IEA Annex 77 (?)

Smart overheating prevention and

Resilient Cooling

in changing urban climates

Peter Holzer

Institute of Building Research & Innovation
Vienna, Austria

Challenge

- Urbanisation and densification, together with climate change raise issues of overheating prevention & resilient cooling.
- The phenomenon of an increasing need for cooling is relevant for both new and existing, residential and commercial buildings in all densely populated areas all over the world.
- The rapid development towards overheating and cooling need of homes is a global and multi-dimensional issue …

Challenge

- Energy System Issue: Worldwide energy demand and peak-loads for air-conditioning is rising at dramatic speed, rising the danger of blackouts and grid instability and compromising the implementation of green electricity production.
- Public health: Suffering from heatwaves without protection from decently designed homes not only is an issue of comfort but of health.
- Sociocultural issue: Low-income people are most vulnerably exposed to heat stress, e.g. living in dense and polluted urban areas, in poorly designed homes without air-conditioning

Chance

- This global challenge calls for concerted action;
  not at least at technological level.
- Cooperative research towards resilient cooling technologies offers realistic options for both tackling the challenge and furthermore boosting appropriate technological development.
- From today's point of view, promising fields of technical development are expected in the following areas …

Possible Developments

- Passive cooling, prevailingly at low-cost-level, ready for application in refurbishment, increasing the robustness against heatwaves. **E.g. effective sun protection, reflective coatings, effects from plants**
- Natural cooling, not at least for temporary and local cooling. **E.g. night ventilation together with PCM, comfort ventilation, including adiabatic effects**
- Active cooling devices, energy efficient and adaptive, ready for use in renovation, possibly including heat storage effects for increased robustness and for lowering/shifting peak-loads. **E.g. Low exergy cooling emitters. Low ΔT chillers, personal comfort control**
- Combined heating & cooling solutions, making use of low energy cooling and heating and seasonal heat storage, **E.g. borehole heat exchangers together with GSHP and free-cooling**

Annex Scope

- *How can resilient and carbon neutral technologies be developed and implemented to face the challenge of building overheating prevention and cooling in dense urban surroundings?*
- Emphasis shall be put on energy-efficiency as well as resilience: robustness against weather extremes, robustness against blackouts and accessibility for people with low income and applicability to existing, poorly constructed flats.
- The annex will address both residential and non-residential buildings, however, these two sectors will be treated separately. The Annex will address both new constructions and renovation.
- The Annex will welcome contributors from all climate zones, taking advantage of learning from and further developing very specific approaches and solutions.

Annex Subtasks

The Annex will be structured in three Subtasks

A Knowledge Base

B Solutions

C Case Studies

Subtask A: Knowledge base

- Decision making toolkit: Develop a set of criteria for the specific applicability of solutions for overheating prevention and resilient cooling. Driven by parameters such as climate, air-quality, noise level, building construction, building-use.
- Local Climate Effects: Investigate the quantitative effect of the building's adjacent micro- and meso-climate to building design: urban heat islands, evapotranspiration from green façades, warm upwinds at dark facades and others. Develop amendments to general climate data sets.
- Health impacts: Develop a comprehensive excerpt of up to date knowledge regarding health impacts of heat-stress.

Subtask B: Solutions

- Passive cooling, prevailingly at low-cost-level, ready for application in refurbishment, increasing robustness against heatwaves.
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Subtask C: Case Studies

- Provide a set of well documented case-studies, including a wide variety of solutions from all possible climate zones. The case studies shall not only illustrate the variety of possible solutions and encourage further application.
- Carry out post occupancy performance evaluations, additional to the case-studies, wherever possible. Explain best practise as well as limitations and learnings.

The Plan

- Write the Annex concept proposal: Done
- Send it to the IEA EBC Program's Executive Committee: Done
- Present it at the ExCo's Ottawa meeting at Nov 8th, 2017 hopefully getting the decision of acceptance. Scheduled

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- 1 year preparation phase until Nov 2018
- 3 year working phase until Nov 2021
- 1 year reporting phase until Nov 2022

Outlook on Preparation Phase

- Formulating national research items
- Formulating overarching research items
- Raising money
- Team building

- Starting in Jan 2017
- Virtual Communication via Mailing List, dropbox, webmeetings
- Real Communication at workshops, adjacent to topical conferences
- Final preparation workshop at AIVC 2018, Antibes Juan-Les-Pins
- Decision upon Annex working phase by ExCo in Nov 2018

The Invitation

- You are very much invited to consider joining the new Annex. If so, please …
  - Let me know: peter.holzer@building-research.at
  - Let your ExCo representative know, before Nov 8th !! http://www.iea-ebc.org/contacts/
- Interest so far from Australia, Austria, Belgium, China, Denmark, France, Italy, Japan, Netherlands, Great Britain

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Thank You !