



INTEGRATION OF ADAPTATION TO CLIMATE CHANGE WITHIN THE DESIGN PROCESS OF URBAN PLANNING PROJECTS: NEW TOOL(S) AND NEW METHODOLOGY(IES)

Morgane Colombert¹, Marie Gantois², Laurent Jacquet³, Alexia Leseur⁴, Guillaume Meunier³, Hypatia Nassopoulos¹, Jean-Luc Salagnac⁵

1 Université Paris-Est, Lab'Urba, EA 3482, EIVP

2 City of Paris, Green Spaces and Environment Department

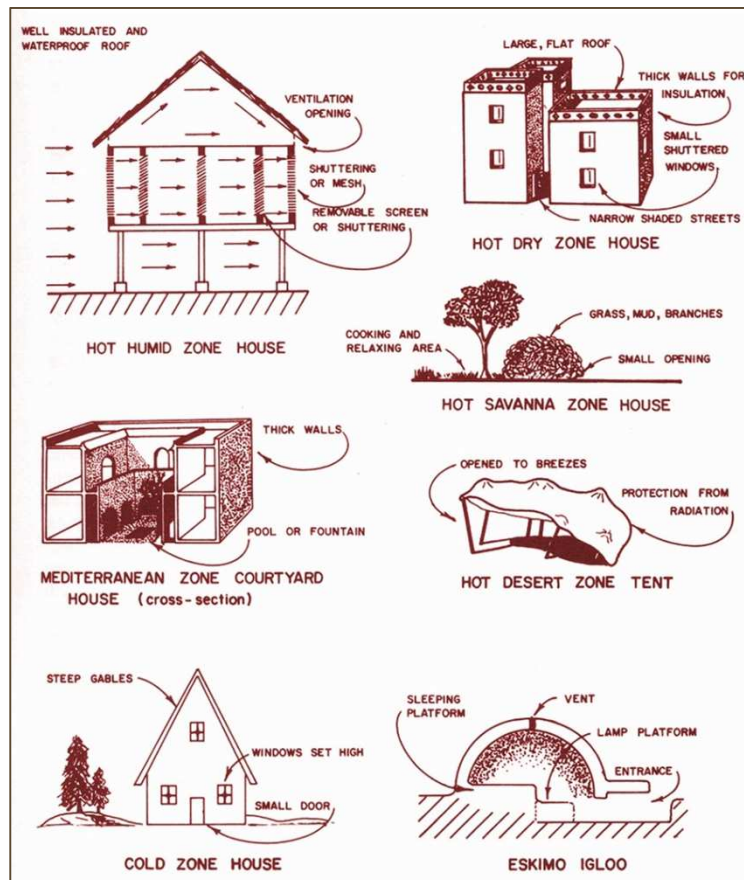
3 EGIS concept, Elioth

4 CDC Climat Research

5 Université Paris-Est, CSTB



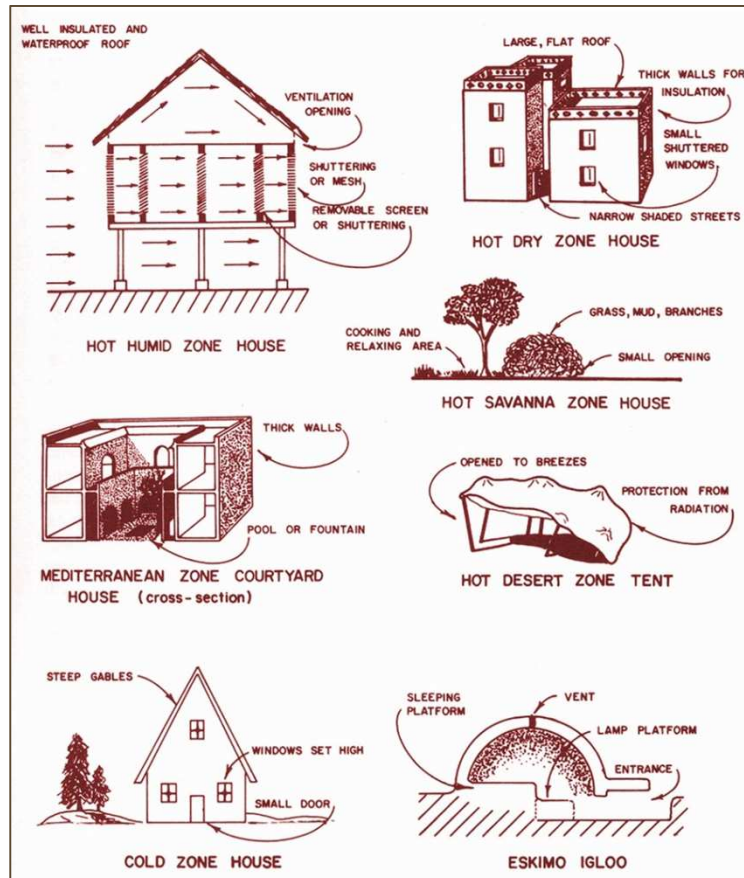
Built environment and climate : a long interaction re-examined by the evolution of energy prices and climate projections



Vernacular and traditional houses (Griffiths, 1976)

- The built environment is inherently exposed to climatic agents.
- A key function of the buildings is the protection of the human group against climate vicissitudes.
- These very old and unstoppable relationships have led to constructions adapted to climatic characteristics.
- A link between local climate and the built environment.
- Climate impacts often exceed the scale of the concentrated built environment (urban area) or dispersed (rural) to affect entire regions.
- Construction of building based mainly on the use of locally available materials.

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Vernacular and traditional houses (Griffiths, 1976)

- New construction processes
- New technologies and equipments from the late 19th century and during the 20th century (reinforced concrete, float glass, air conditioners, elevators, etc.)
- globalization of architecture
- Low price of energy



Sydney

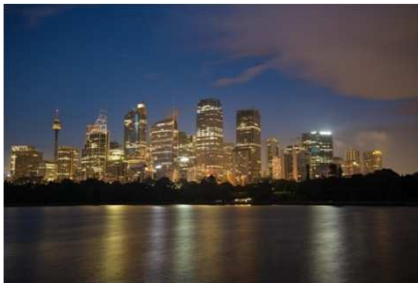


Paris

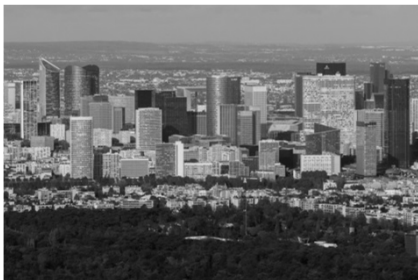


New-York

Built environment and climate : a long interaction re-examined by the evolution of energy prices and climate projections



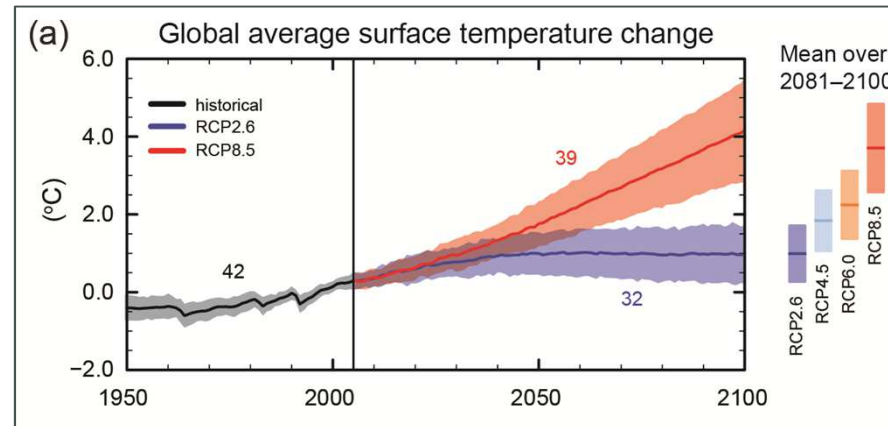
Sydney



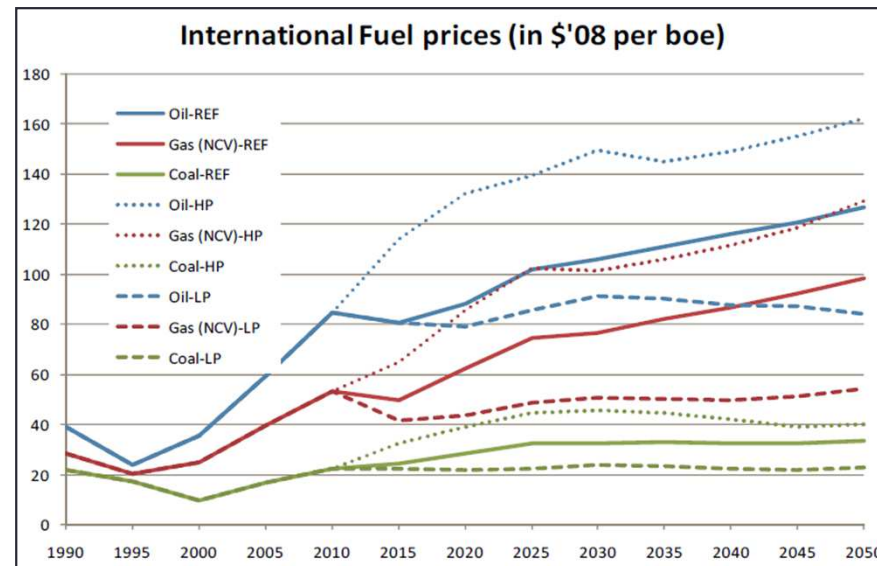
Paris



New-York



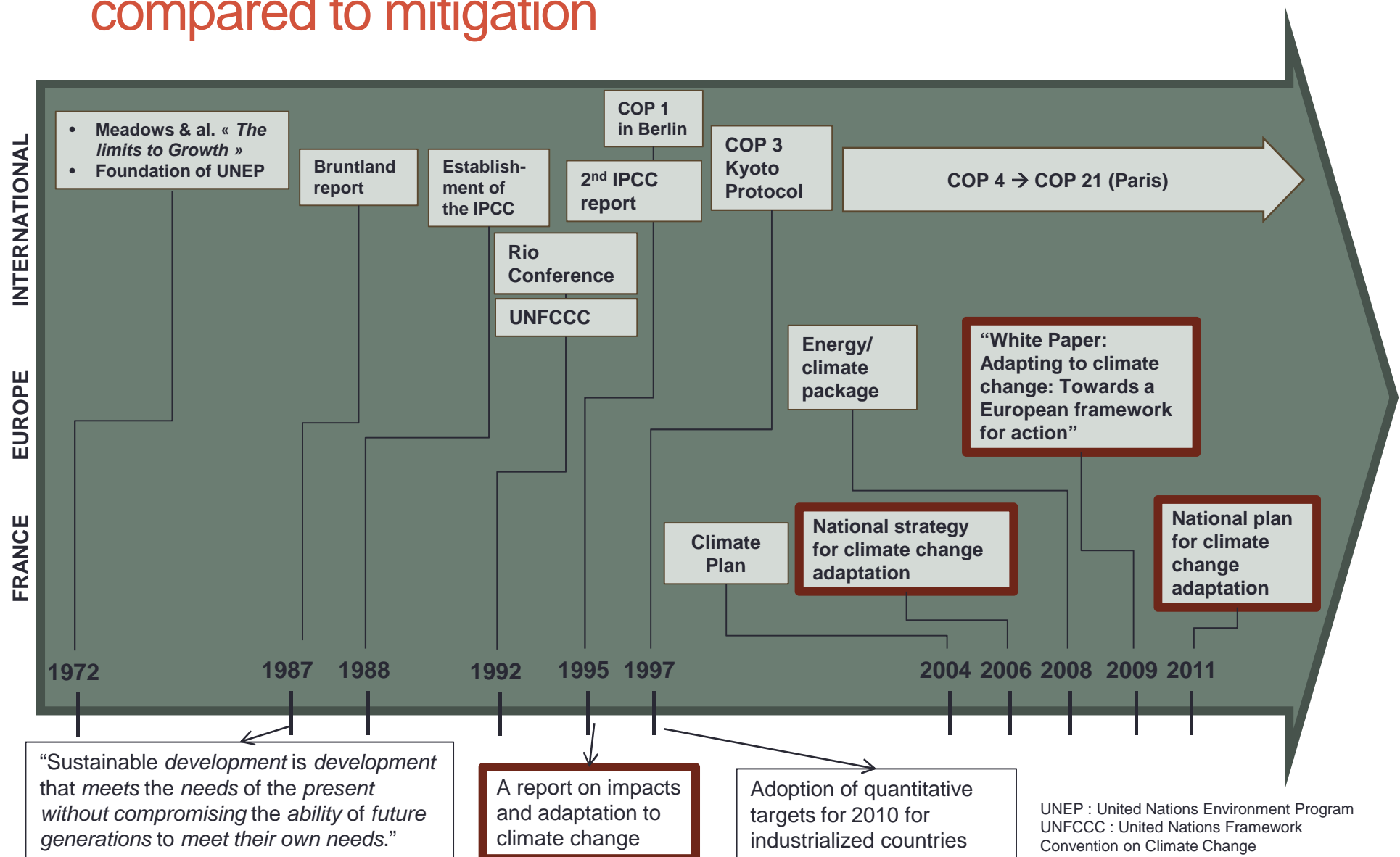
IPCC (2013)






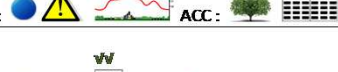
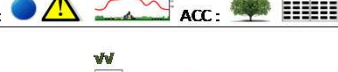
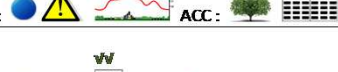
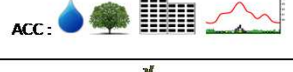
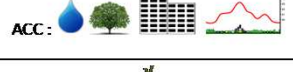
















Energy roadmap 2050, European Commission

?

Adaptation to climate change : a recent concept, compared to mitigation



French actors interested but uncommitted: underdeveloped tools

Méthodes	Thèmes pris en compte
HQE Aménagement	 Apart from ACC:
LEED for Neighborhood Development – LEED ND (Etats-Unis)	
BREEAM Communities (Grande-Bretagne)	
Référentiel aménagement durable de la Ville de Paris	 Apart from ACC:  ACC: 
Référentiel en aménagement urbain dénommé AURA (Améliorer l'Urbanisme par un Référentiel d'Aménagement) Guide développement durable de Montpellier	 ACC: 
Méthode HQE ² R et le système ISDIS	
RST02	 Apart from ACC:  ACC: 
Approche Environnementale de l'Urbanisme – AEU	
Démarche Ecoquartier – Grille concours EcoQuartier – Label EcoQuartier	 ACC: 
@d aménagement durable®	
CBDD®2013	 Apart from ACC:  ACC: 
<p><u>CUTLINE</u></p> <p>Presence of elements on ACC</p> <p>∨ indirectly involved ∨∨ involved</p> <p>Solutions, thematic and related fields involved</p> <p>  Crisis situation, risk  Built environment  Vegetation  Urban heat island  Water </p>	

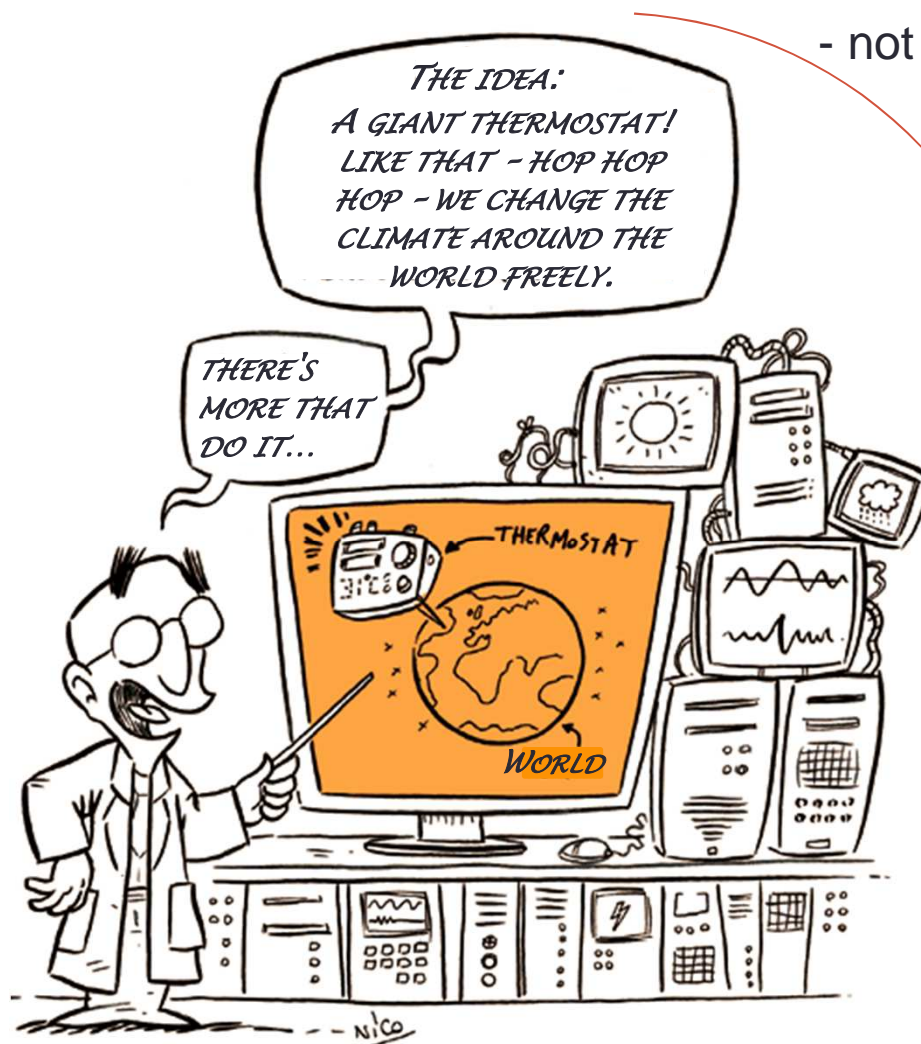
On the scale of urban developments, actions may be brought and allow to adapt to climate change (CC) without this primary purpose.

A review of 13 existing tools for the assessment or environmental monitoring of urban development projects shows :

- ✓ a very limited consideration of adaptation to climate change,
- ✓ but an important interest for summer comfort.

Presence of issues, objectives, actions, criteria or indicators related to ACC

French actors interested but uncommitted: underdeveloped tools

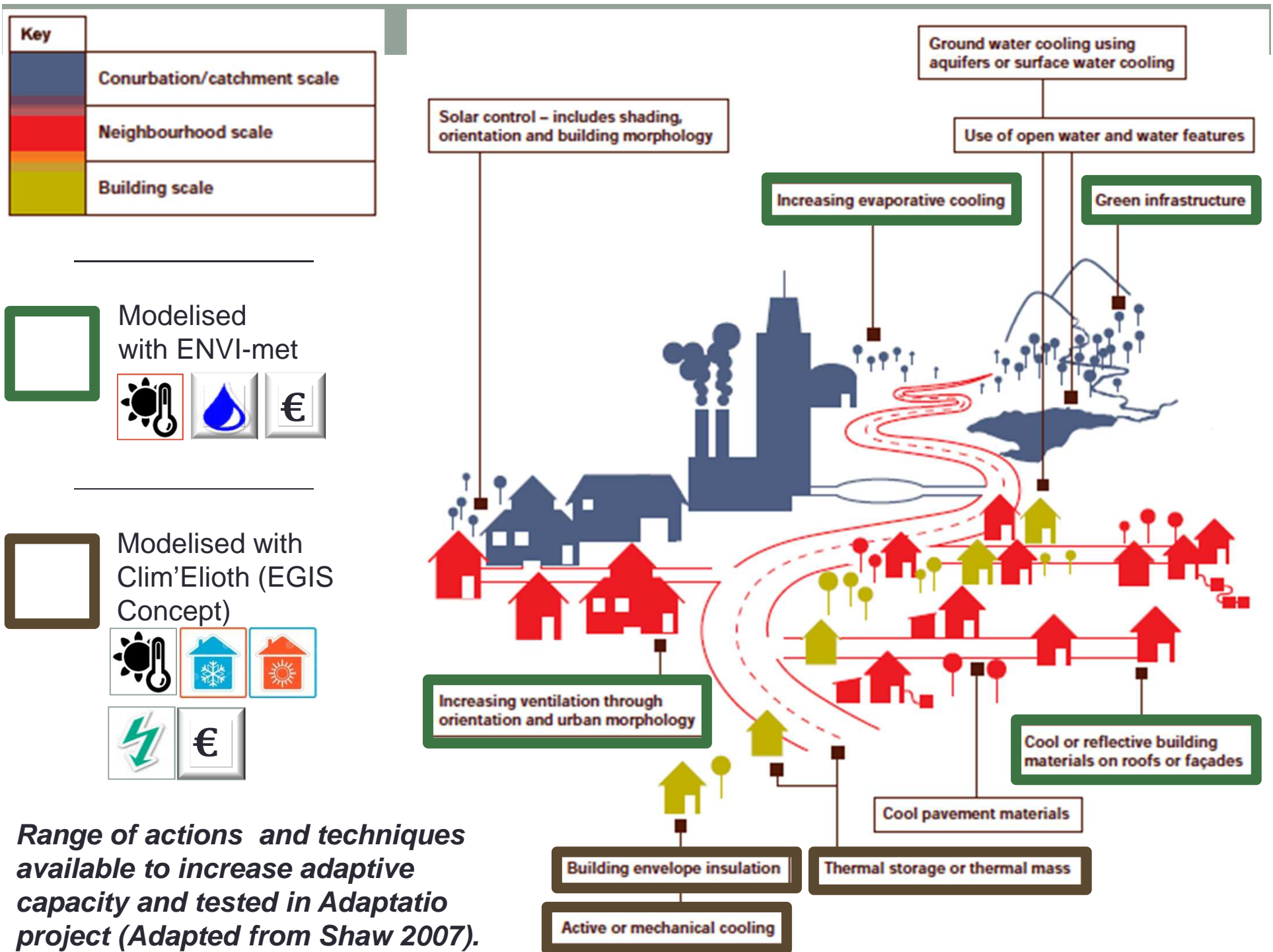


- not expect everything from the sciences,
- difficult to understand the scope of our actions
- uncertainty
- no reproducibility solutions

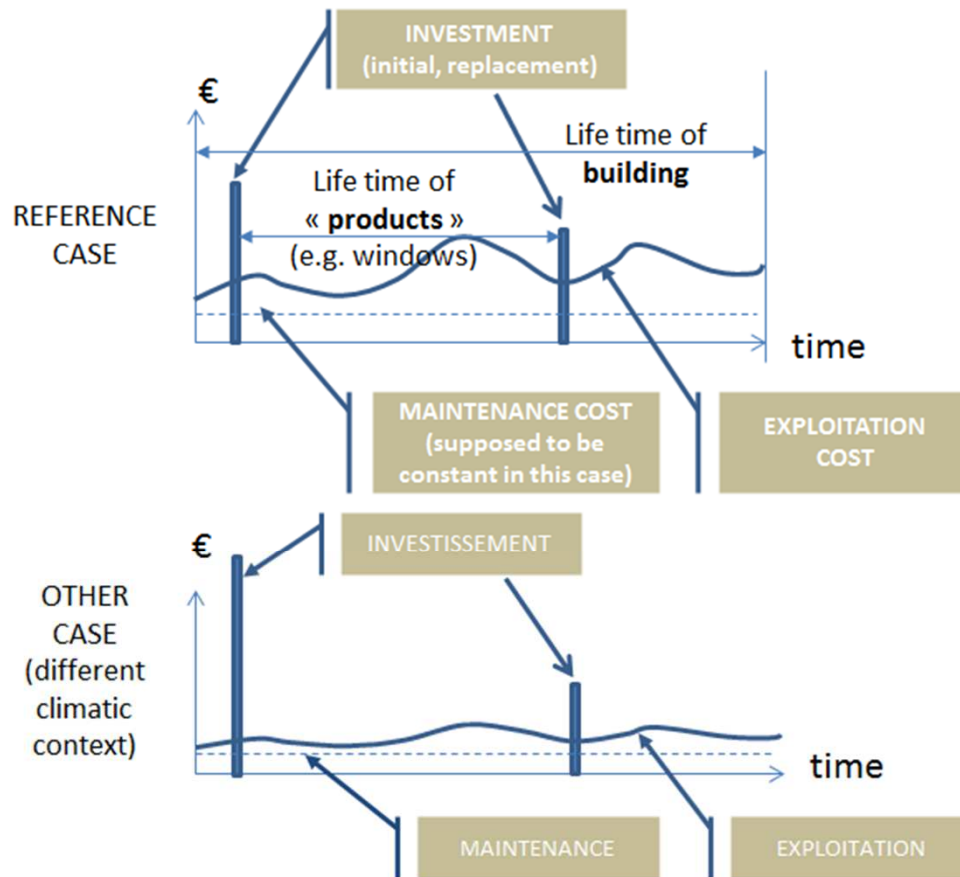
➔ But scientists could offer new information, new tools...

ADAPTATIO project :

- 2 climate change scenarios
 - A1B (moderate)
 - A2 (pessimist)
- Increase of energy prices
- 2 key resources : **water and energy**
- Economic evaluation
- A real urban project



Evaluation of energy, water and economic vulnerabilities to CC



- (Theoretical) EXTRA-COST = COST "OTHER CASE" (investment + maintenance + exploitation...) – COST "REFERENCE CASE" (investment + maintenance + exploitation...)
- Difficulty to choose actualisation rate => simplified assumptions
- Annual EXTRA-COST = COST "OTHER CASE" (maintenance + exploitation) – COST "REFERENCE CASE" (maintenance + exploitation)
- And comparison of investment costs

The choice of technologies to produce heat or cold will then condition the investment costs and those due to energy consumption.

Principles of reasoning for the analysis of the extra cost (CDC Climat)

Results

- ✓ **A toolbox** with Tolbiac Chevaleret results
- ✓ **The solutions optimizing energy needs due to air conditioning retain their "energy advantage" with climate change**, such as air coupling, simple natural ventilation opening and Canadian well.
- ✓ *A priori* **no solution allows to minimize all costs** throughout the project lifetime. It is thus necessary to make choices between time and the amount of costs to be supported (excluding the entity that supports these costs and other considerations such as social or political acceptability).
- ✓ **Actors interested but uncommitted**: the ACC is not listed in the specifications of current or planned in the short term projects, the course and the daily follow up are already very complex. The uncertainty surrounding the intensity of future climate change does not facilitate their consideration during projects.

A project with many perspectives!

This project opens up many perspectives:

- ✓ Organizing the exchange between scientists and professionals to develop an operational approach of adaptation to climate change,
- ✓ Refine the economic approach on adaptation in exploring contrasting scenarios of influential factors,
- ✓ Integrate other indicators such as greenhouse gas emission level associated with the technical solutions,
- ✓ Open the possibility of involving future users of the district to the choice of adaptation options through enhanced visualization capabilities and an educational effort on presentation of simulation results,
- ✓ Create the conditions for the mobilization of "design-thinking" methods by enhancing tools like ADAPTATIO toolbox as a support to the intervention of specialized designers that help facilitate discussion and innovation.

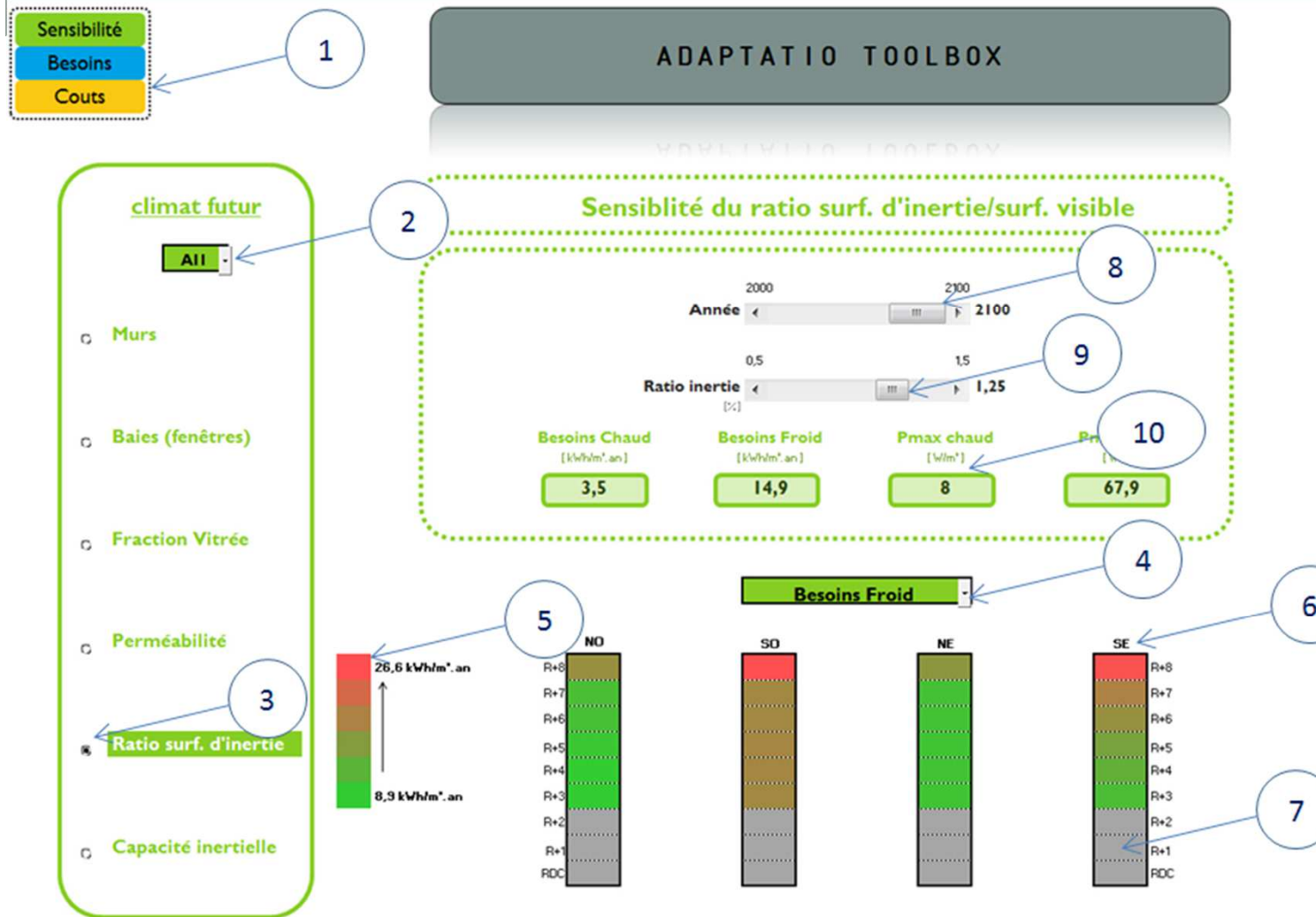


*Thank you for your
attention*

morgane.colombert@eivp-paris.fr



ADAPTATIO



- 1: generic links to "click" to access one of 3 results publishers
- 2: Choice of the "desired future climate" scenario (A1B and A2).
- 3: Scenario Selection "sensitivity parameters to test." When choosing a parameter, the others are automatically fixed to the median value.
- 4: Choice of the scenario "type of needs to test" (heating needs or cooling needs).
- 5: Scale Indication of needs (Scale adjusts automatically when scenario changes)

- 6: Display of the results depending on the floor and orientation of inside spaces.
- 7: The gray levels indicate (for information) the floors of shops and activity programs (not studied in our project).
- 8: Cursors to compare results for different year (2000, 2050 or 2100).
- 9: Cursors to compare different values of performance parameter chosen according to the climate target year (2000, 2050 or 2100). As seen above, the cursor has 5 graduations which describes a value-performance center, one extreme to + 50% and another 50%.
- 10: Indicator results displayed on average for the entire building program.