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Energy in H2020

Testimony of research work in the field of energy

H2020 Seminar - La Reunion, 30th Oct 2014

Dr Rosa Schiano-Phan, University of Westminster, London, UK

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Overview

- My research subject
- EC research programs I have been involved in
- Programs working on at the moment
- Ideas of collaborations with Reunionese partners

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Research Subject

- Environmental Design
- Low Energy Architecture
- Thermal Performance
- Passive Cooling, Nat Vent

Energy Demand Reduction

- Fieldwork
- Modelling and simulation
- Post occupancy evaluations

Evidence based approach to building design

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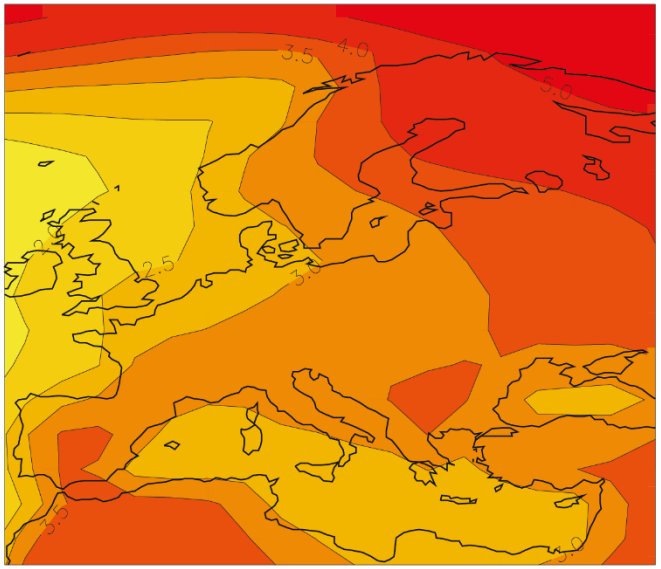

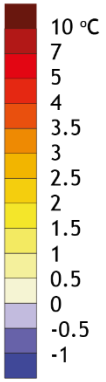

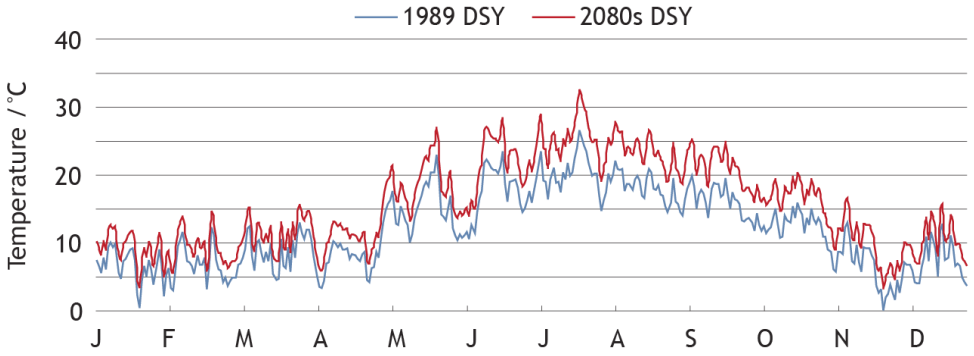

Climate change and Sustainability

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CIBSE

breeam

PLEA
SUSTAINABLE ARCHITECTURE + URBAN DESIGN

standards, regulations and theoretical background

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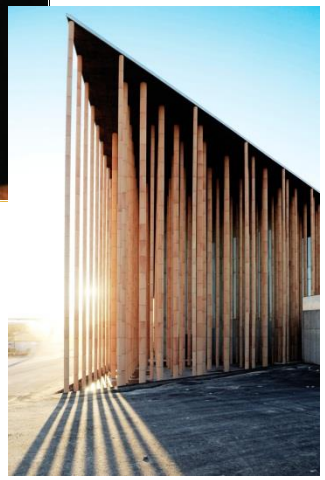

From Vernacular to Post-carbon Architecture

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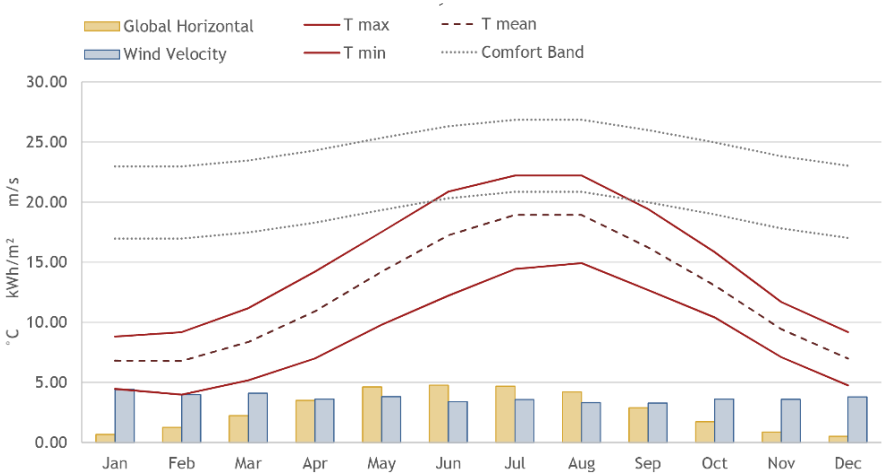

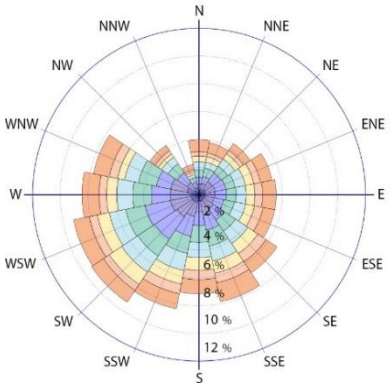

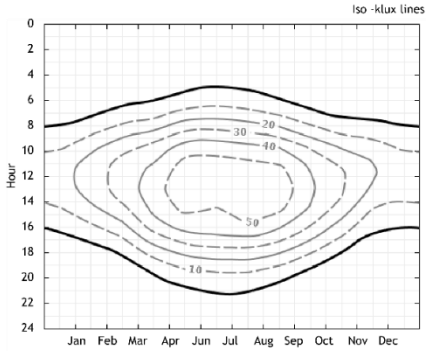

climate

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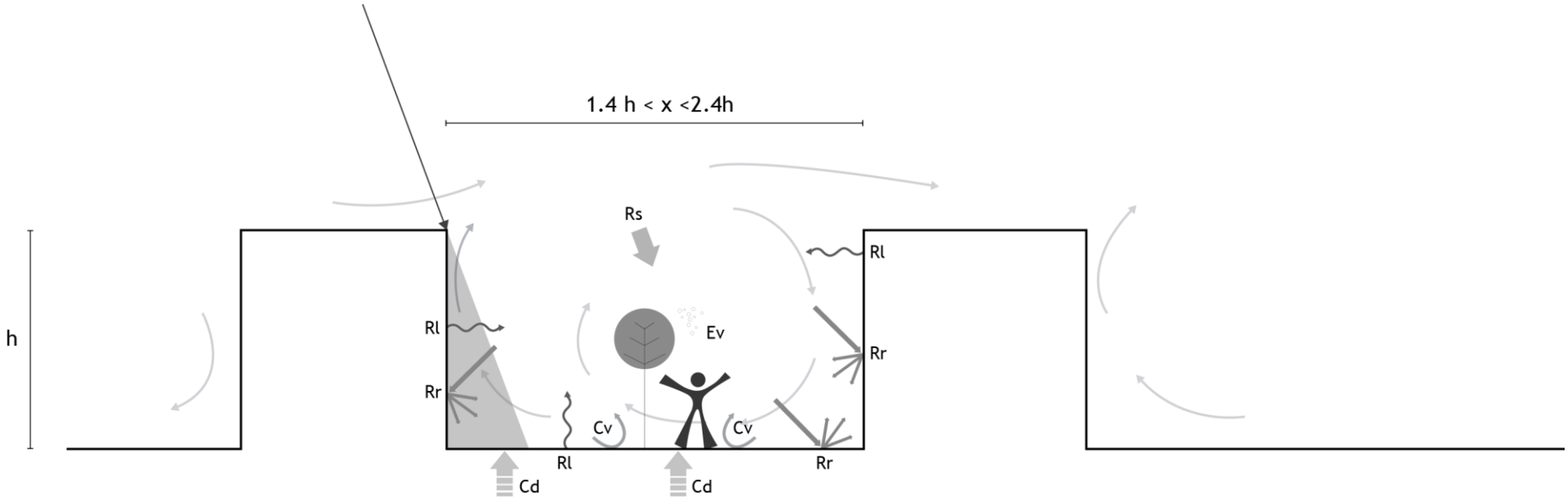

microclimate

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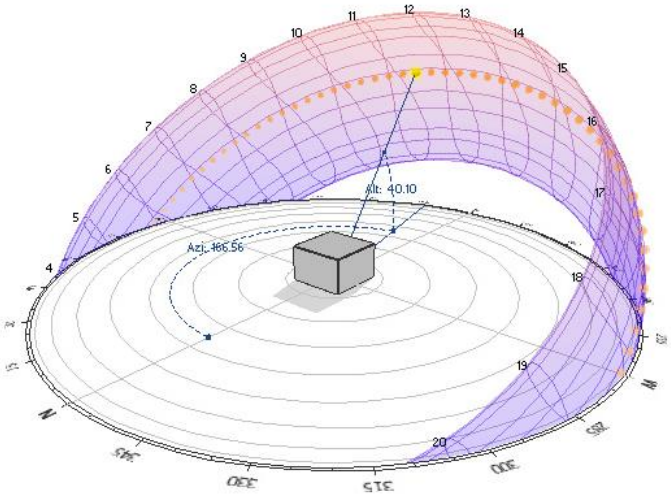

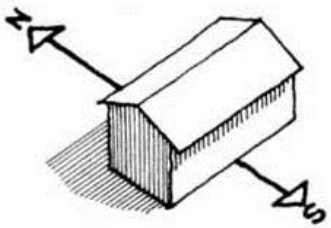

solar control

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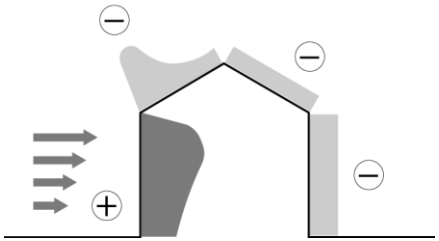

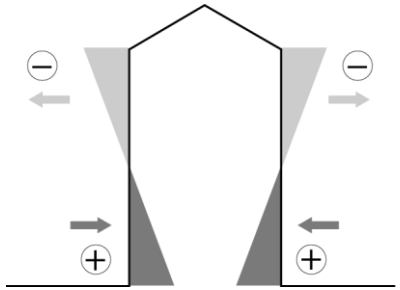

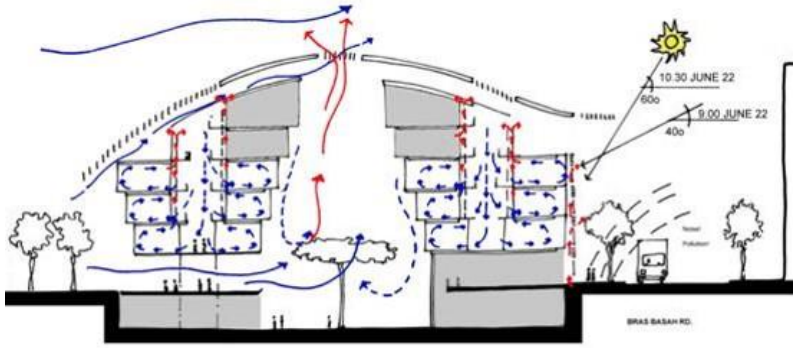

natural ventilation

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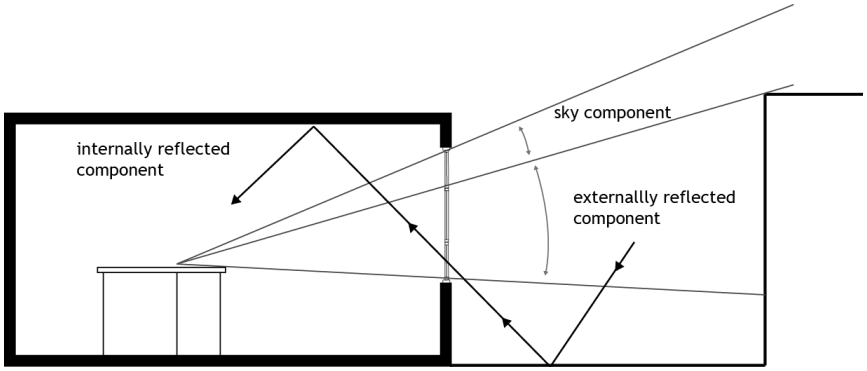

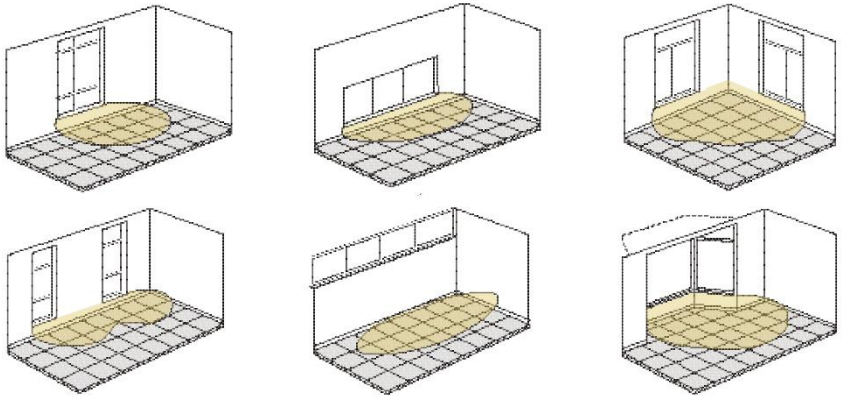

daylight

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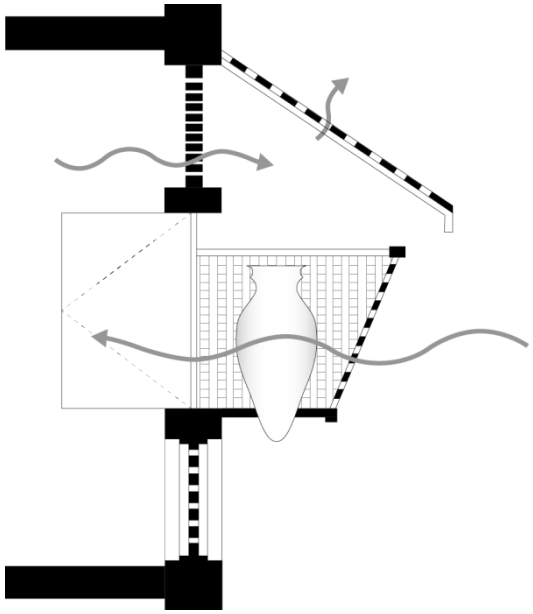

passive solar heating/cooling

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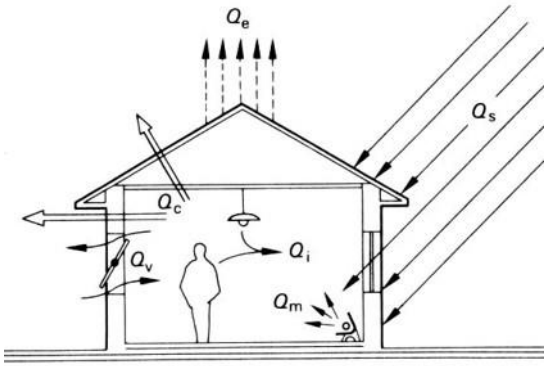

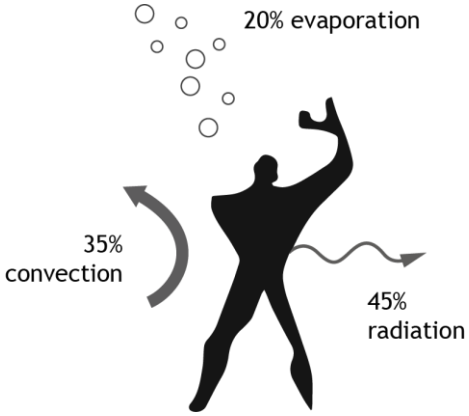

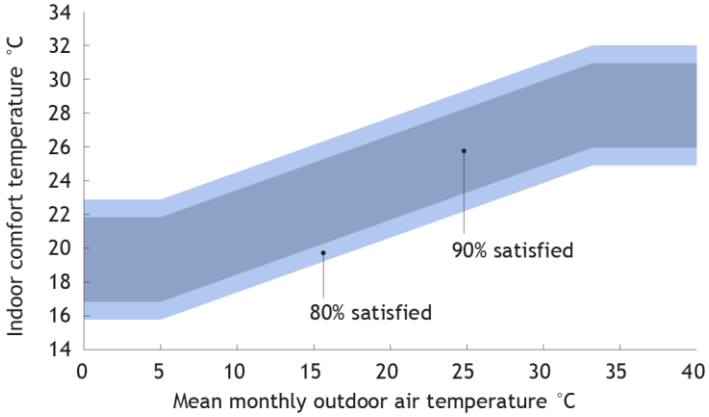

heat exchanges - comfort

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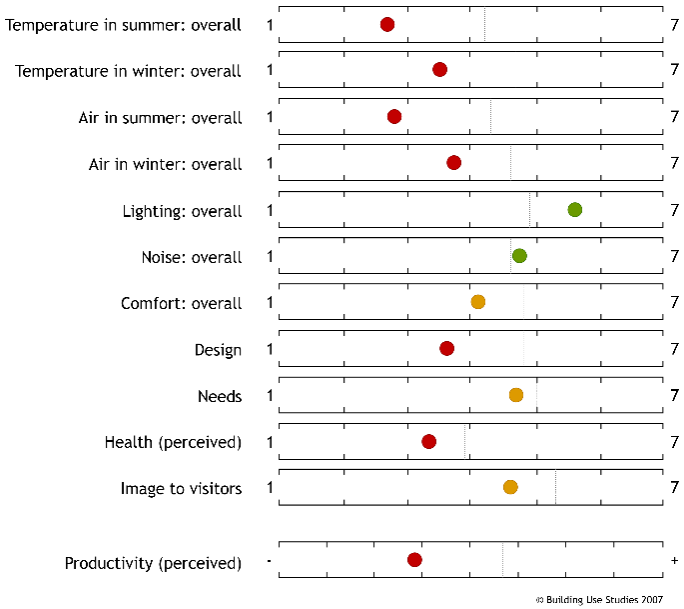

Fieldwork – Surveys methods

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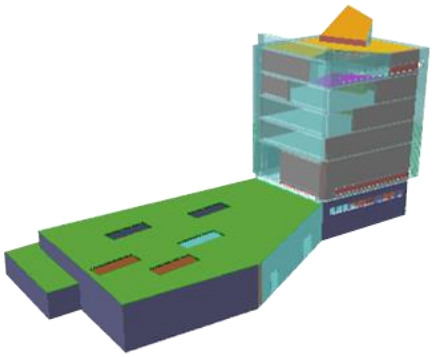

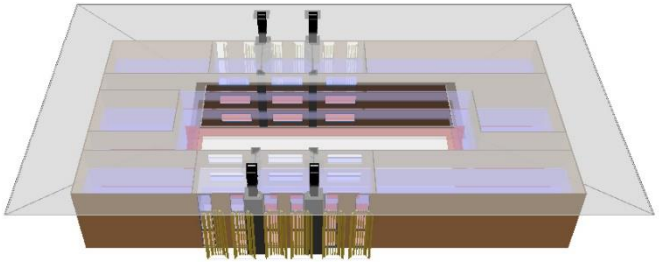

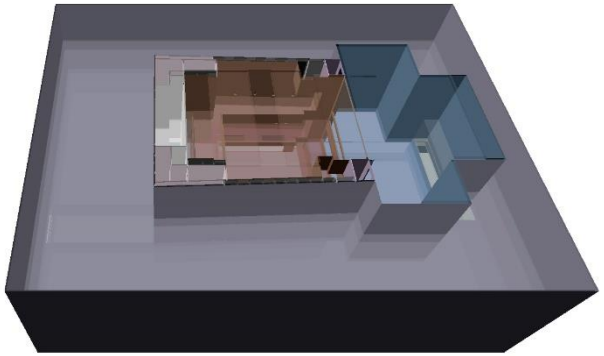

dynamic thermal models

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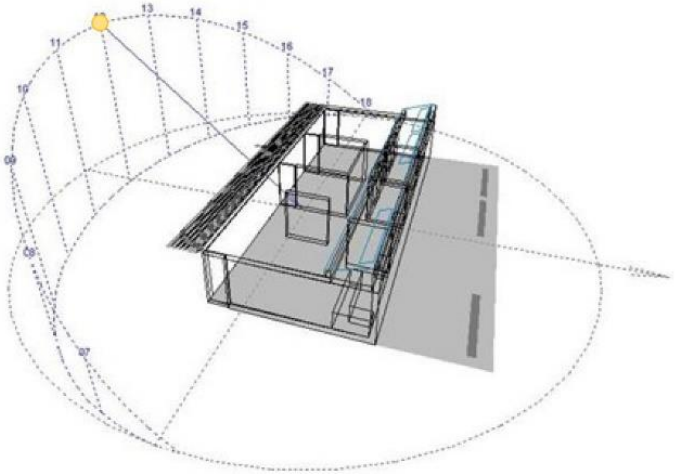

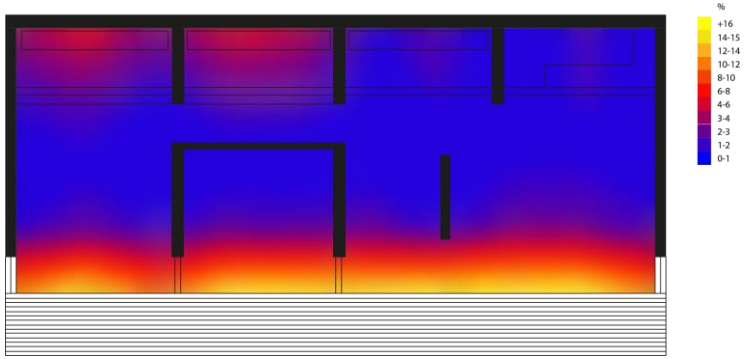

daylight simulations

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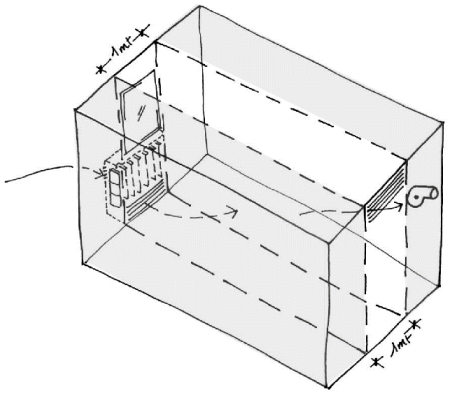
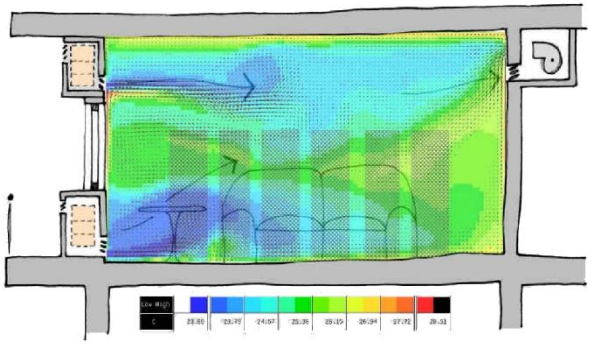
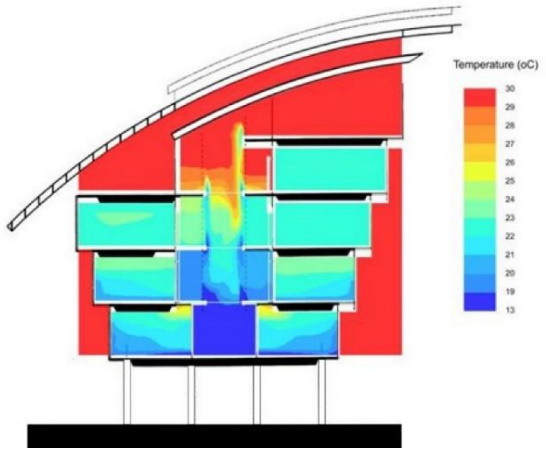




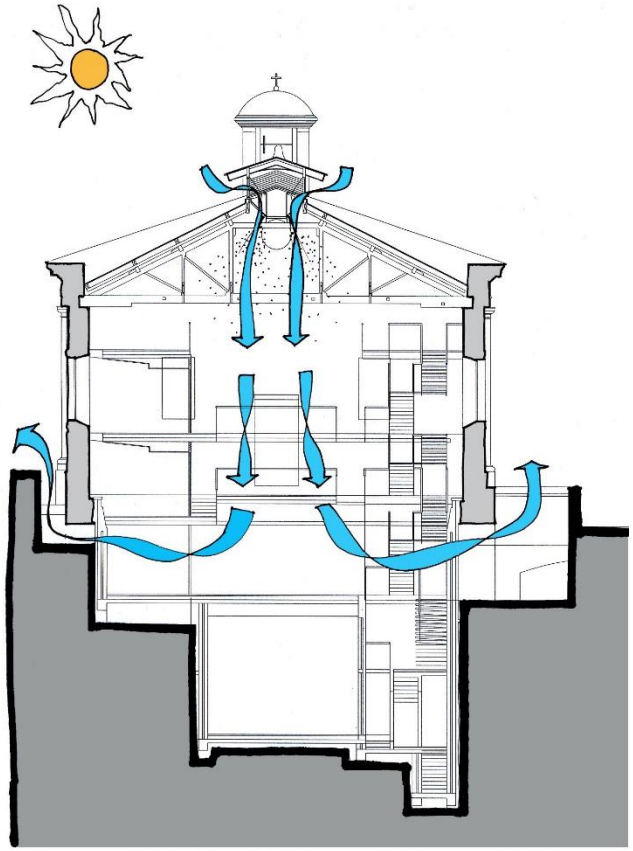


CFD simulations

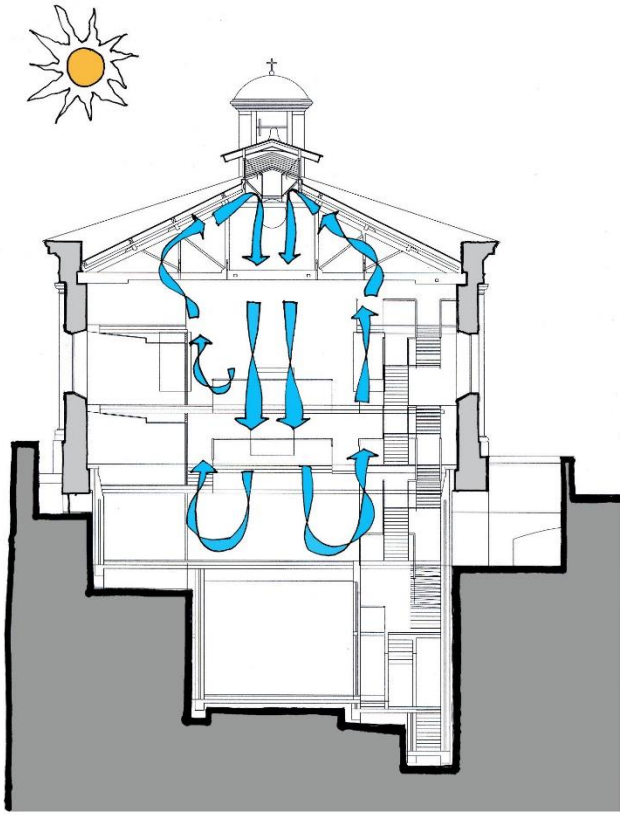
Past Research Projects
(1999-2010)

- TripleSave Project, R&D, Joule III
- PDEC Project, R&D, Save FP4
- EvapCool Project, R&D, FP5
- Market Assessment of PDEC, Altener II, IEE
- PHDC, Promotion & Dissemination, FP6
- Passive-on, IEE

Passive & Hybrid Downdraught Cooling (PHDC)



Evaporative Cooling (in dry conditions)
PASSIVE

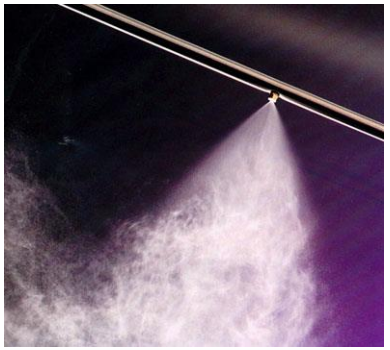


Cooling Coils (in humid conditions)
HYBRID

Research on PDEC:

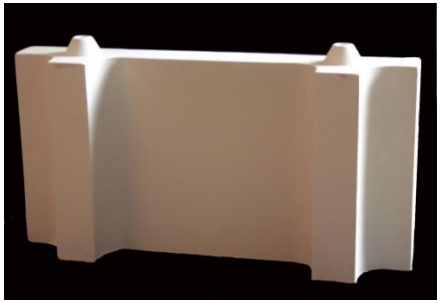
PDEC (1996-1999):

- meets 85 % of cooling load of typical office building
- deals with urban noise and pollution
- 6% capital cost saving over mechanical option



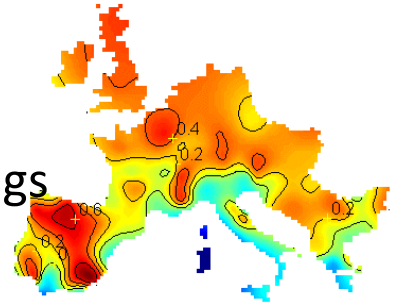
Evapcool (2001-2003):

- meets cooling loads of residential building
- avoids problems of potential microbiological contamination
- LCC smaller than conventional A/C

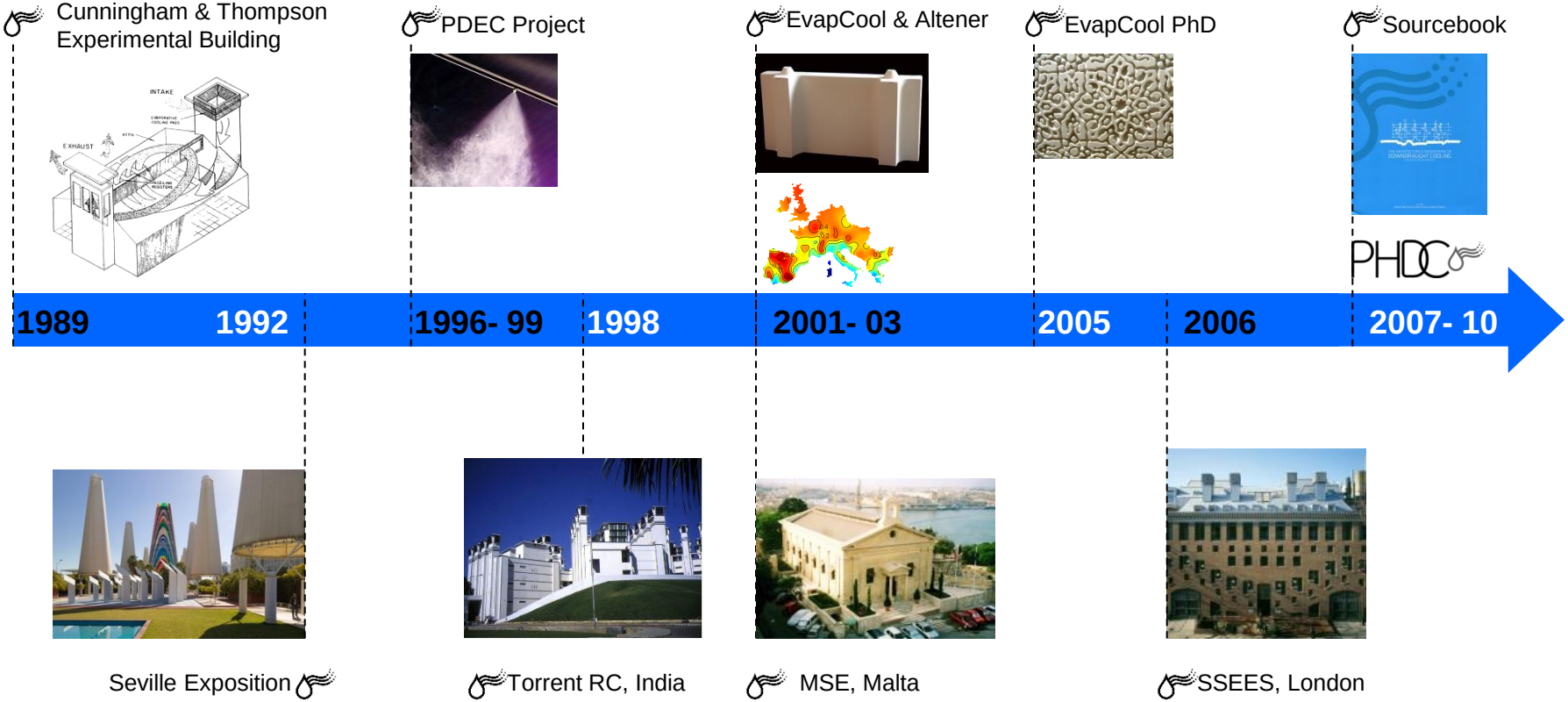


Altener (2001-2003):

- PDEC is applicable to 80% of S European building stock
- Energy and CO2 savings
- Can save 15% of energy demand of existing commercial buildings



PDEC Timeline: Research & Application



PHDC Project (2007-2010)

Dissemination of Previous Research

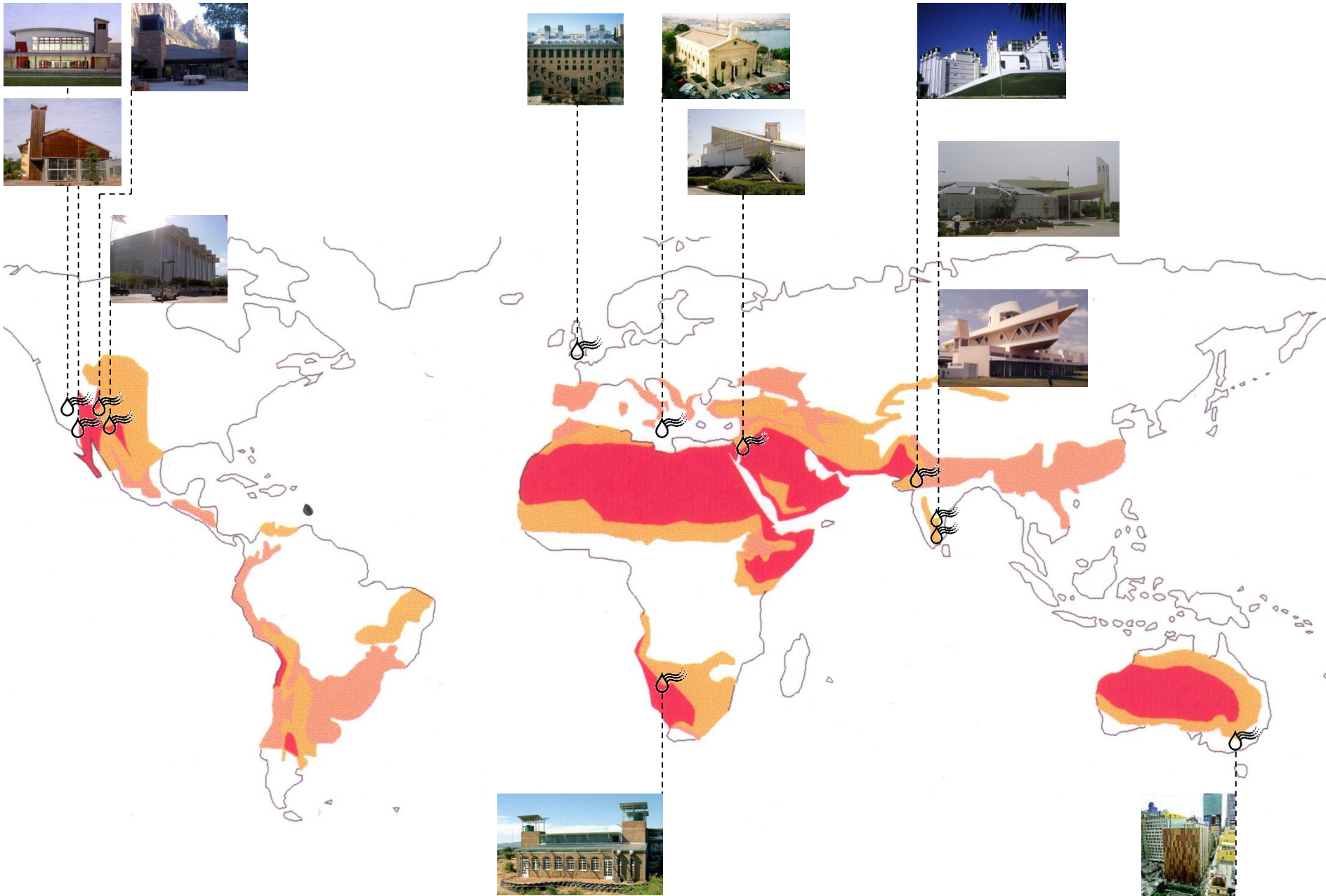
- Promote PHDC amongst building/design professionals and users

- Disseminate the results of previous EC research projects on PHDC and the knowledge arising from pioneering buildings

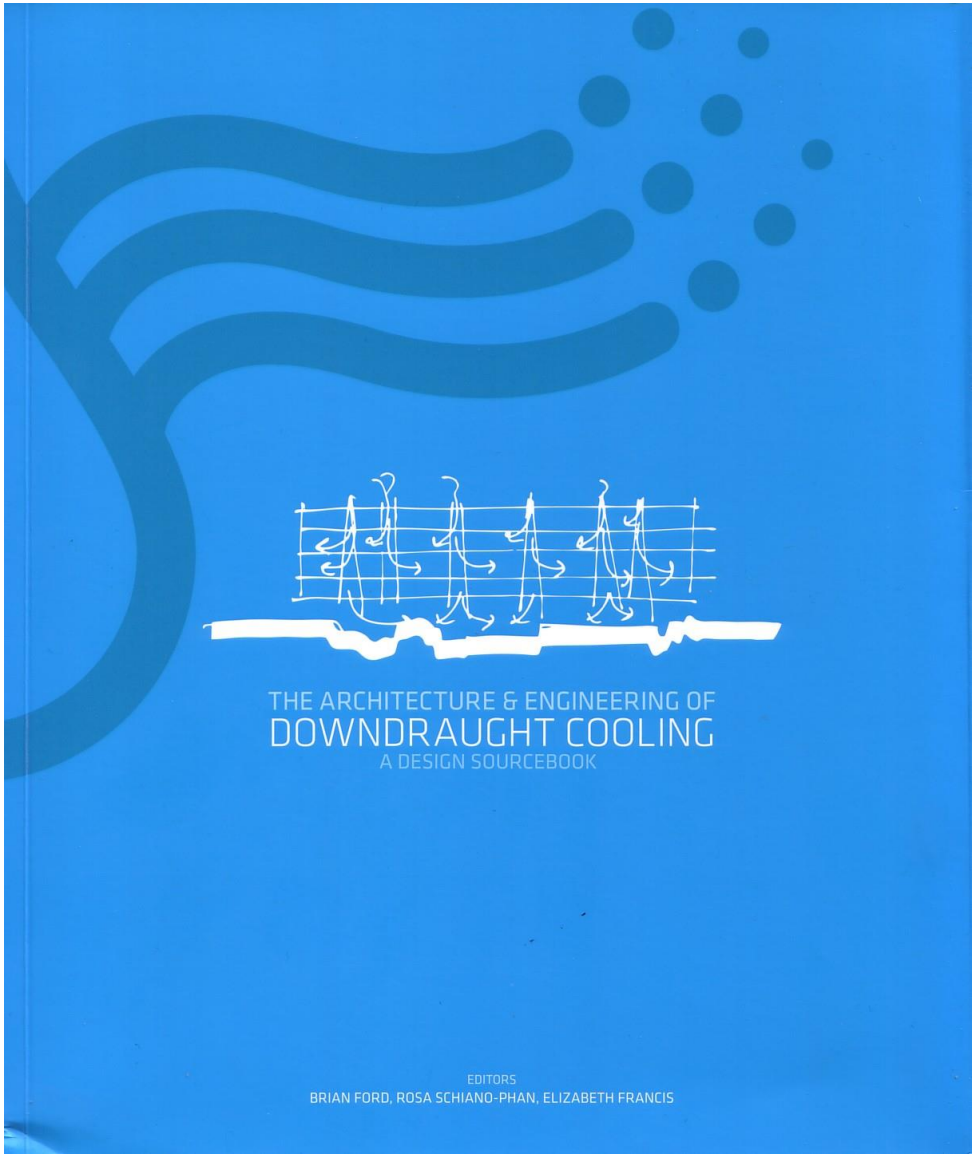
PHDC project tasks

1. Post Occupancy Evaluation → user satisfaction & performance
2. Market Analysis → applicability & costs
3. Sourcebook → design guidance
4. Website → promotion & dissemination
5. Symposia and Workshops → promotion & dissemination

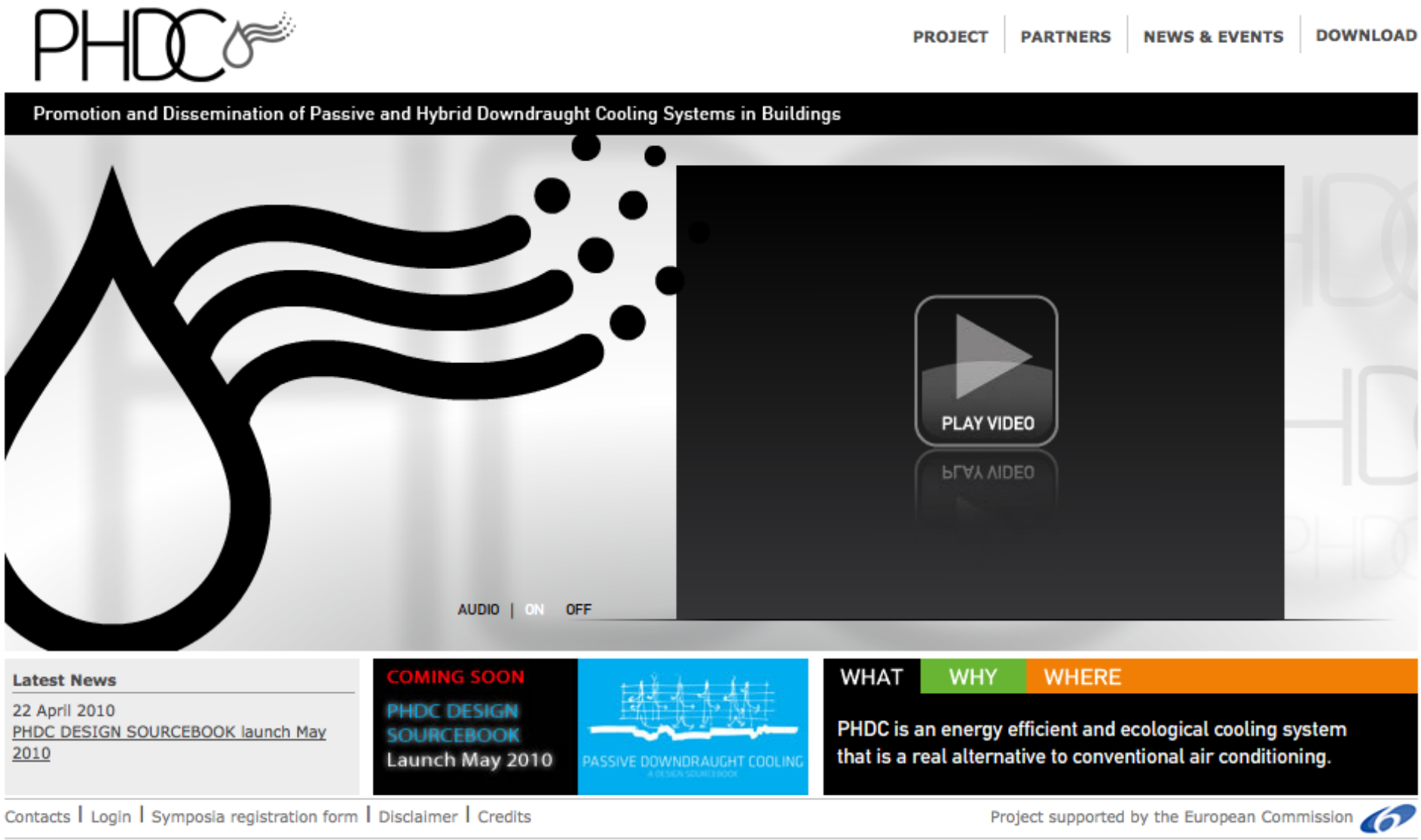
PHDC Case Study Buildings



PHDC Project : Sourcebook & Video



PHDC Project : Design Sourcebook, CD, website + video



www.phdc.eu

Past Research Projects: Passive-on

- ***Project:*** 'Marketable passive homes for winter and summer comfort (Passive-on, Contract No. EIE/04/091/S07.38644, 2004-'07)
- ***Funding scheme:*** European Commission Intelligent Energy for Europe
- ***Grant value:*** 714,000 Euro
- ***Duration:*** 30 months
- ***Involvement:*** Co-Investigation, technical development, tasks leadership, symposium organisation
- ***Status:*** Successfully Completed

Current Research Programmes/Proposals

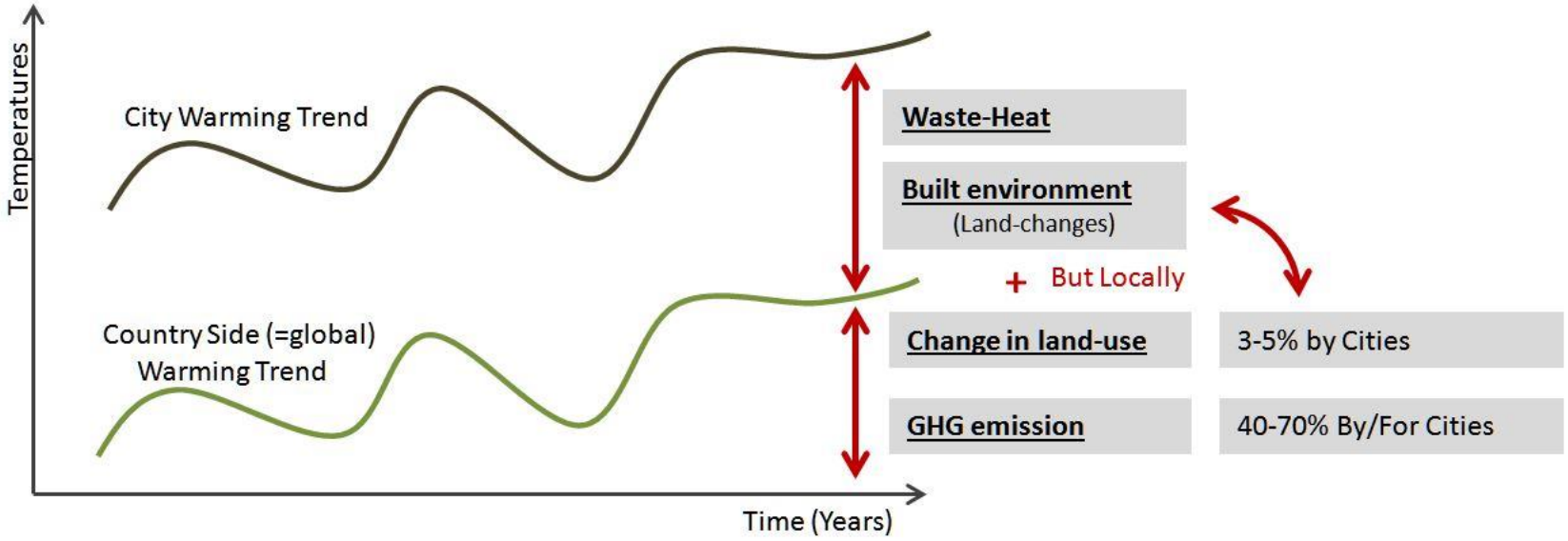
- SC5-03b-2014: **Linkages between climate change actions and sustainable development**

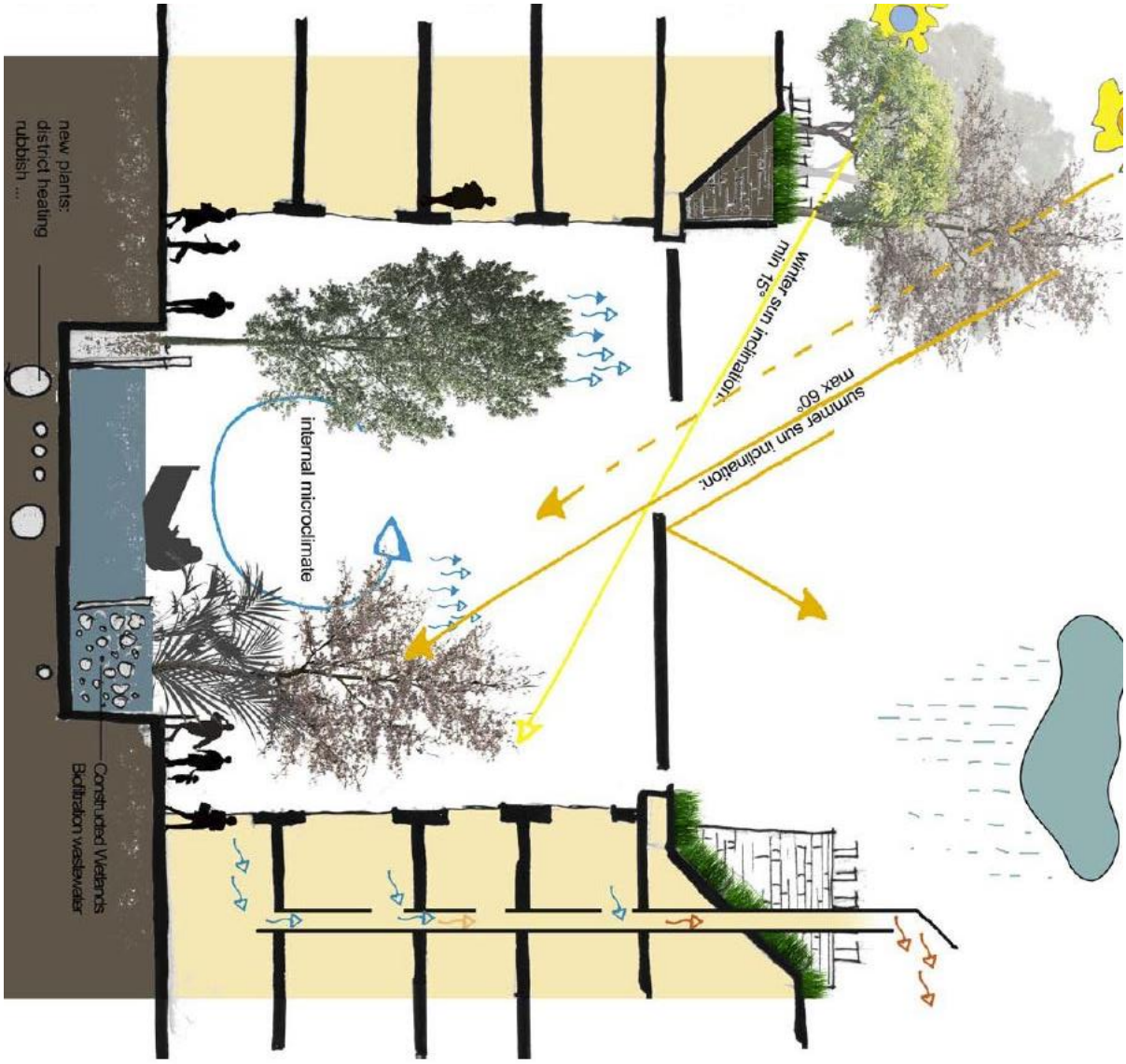
- EE-02-2015: **Buildings design for new highly energy performing buildings** (Energy Efficiency - PPP EeB and SPIRE topics H2020-EE-2015-1-PPPSub call of: H2020-EE-2014-2015)

- EeB-05-2015: **Innovative design tools for refurbishing of buildings at district level**

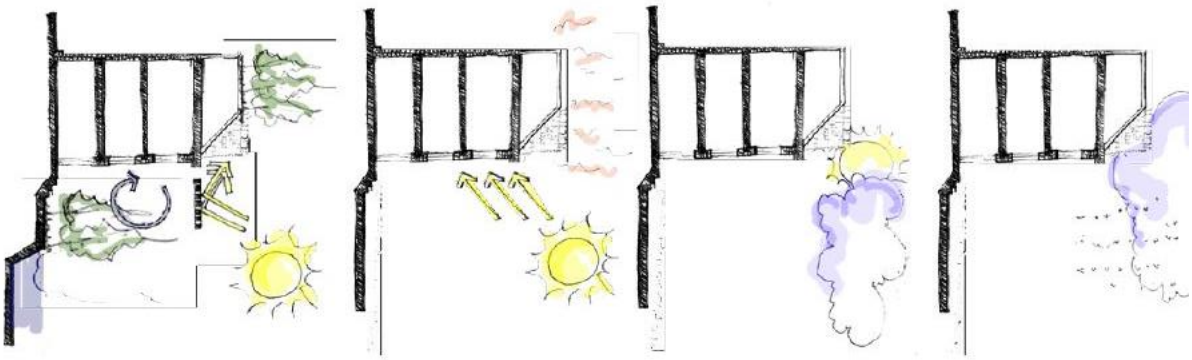
Urban Microclimatic Changes and Climate Change

NB. Qualitative Graph





CLIMATE CHANGE AND ADAPTATION



To reduce the Impact of Cities and Urban Activities on Climate Change and on Urban Micro-Climate

There are Two main Strategies

Increasing Efficiency

Reducing Demand

Focusing on Improvements of
The space in-between buildings and its edges:
"The Shared City"

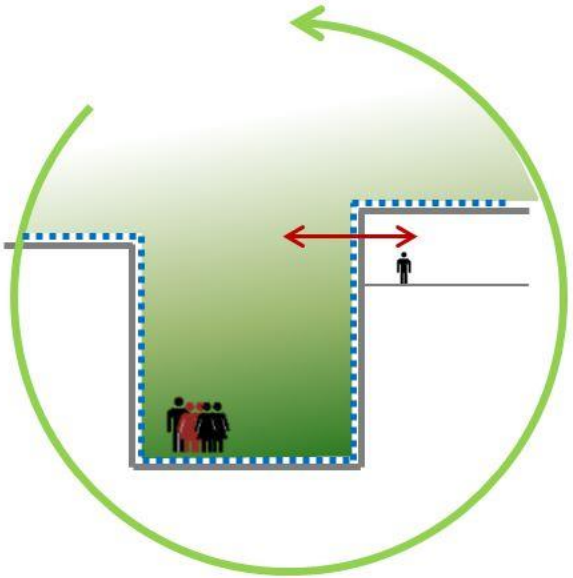
The concept is that the urban environment should be designed in a way that it generates the environmental condition that best suit outdoor activities and at the same time extend the potential for the use of bioclimatic condition.

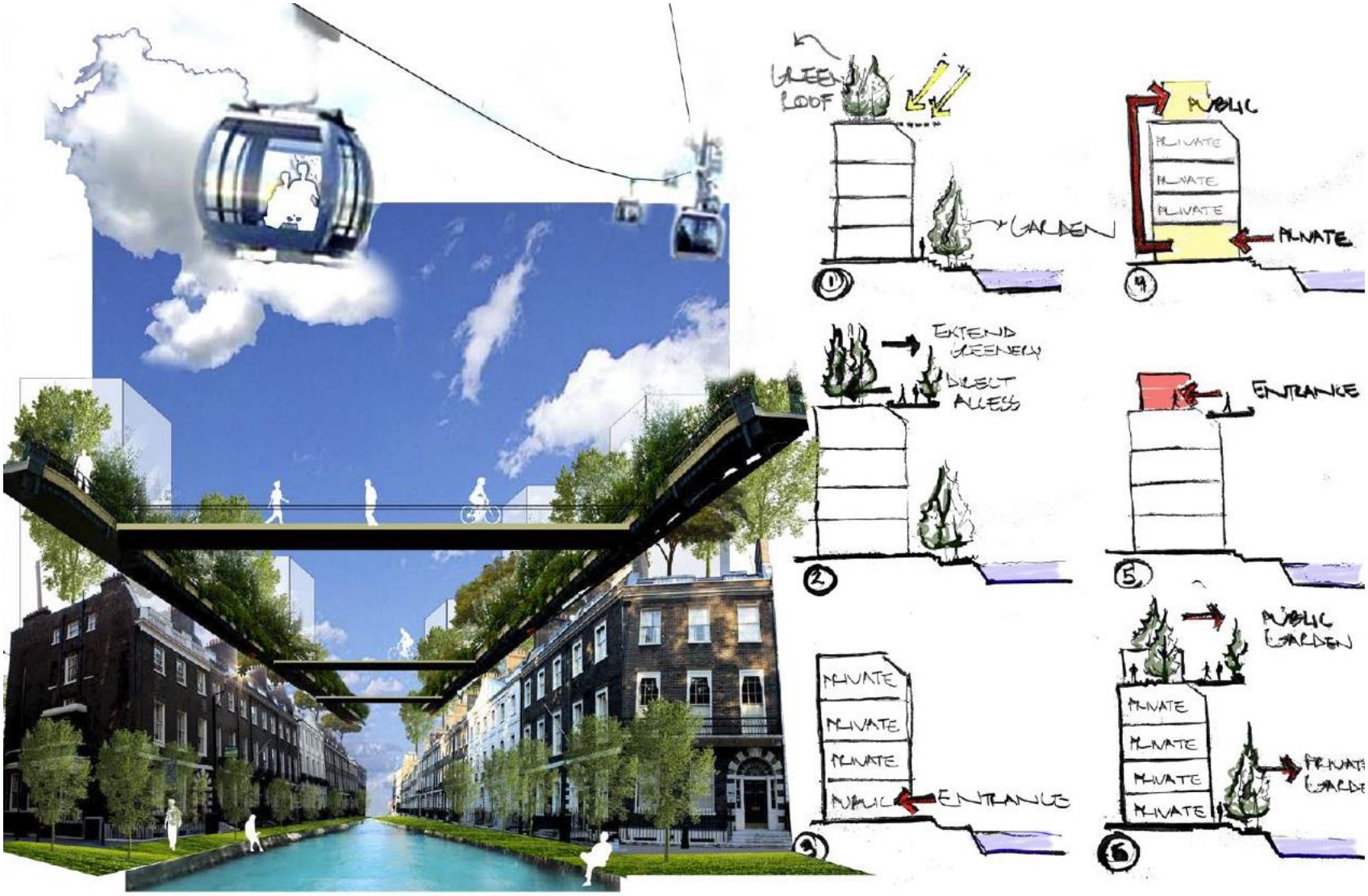
The Urban Environment should be regarded as a "Social Good" and as such has to be treated

Moving Towards Mitigative Urban Environments

Changing Human/Consumer Behaviour
(20% potential reduction in energy demand) [EU]

Also towards new notion of Comfort




GREEN ROOF
GARDEN
PUBLIC
PRIVATE
PRIVATE
PRIVATE
PRIVATE
EXTEND GREENERY
QUIET ALLEY
ENTRANCE
PRIVATE
PRIVATE
PRIVATE
PUBLIC
ENTRANCE
PUBLIC GARDEN
PRIVATE
PRIVATE
PRIVATE
PRIVATE

Potential for collaboration

- CIRBAT/SMEs
  - Collaborative study on new and naturally sourced insulating materials (e.g. coconut, palm tree)
  - Development of new bamboo based building materials and ventilated roofs for tropical buildings

- PIMENT/SMEs
  - Measuring UHI effect in La Reunion
  - Demonstration of Plus Energy in urban areas
  - Applications to retrofit of existing buildings
  - Study of buildings users behaviour and attitudes towards energy use and lifestyle

Merci!