IEA EBC Annex 62
Ventilative Cooling

Ventilative Cooling
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The current development towards nearly-zero energy buildings have lead to an increased need for cooling – not only in summer but all year.

Elevated temperature levels are the most reported problem in post occupancy studies, especially in residences - even in the “heating season”

There has been a large focus on reducing the heating need in buildings. There is also a need to address the cooling need and to develop more energy-efficient cooling solutions.

Utilization of the cooling potential of outdoor air can be an attractive and energy efficient solution (cooling is correlated with solar and internal heat load and not outdoor temperature)
Home for life, Lystrup, Denmark

Source: Ellen Katrine Hansen, VKR
Temperature Levels – Living Room

Reference: Esbensen
Improved Control and Operation

Reference: VELUX og Esbensen
Why do we have a overheating problem?

- A “new and increasing problem” for high performance residential buildings in cold and moderate climate

- No (very few) standard technical solutions available, especially for dwellings

- No (very limited) user experience on handling of overheating problems - “one-of-a-kind” solutions are often not well-adapted to “practical use”

- Use of too simplified design methods – no correlation between cooling need and overheating risk
Ventilative Cooling in Offices

- Always a cooling need during occupied hours

- Cooling is not a new technology, but the need for cooling is increasing and more efficient systems have to be developed to fulfill future energy requirements

- Application of the free cooling potential of outdoor air is widely used in mechanical ventilation systems, while the use in natural and hybrid ventilation system is still limited in many countries
Web Seminar

OFFICES IN COLD CLIMATE
Definition of Ventilative Cooling

- Ventilative Cooling is application (distribution in time and space) of ventilation air flow to reduce cooling loads in buildings.

- Ventilative Cooling utilizes the cooling and thermal perception potential (higher air velocities) of outdoor air.

- In Ventilative Cooling the air driving force can be natural, mechanical or a combination.
Ventilative cooling can be an attractive and energy efficient passive solution to avoid overheating.

- Ventilation is already present in most buildings through mechanical and/or natural systems using opening of windows.
- Ventilative cooling can both remove excess heat gains as well as increase air velocities and thereby widen the thermal comfort range.
- The possibilities of utilizing the free cooling potential of low temperature outdoor air increases considerably as cooling becomes a need not only in the summer period.
IEA EBC Annex 62
Ventilative Cooling
Annex Objectives

- To analyse, develop and evaluate suitable methods and tools for prediction of cooling need, ventilative cooling performance and risk of overheating in buildings that are suitable for design purposes.
- To give guidelines for integration of ventilative cooling in energy performance calculation methods and regulations including specification and verification of key performance indicators.
- To extend the boundaries of existing ventilation solutions and their control strategies and to develop recommendations for flexible and reliable ventilative cooling solutions that can create comfortable conditions under a wide range of climatic conditions.
- To demonstrate the performance of ventilative cooling solutions through analysis and evaluation of well-documented case studies.
Annex Outcome

- Guidelines for energy-efficient reduction of the risk of overheating by ventilative cooling
- Guidelines for ventilative cooling design and operation in residential and commercial buildings
- Recommendation for integration of ventilative cooling in legislation, standards, design briefs as well as on energy performance calculation and verification methods
- New ventilative cooling solutions including their control strategies as well as improvement of capacity of existing systems
- Documented performance of ventilative cooling systems in case studies
Annex Organization

- Subtask A: Methods and Tools
- Subtask B: Solutions
- Subtask C: Case Studies
Subtask A: Methods and Tools

- Will analyse, develop and evaluate methods and tools for prediction of cooling need, ventilative cooling performance and risk of overheating in buildings that is suitable for design purposes.
- Will give guidelines for integration of ventilative cooling in energy performance calculation methods and regulation including specification and verification of key performance indicators.
Subtask B: Solutions

- Will investigate the cooling performance of existing mechanical, natural and hybrid ventilation systems and technologies and typical comfort control solutions as a starting point for extending the boundaries for their use.

- Will develop recommendations for flexible and reliable ventilative cooling solutions that can create comfort under a wide range of climatic conditions.
Subtask C: Case Studies

- Will demonstrate the performance of ventilative cooling through analysis and evaluation of well-documented case studies.
Annex Leadership

- Participating countries
  - Austria, Belgium, China, Denmark, Finland, Greece, Ireland, Italy, Japan, Netherlands, Norway, Switzerland, UK, USA

- Operating Agent:
  - Denmark, represented by Per Heiselberg, Aalborg University

- Subtask A:
  - Leader: Switzerland, represented by Fourentzos Florentzou, ESTIA
  - Co-leader: Italy, represented by Annamaria Belleri, EURAC

- Subtask B:
  - Leader: Austria, represented by Peter Holzer, IBRI
  - Co-leader: Italy, represented by Lorenzo Pagliano, POLIMI

- Subtask C:
  - Leader: Greece, represented by Mat Samtamouris, NKUA
  - Co-leader: China, represented by Guoqiang Zhang, Hunan University
Overview and state-of-the art of Ventilative Cooling

- Ch1- Introduction
- Ch2- Potential and limitations to Ventilative Cooling
- Ch3- Ventilative cooling in existing Energy Performance Regulations
- Ch4- Exemplary existing buildings using Ventilative Cooling
- Ch5- Existing components and control strategies for ventilative cooling
- Ch6- Existing methods and tools

To be published at the Annex 62 website by the end of 2014
Thanks for your attention

More information on IEA EBC Annex 62 on www.venticool.eu