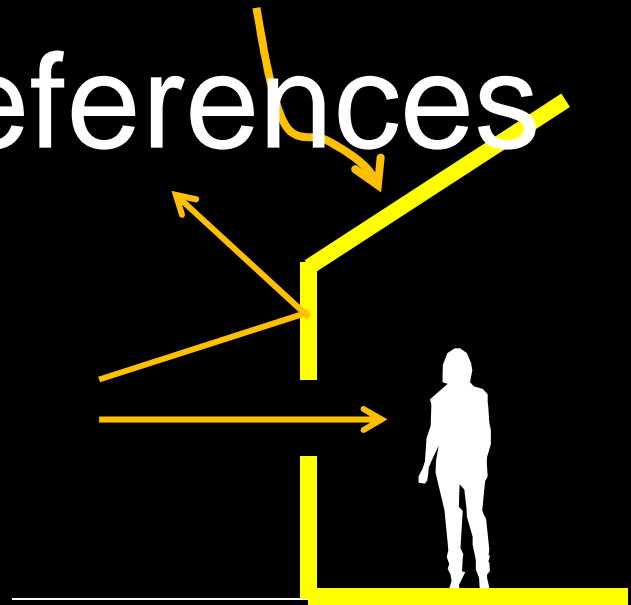
Post modernism

Climate ?

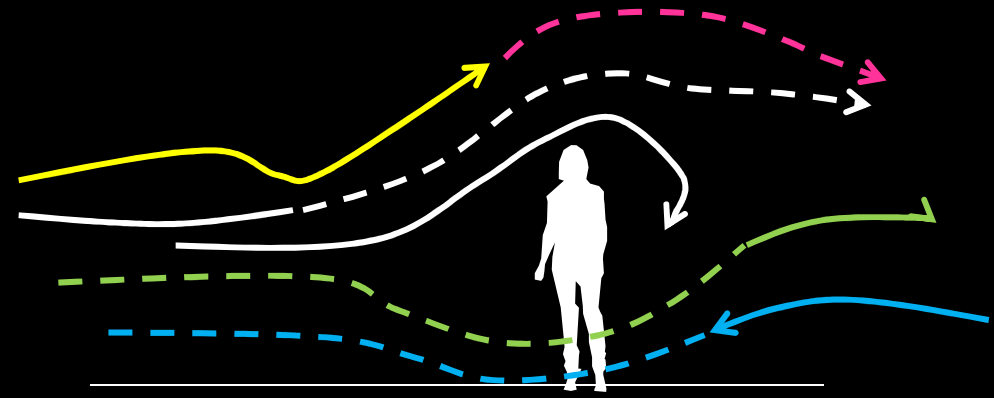
Form&Function Follows Climate !
regenerative architecture...



references

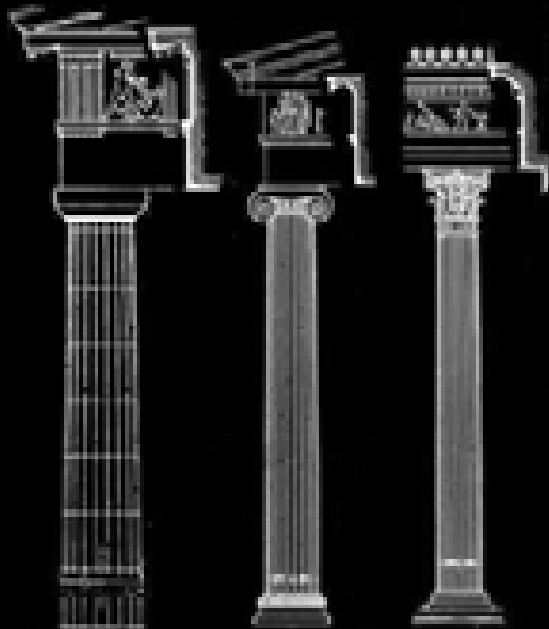


architecture as
« mediation »



designing our « active
context » as architecture

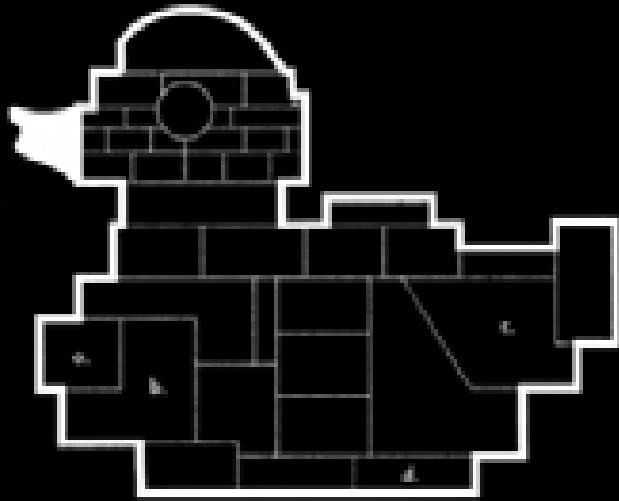
*from Sean Lally



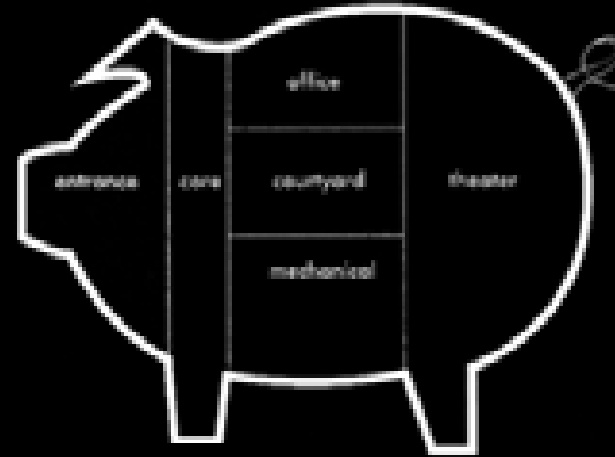
Dorique

Ionique

Corinthien



Stacked duck



Stuffed pig

*from Sean Lally



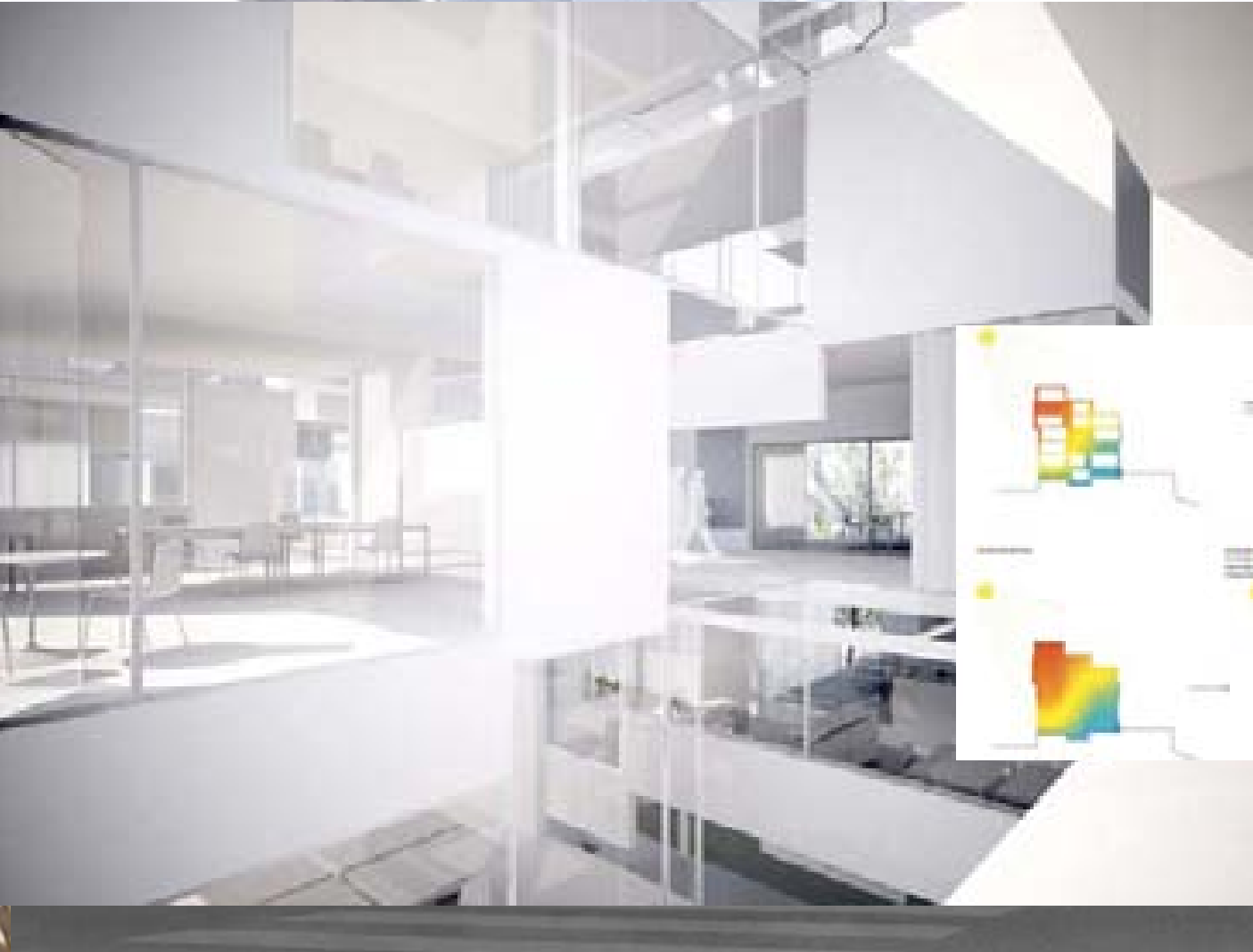
Glass => Transparency



Concrete=> malleability

MMA (A2M-FNA)

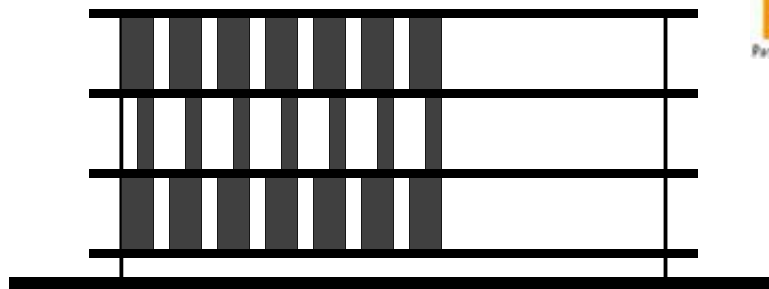
references



case
study
01



MMA

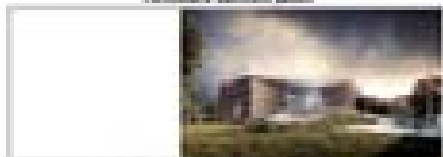


Spécificités climatiques, l'enveloppe comme interface

République Démocratique

Formule bâtiment actif

Rayonnement



Paramètre	Valeur
Température ambiante	25°C
Humidité relative	70%
Vitesse du vent	2 m/s
Pression atmosphérique	1013 hPa
Ensoleillement	1500 h
Précipitations	1500 mm



Stade d'insulation

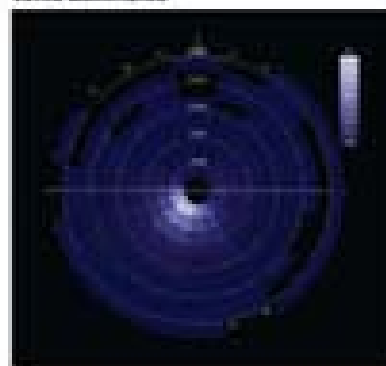


Étape	Description
1	Isolation de base
2	Isolation de toit
3	Isolation de murs
4	Isolation de fenêtres
5	Isolation de portes
6	Isolation de planchers

Précipitations



Voies d'insolation



Températures

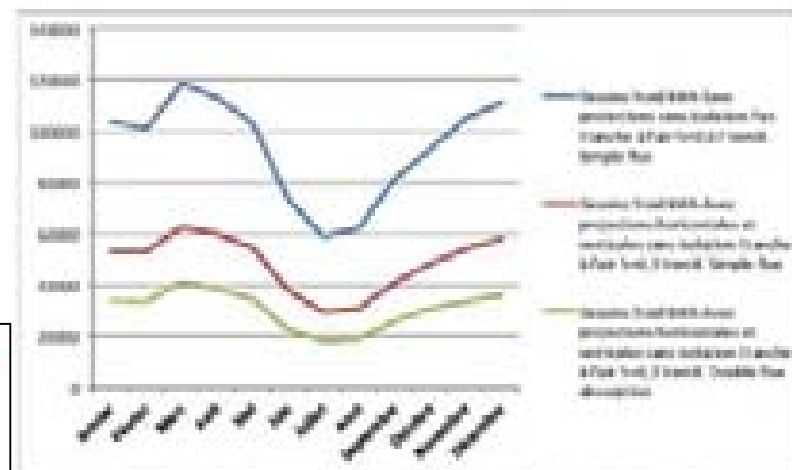


Figure 1.14: Besoin annuel d'énergie des résidents d'habitations (chauffage et eau)

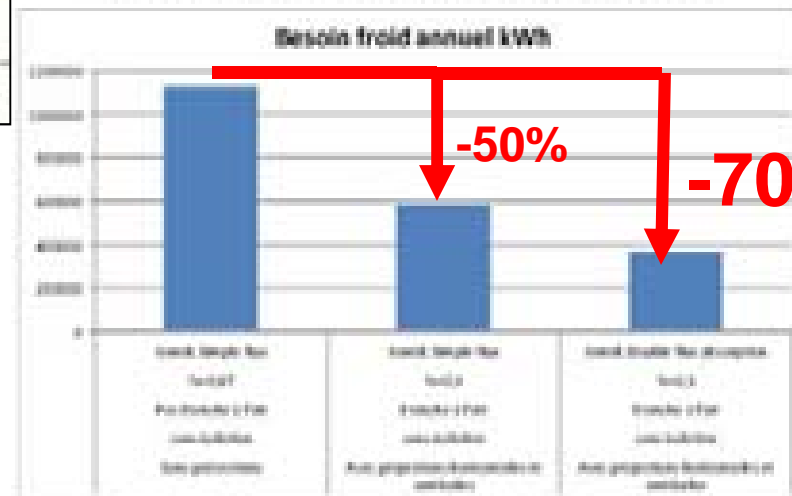


Figure 1.15: Besoin annuel d'énergie des résidents d'habitations (chauffage)



48,2%

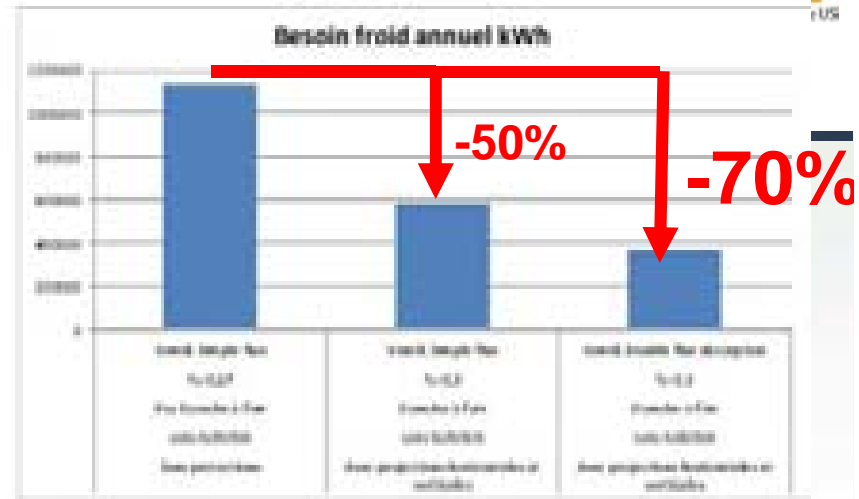
18,1%

6,2%

MMA (A2M-FF) office



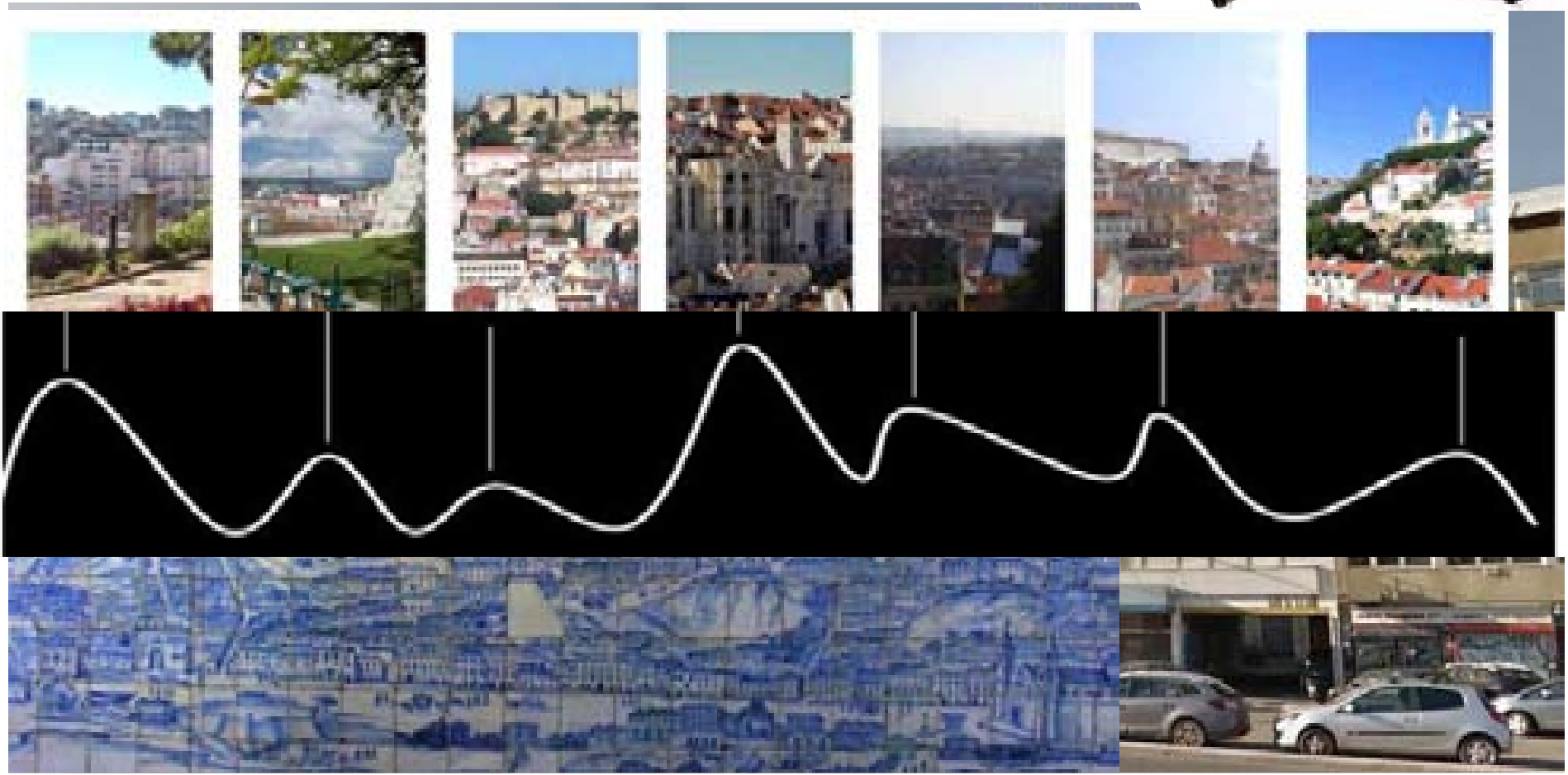
Design & build: BE/NL/LUX embassy
Cost= 10,5 M€ passivehouse & BREEAM excellent
3 others = ... 21 M€ for ... low energy !
90% RH and 85 to 100 °F



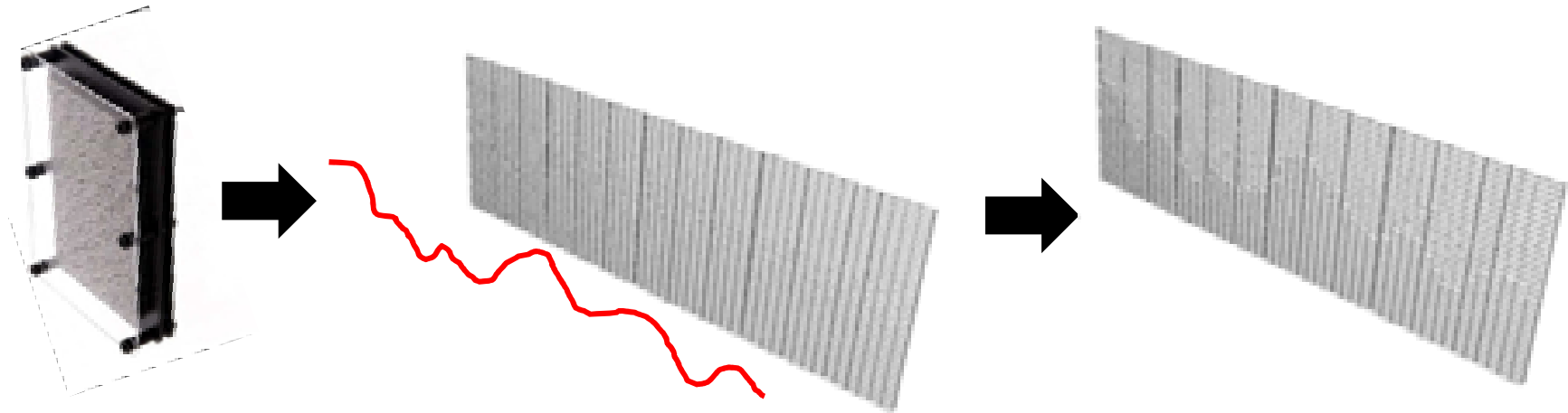
MMA (A2M-FNA)

case study 02

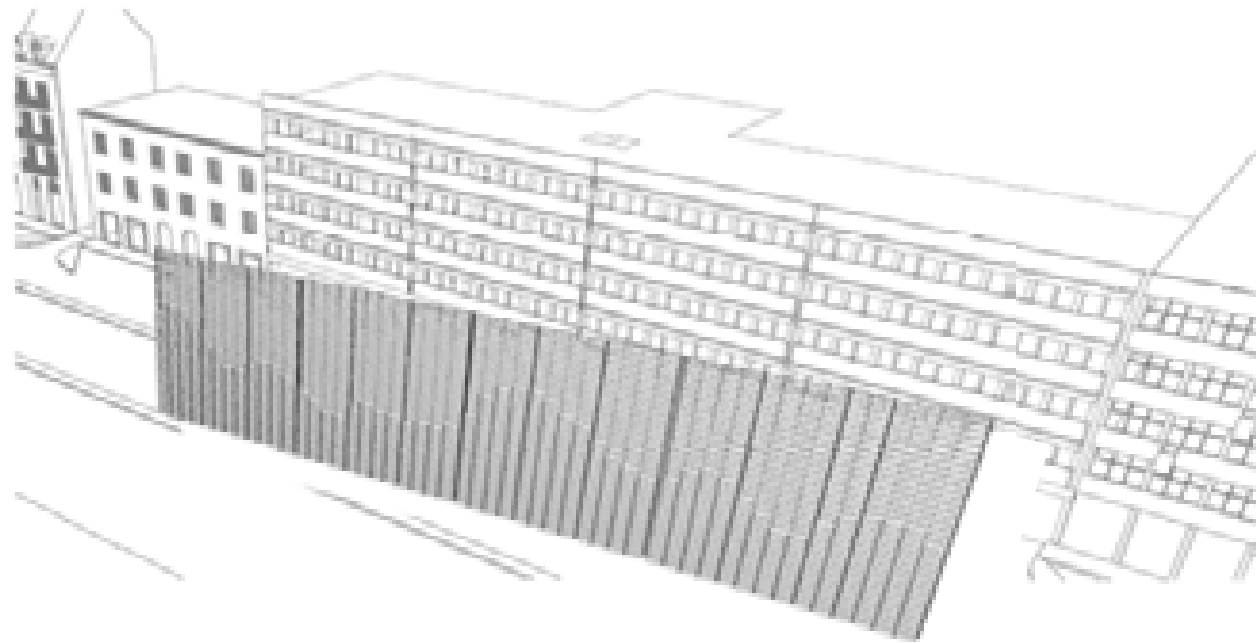
Meininger Lisbonne (Po)
6 055 m² 60 550 ft² 300 p/d
125 rooms passivehouse – zero energy



MMA (A2M-FNA)



MMA (A2M-FNA)



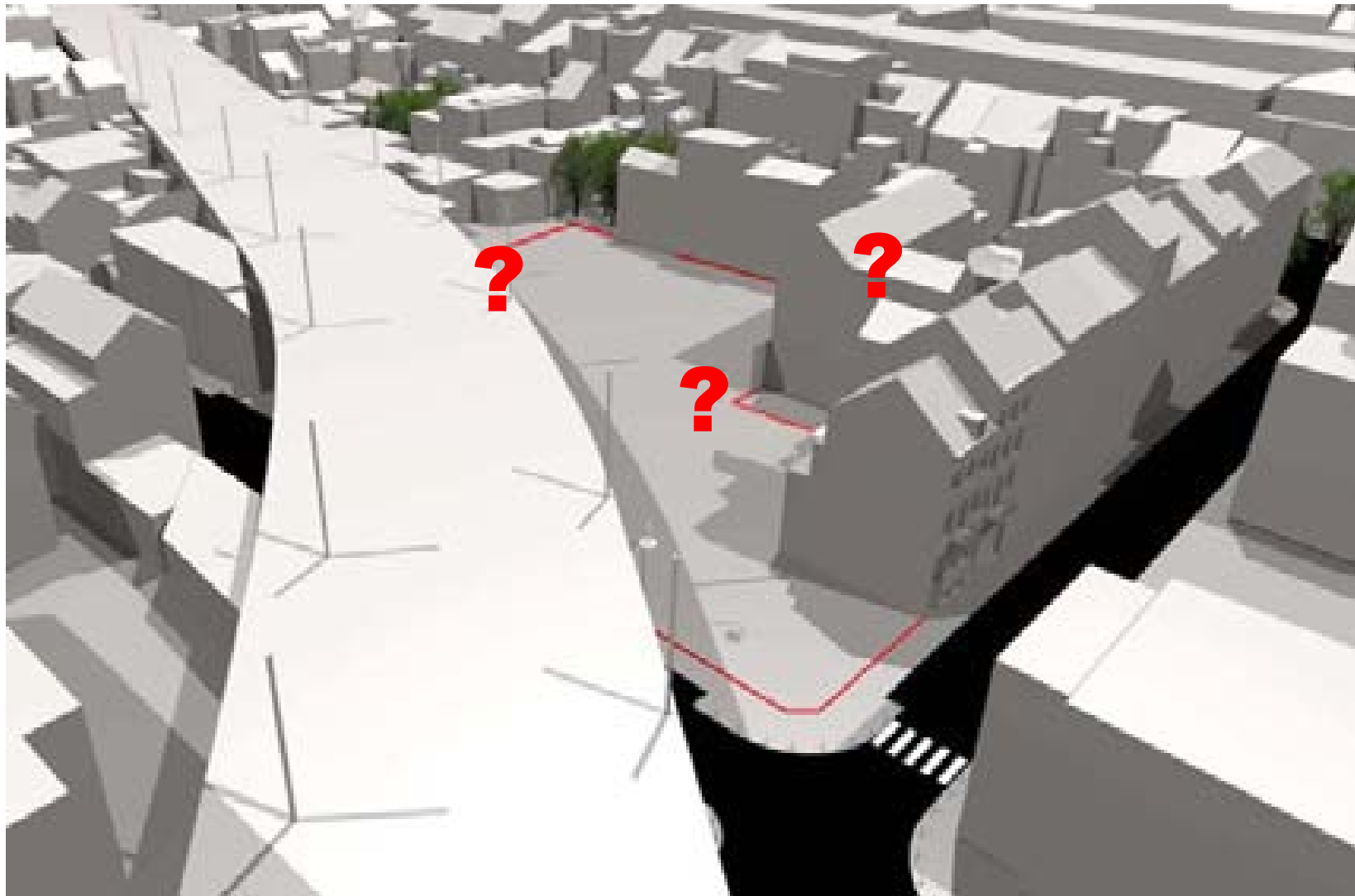
MMA (A2M-FNA)



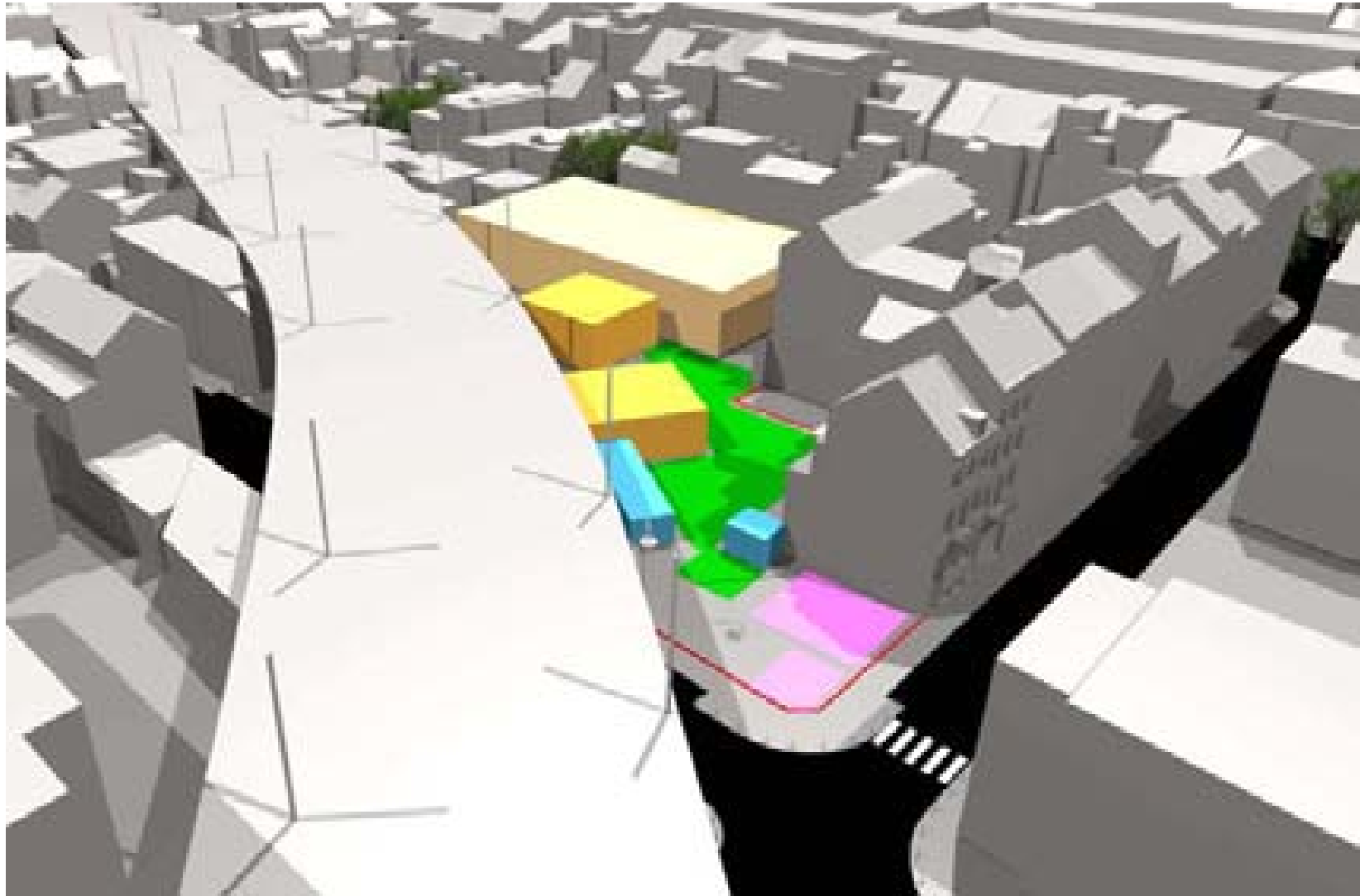
case
study
03



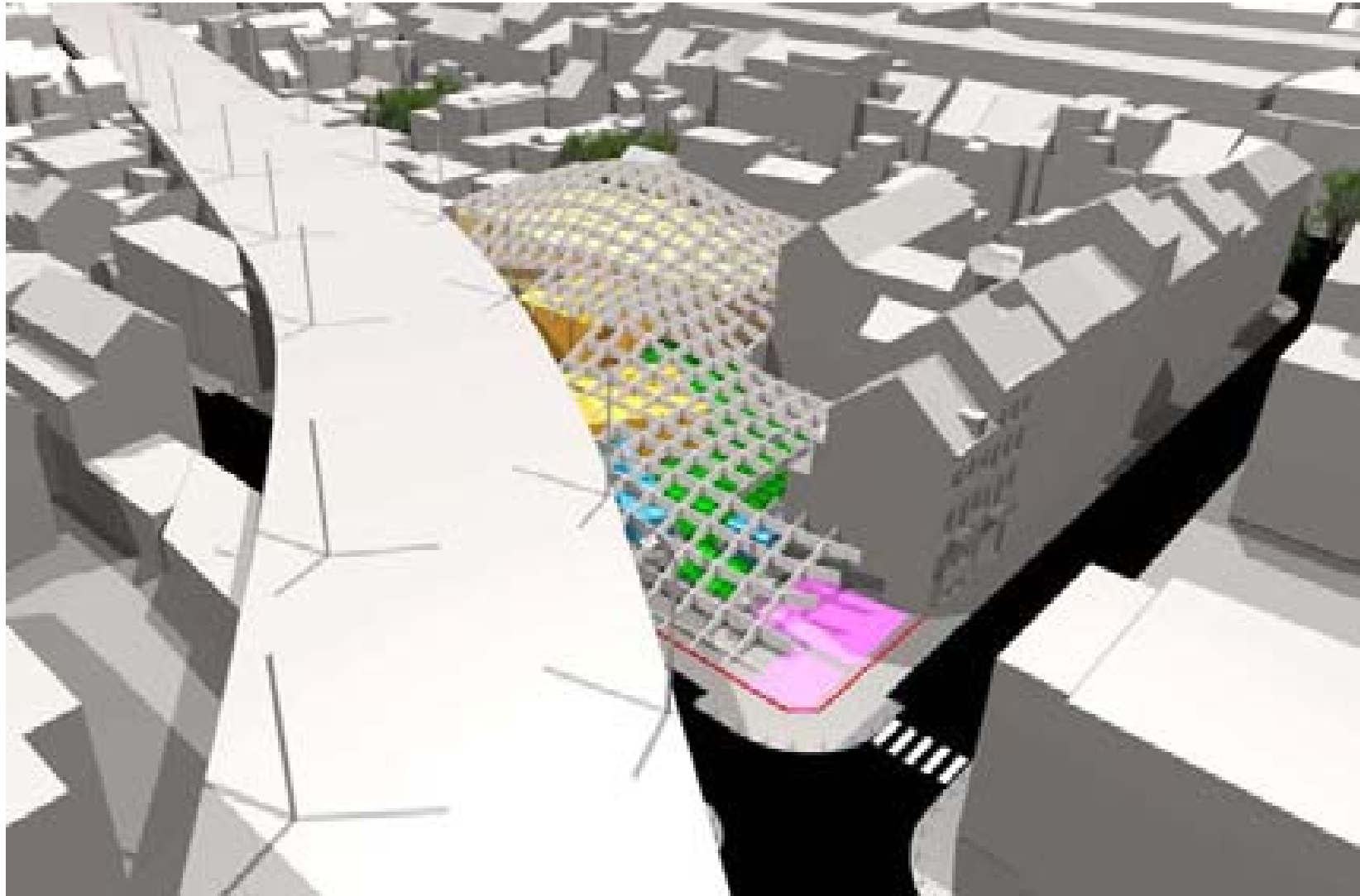
MMA (A2M-FNA)



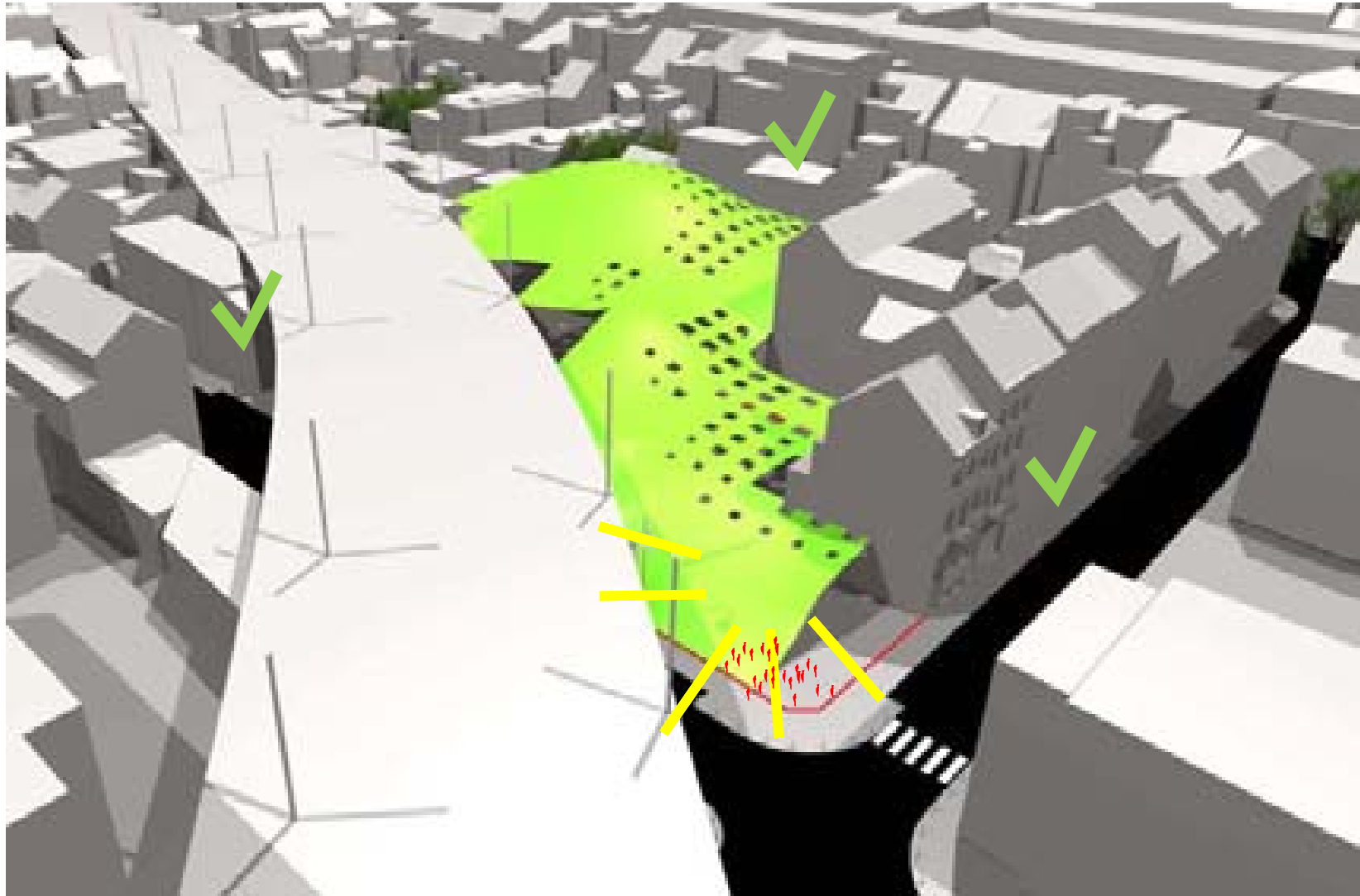
MMA (A2M-FNA)



MMA (A2M-FNA)



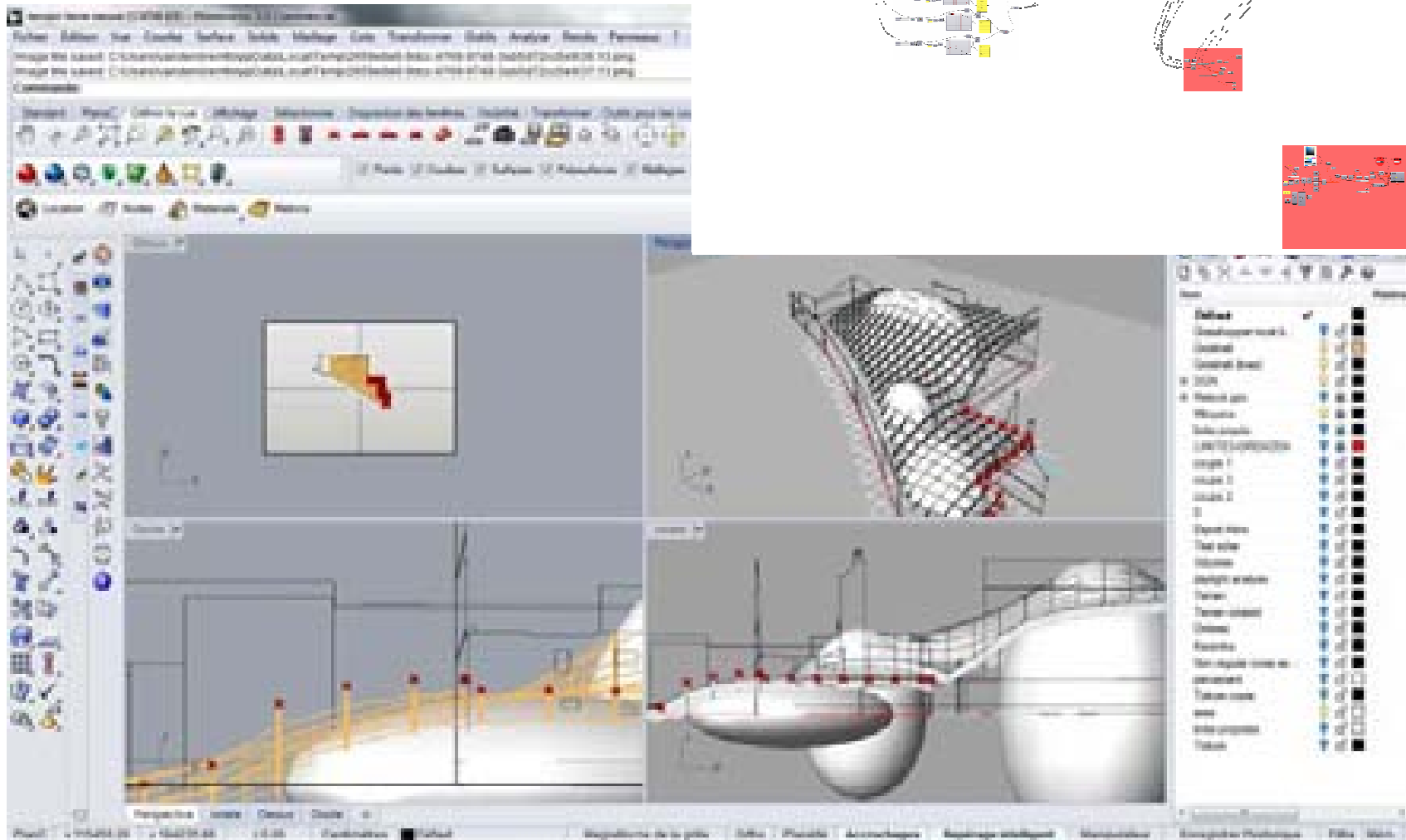
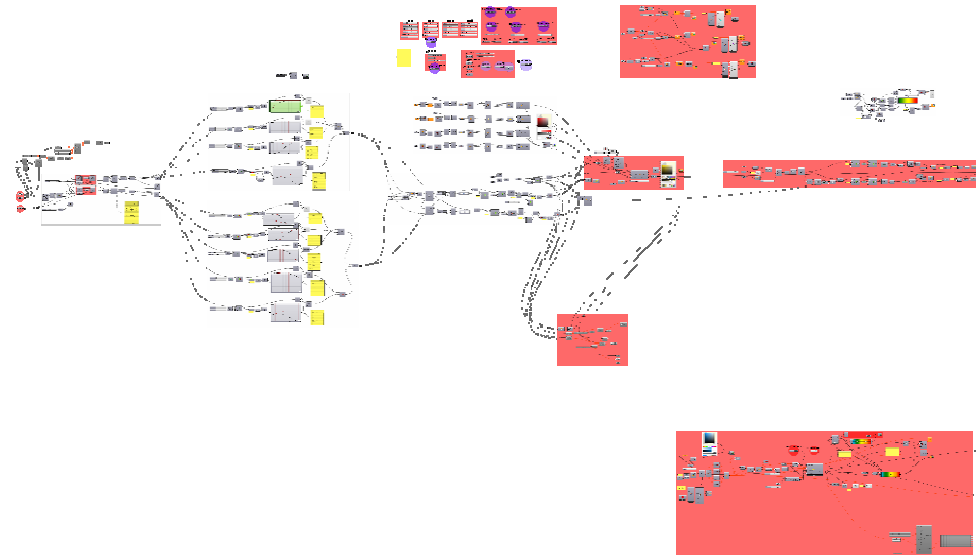
MMA (A2M-FNA)



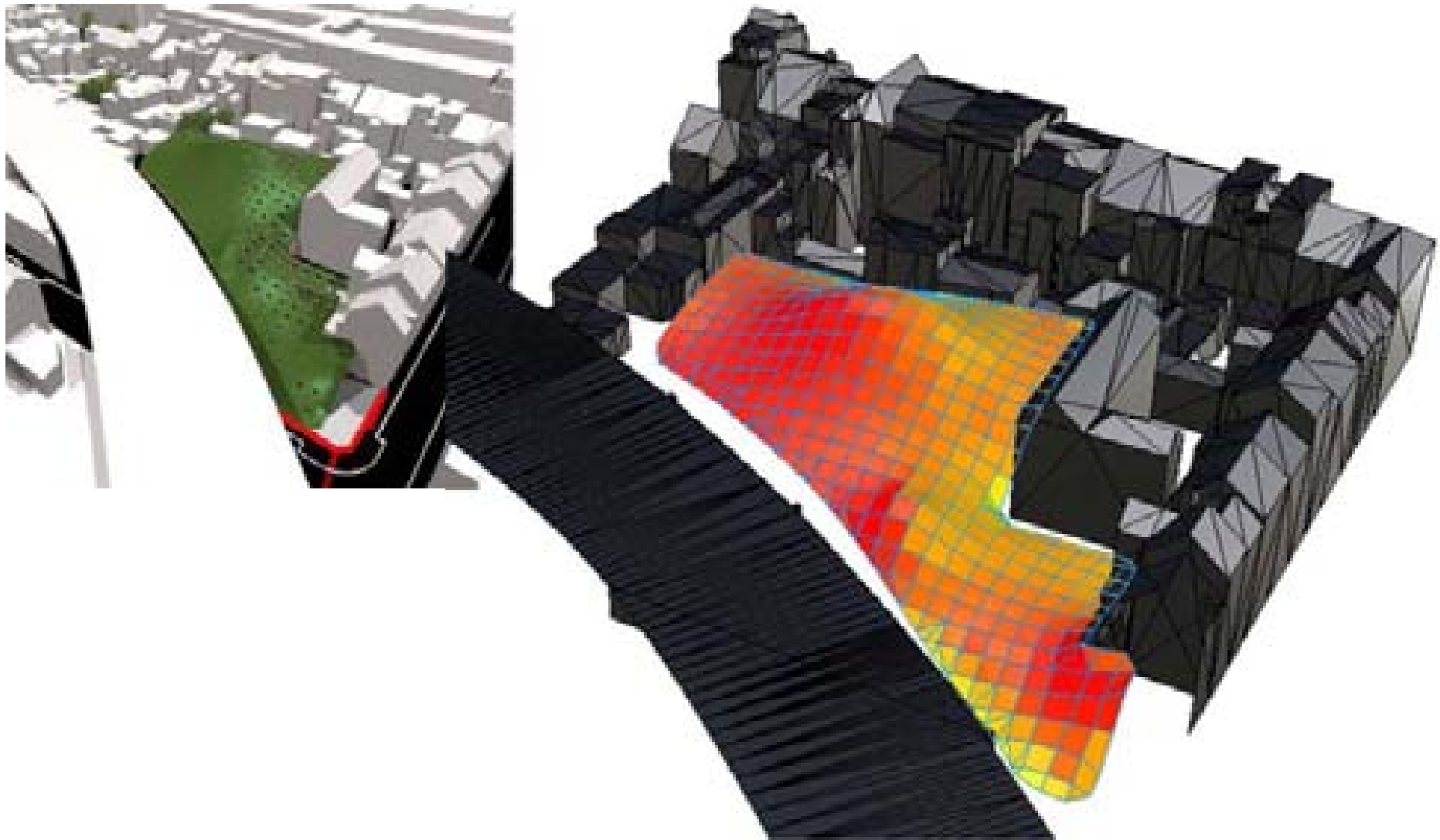
MMA (A2M-FNA)



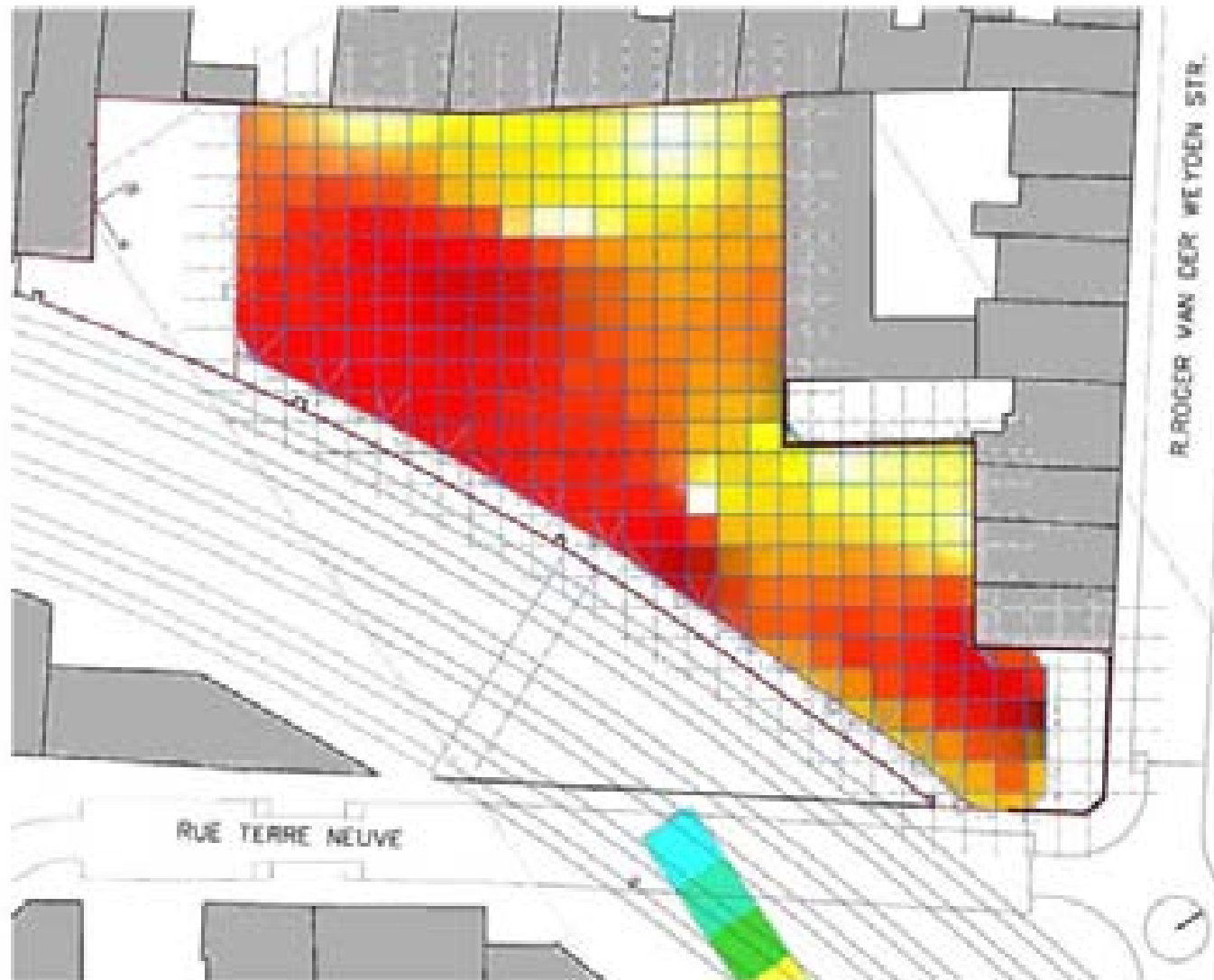
MMA (A2M-FNA)



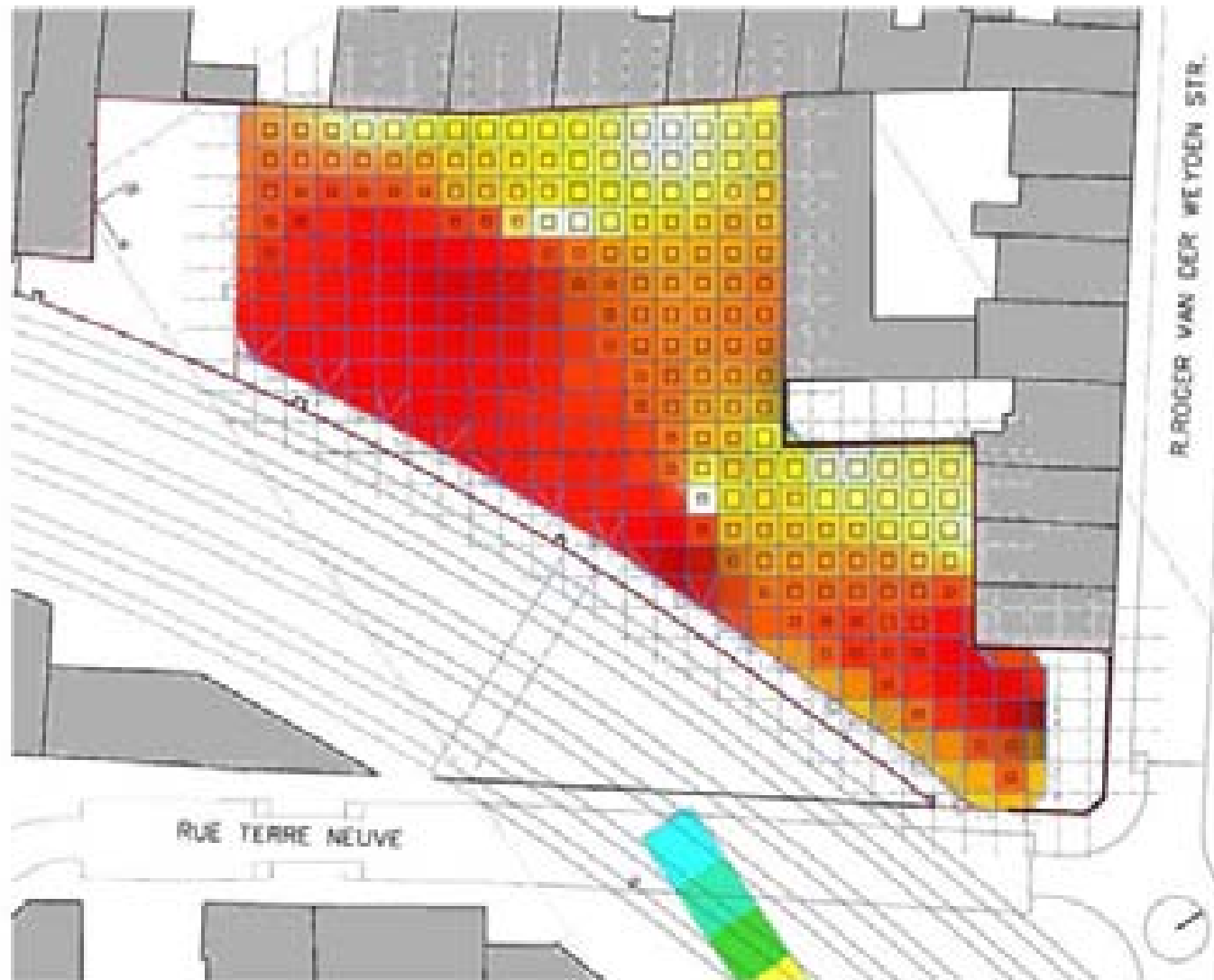
MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



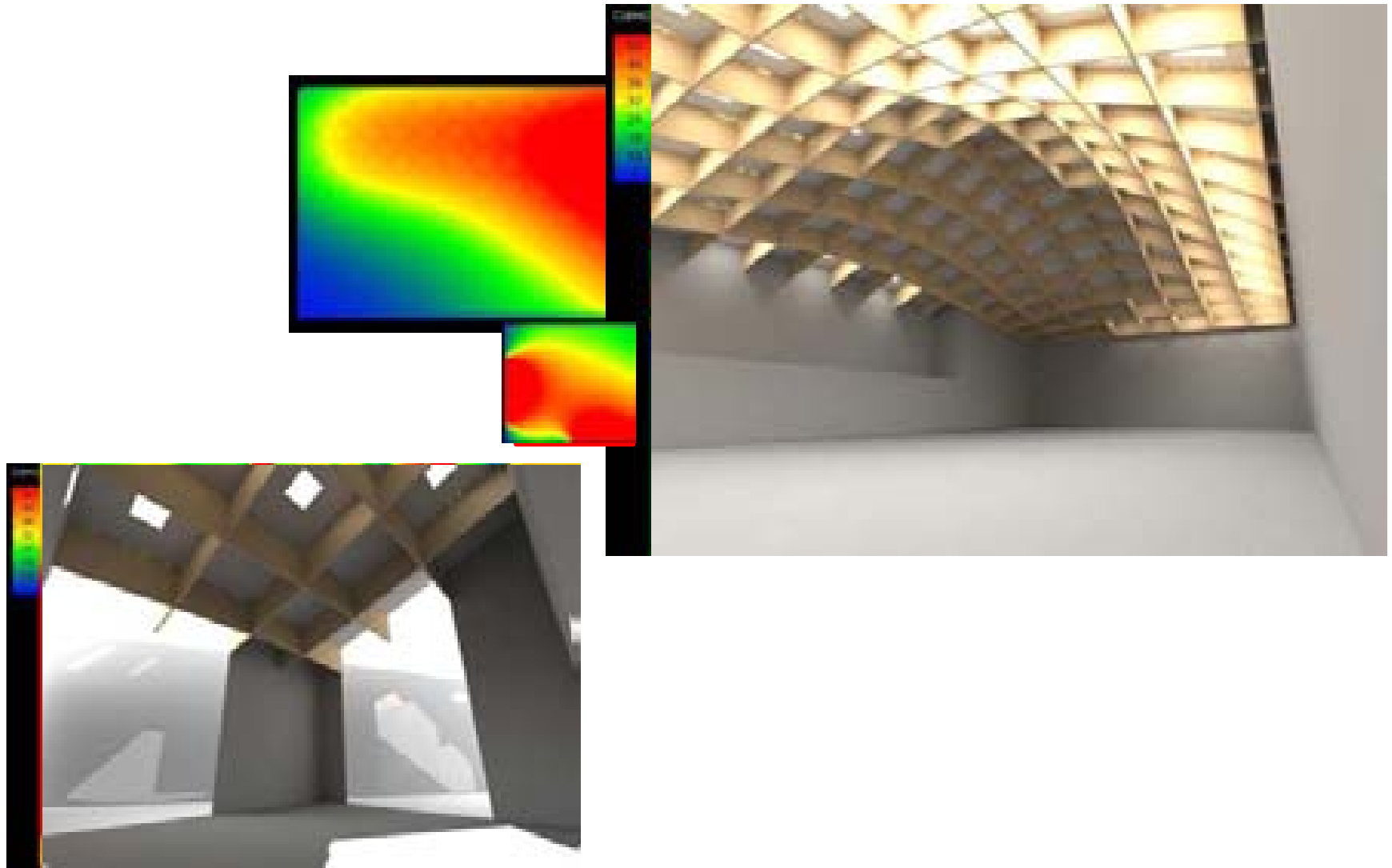
MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)



MMA (A2M-FNA)

think tank

Bara

a zero energy hotel + CO2 catalysor facade



FAAST

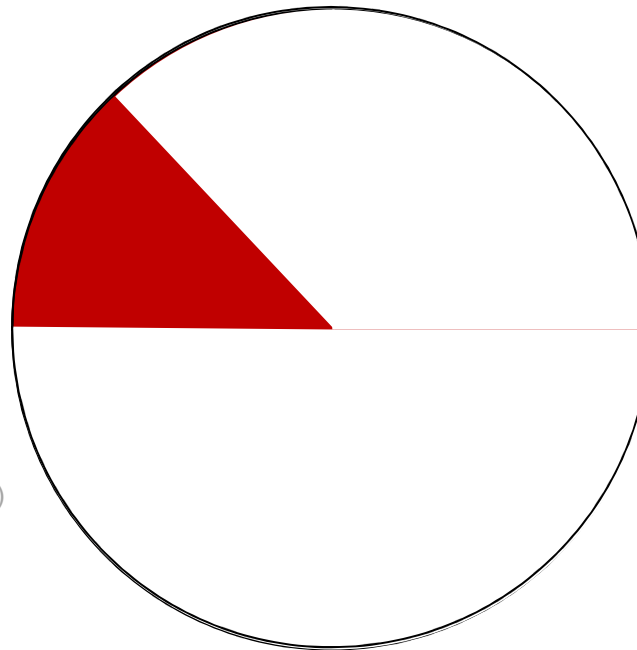


MMA (A2M-FNA)



think tank FAAST





The equation of the water lily

A. Jacquot professor of mathematics and genetics in Paris (98)

Which daytime will the water lily cover half of the lake?

a quarter of the lake?

an eighth of the lake?

Imagine a lake

There is a special water lily who is able to reproduce rapidly. So it double everyday

The next day, obviously, there are 2 water lilies. The day after that, 4 water lilies, and so on.

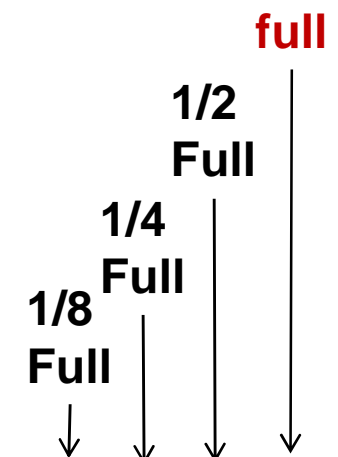
Lets say that after 30 days the lake is completely full

Question , which daytime the water lily will cover half of the lake? And only a quarter? And an eighth?

The moral of the story, is that no one would probably notice that the lake had a problem until the 27th or 28th day of the month, when the lake would be spotted. And by then, it's too late to do anything. The lake, for all intensive porpoises, is dead.

Lets say the lake is our Earth. This parable makes us perceive clearly what the upcoming end-of-the-world might look like from our still comfortable seat in the 21st century!

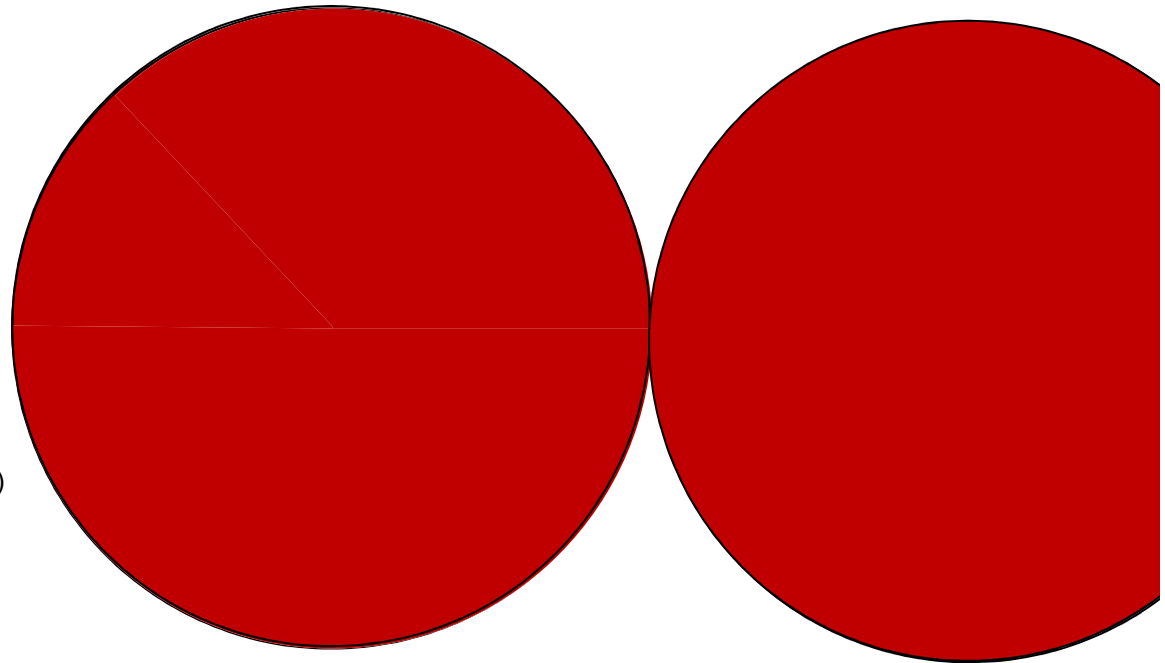
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30





The equation of the water lily

A. Jacquot professor of mathematics and genetics in Paris (98)



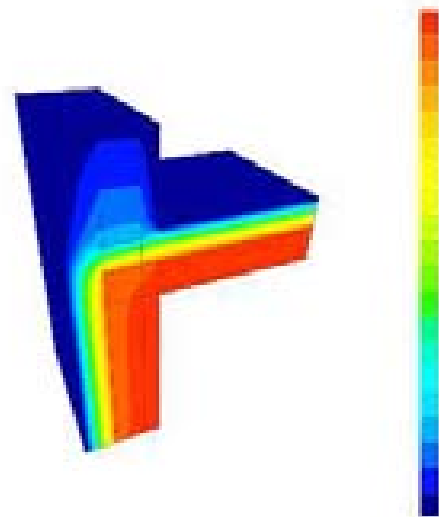
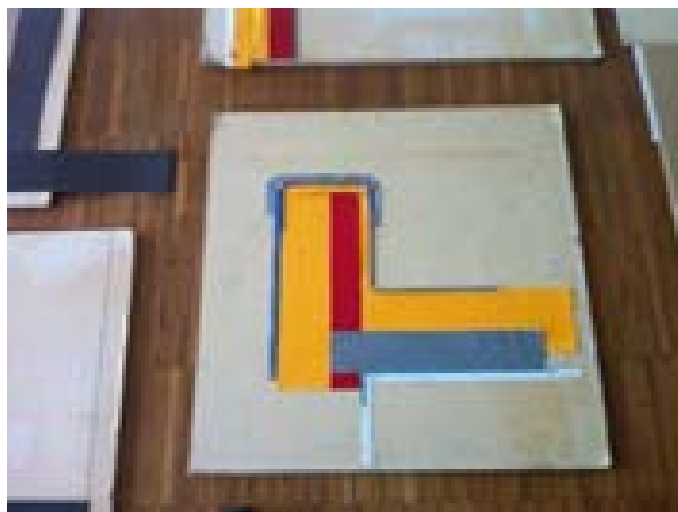
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**MMA (A2M-FNA)
soon:
pragmatic
passivehouse
trainings in NYC...**



www.facebook.com/a2mteam
www.a2m.be/practice/



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www.FNA.com

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Belgium

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New York, NY 10010
USA



to infinity ... and beyond !

Buzz Lightyear

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