Highlights of the workshop

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Maria Kapsalaki, INIVE

International Workshop on summer comfort technologies in buildings
9-10 March 2016, Athens, Greece
Main topics

- General context
- Solar control
- Ventilative cooling
- Standardisation
- Cool roofs
GENERAL CONTEXT
Challenges for sustainable summer comfort (M. Santamouris, NKUA)

• Detailed presentation showing challenges of thermal comfort for our societies, including:
  – Mortality and well-being, in particular for vulnerable persons
  – Economy (A/C industry represents ~ US$ 100 billion, some new technologies require significant investments)
  – Environment (energy use and CO2 emissions)
• Stressed that these problems increase with global and local climate change
• We should invest in R&D to transform these problems into opportunities
Overview of technological development in passive cooling and high efficiency active cooling (J. Molina, Seville University)

• Cooling was not originally considered in standards (cf. EN 832) and North European policies

• Now, a major challenge is to keep our buildings sufficiently cool (even in Northern EU) during a significant fraction of the year

• Solar shading, inertia, ventilative cooling should be prioritized to deal with cooling needs before active systems are considered
Crossroads between architecture, urbanism and renewable energy sources (N. Fintikakis, Synthesis & Research Ltd)

- Tremendous change in the philosophy of architecture
- Social acceptance of extended use of RES in architecture should begin from the urban scale
- Stressed the critical constraints set by the urban environment
Policies and instruments for increasing buildings energy efficiency (M.Karavasili, Citizens Inspectorate for Sustainable Development)

• An overview of energy savings policies implemented in Greece

• Results of “Energy Efficiency at Household Buildings” Program

• 2 energy inspections
  - Ex ante: First EPC + proposal for interventions with cost analysis
  - Ex post: Second EPC + verification of implementation of interventions & energy saving results

Program Results (to date)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Applications</td>
<td>251.570</td>
</tr>
<tr>
<td>Number of loan pre approval (credit control)</td>
<td>133.628</td>
</tr>
<tr>
<td>approved applications</td>
<td>50.175</td>
</tr>
<tr>
<td>loan agreements</td>
<td>45.558</td>
</tr>
<tr>
<td>Completed applications</td>
<td>42.780</td>
</tr>
</tbody>
</table>
A Greek study on quality of works, compliance with existing legislation and reliability of EPC data (T. Karlessi, NKUA)

- 26 buildings residential and non residential buildings (new and renovated)
- Often discrepancies between EPC input data and as-built characteristics
- Reasonably good quality of the works based on airtightness and IR measurements as well as site visits
SOLAR CONTROL
Characterisation of solar control properties - compliant product data (Wouter Beck, Ascendilex)

- Dynamic Energy Modelling output depend on reliable input
- Several standards are available to characterize solar shading data
- Use of solar shading data varies considerably between countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Shading in BC or EPB</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Prevention of overheating</td>
<td>$F_c = 0.15/0.25/0.5$ or 13363 g-value</td>
</tr>
<tr>
<td>Belgium</td>
<td>Prevention of overheating</td>
<td>$F_c = 0.50/0.60/0.9$ or accredited value</td>
</tr>
<tr>
<td>Denmark</td>
<td>yes</td>
<td>Actual g-value, automatic/manual</td>
</tr>
<tr>
<td>Finland</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>detailed</td>
<td>At least 24 actual values, aut./man.</td>
</tr>
<tr>
<td>Germany</td>
<td>yes, DIN 4108-2, 18599</td>
<td>Actual $F_c$ value</td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Prevention of overheating</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>Yes, UNI 11300 (13790)</td>
<td>Actual g-value, ext.</td>
</tr>
<tr>
<td>Malta</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Yes, NEN 7120 (13790)</td>
<td>Ext: $F_c = 0.3$</td>
</tr>
<tr>
<td>Norway</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>Yes</td>
<td>Default values</td>
</tr>
<tr>
<td>Portugal</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Yes</td>
<td>Actual g-value</td>
</tr>
<tr>
<td>Sweden</td>
<td>No (no EPB calculation)</td>
<td>Dynamic Simulation</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Yes</td>
<td>Default g-values</td>
</tr>
<tr>
<td>UK</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
ES-SDA solar shading products database (Dave Bush, ES-SO)

- ESS-DA provides g-values, visible reflectance and transmittance, U-values, visual comfort descriptors for windows fitted with solar shading using EN and ISO norms
- ESS-DA can feed all national calculation methodologies & dynamic energy simulation codes
- All ESS-DA data is validated and peer reviewed
- Few accredited labs... procedure for non-accredited or manufacturer testing, inter-lab comparison
Quality of system and the works of solar shading devices (Ann Van Eycken, ES-SO)

- Training: FI, SE, NL, AU, FR, and also by ES-SO (basic level in 2016, expert in 2017)
- Recognition/certification of persons/companies: FR (pre-condition to subsidies), UK
- Technical approvals / labels concerning the components and systems: CSTB label, Minergie label

National Occupational Standard (NOS) developed for blind and shutter trade:
- Install internal blinds or solar shading systems
- Install external blinds, screens or solar shading systems
- Service or maintain blinds, screens or solar shading systems
VENTILATIVE COOLING
Status on ventilative cooling (P. Heiselberg, AAU)

- Overheating is not only a summer concern. Cooling is increasingly linked to loads, less to losses.
- Solar shading and ventilative cooling are sustainable measures that are able to reduce overheating risk.
- Control strategies significantly influence the performance of these solutions.
- Solutions for commercial buildings exist (diffuse ceiling with mechanical or natural ventilation).
Assessment of ventilative cooling and solar shading (I. Pollet, Renson)

- Regulation is crucial to break the CATCH 22 circle, which is a barrier to the market penetration of ventilative cooling
- Reliable, uniform and affordable database is crucial for solar shading
- Concerns with:
  - eco-design in terms of transparency and relevance
  - inconsistencies in the definition of renewable energy systems: if heat pump energy is partially considered renewable, why not ventilative cooling?

### Representative climate

- Significant difference if based on 20th century data

### Model build up

- Possibility of detailed calculation to prevent barriers

### Time step – zoning

- What is the added value (France ?)
Ventilative cooling in Spain (J. Molina, Seville University)

• Ventilative cooling is not based on components that can be certified; it is based on strategies.

• The effectiveness of heat removal by ventilative cooling depends on actual losses and utilisation factor, which depend on the thermal inertia.

• Buildings are poor regenerative heat exchangers.
Some key aspects to consider ventilative cooling in energy performance regulations (F.R. Carrié, ICÉE)

- In most European countries EP-calculation tools do not fairly consider ventilative cooling
- The new EPBD set of standards gives models to implement ventilative cooling, but there are missing elements
- Unambiguous definition of input parameters and ways to check those input parameters are pre-requisites for compliance checks
- FprEN 16798-7 gives a checklist that can be useful for quality control and compliance checks. First attempt... to be evaluated
STANDARDISATION
Status of CEN work on the new set of EPBD standards (J. Hogeling, CEN TC 371)

- The CEN EPB standards support the implementation of the EPBD in the EU MS’s
- Inputs/outputs are clearly defined, which should help implementation compliance checks
- Excel sheets are available to check calculation routines
- Monthly and hourly methods can be implemented
- Annex A/B mechanism offers flexibility for the MS to define their own default values
- 16798-1 covers indoor environmental quality and thermal comfort issues
COOL ROOFS
Recent progress on Cool Materials in Europe: The role of European Cool Roofs Council (D. Kolokotsa, ECRC)

- Cool roof benefits (AC savings ~ 10-40%, peak electricity demand, heat island)
- Overview of product development and testing (inc. ageing, reduction of heating penalty)
- Case studies with showing the benefits of cool roofs (surface temperature difference > 5 K)
- Need for awareness raising and clear information for the uptake of cool roof products

ECRC strategic objectives

- Formulation of cool roof product rating programme in Europe.
- Inclusion of cool materials in European Standards, Energy Assessment Methods.
- Promote the benefits of cool materials to engineers, stakeholders, etc.

http://coolroofcouncil.eu/
Policy and regulatory framework of Cool Roofs in European and International level (R. Evans, Huntsman International LLC)

• Do we need legislation? Yes, for the uptake of the cool roof market
• Key policy areas:
• ? Should be in EN ISO 52016-1 ...
Cool roofs standards and the ECRC product rating program (A. Synnefa, ECRC)

- Measurement of cool roof product characteristics (solar reflectance / IR emittance)
- Towards a EU standard - interlaboratory comparison between 12 labs
- Little difference in general between methods and standards:
  - Solar reflectance: 0-4% SR difference between ASTM and EU standard, some can be attributed to difference in solar spectra used
  - Absolute difference < 0.08 on IR emissivity depending on method
- On-going process to rate products according to standards adopted by ECRC
- Perspectives on ageing assessment
- ... raised several questions/concerns in the audience
Cool Roofs Markets and practical experiences (Heinz Meier, Sika Services AG)

- White and highly reflective roof systems with initial SRI’s > 110 are standard - maintaining a high level is the key

- Significant reductions of SRIs (~10-50% after ageing or soiling) were observed
Some remarks

• In general, rather new technologies for regulations although there may have been a lot of scientific work
• Often complex to properly consider in calculations
• This can be a barrier to effective compliance checks
  — => input data and checks should focus on key parameters
• Compliance and quality issues are probably not fundamentally different than for other technologies
Next discussion places

- Ventilation and airtightness: LUND, 16-17 March 2015
- Sustainable summer comfort: ATHENS, 9-10 March 2016
- Transmission characteristics: TALLINN, October 2016
- Renewables in multi-energy systems: LYON, ~ January 2017
Next discussion places

The 3rd QUALICheck Conference will take place in Brussels, Belgium, on 10 May 2016. The conference will cover, among others:

- Lessons learned from new QUALICheck studies regarding quality of the works and compliant data for Energy Performance Certificates (EPCs)
- Guidelines for robust legal frameworks for better enforcement of EPC regulations
- The potential impact of Building Information Modelling (BIM) uptake regarding EPC calculations
- Energy Performance of Buildings Directive (EPBD) related databases
- Initiatives to ensure quality of the works

Registration to the 3rd QUALICheck Conference is free and is now open here.

Watch this space for more details to be announced soon.

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