

Ventilative Cooling

Per Heiselberg
Aalborg University



Background

- 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

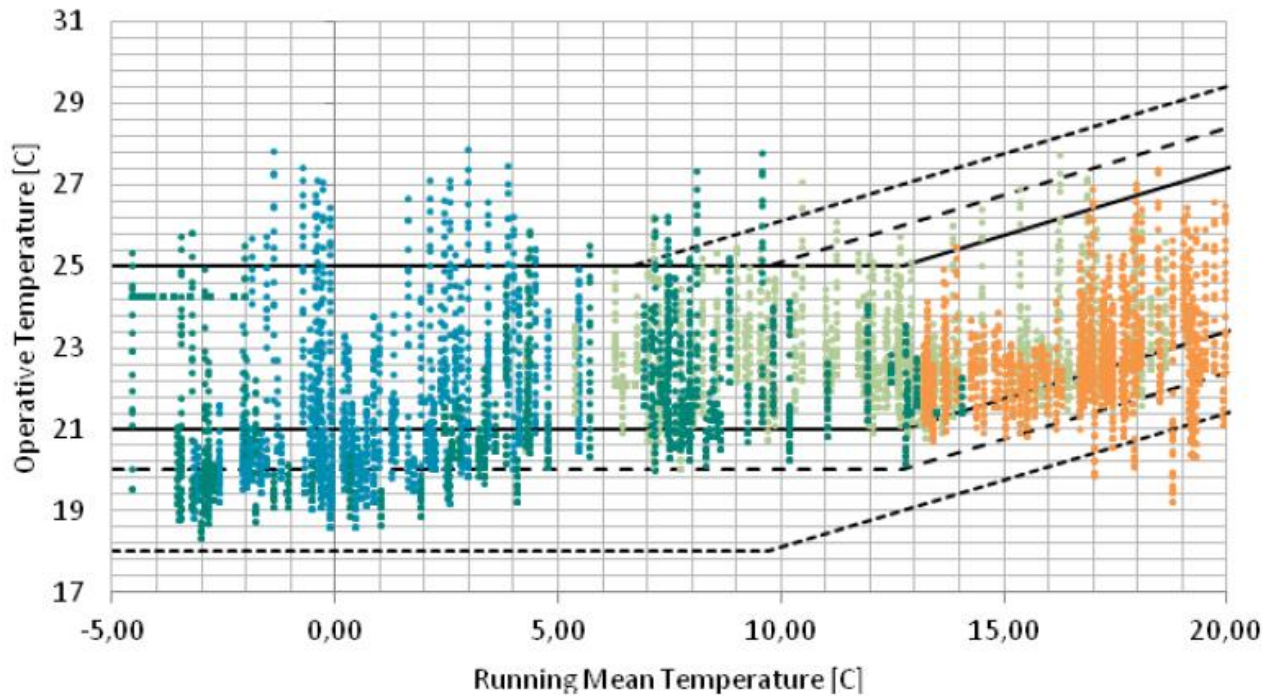
Why do we have a overheating problem?

- A “new and increasing problem” for high performance residential buildings in cold and moderate climate
- Use of too simplified design methods – no correlation between cooling need and overheating risk
- 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”

Overheating Risk – Living Room



— Category I - - - - Category II - - - - - Category III • Winter
 • Spring • Summer • Autumn



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

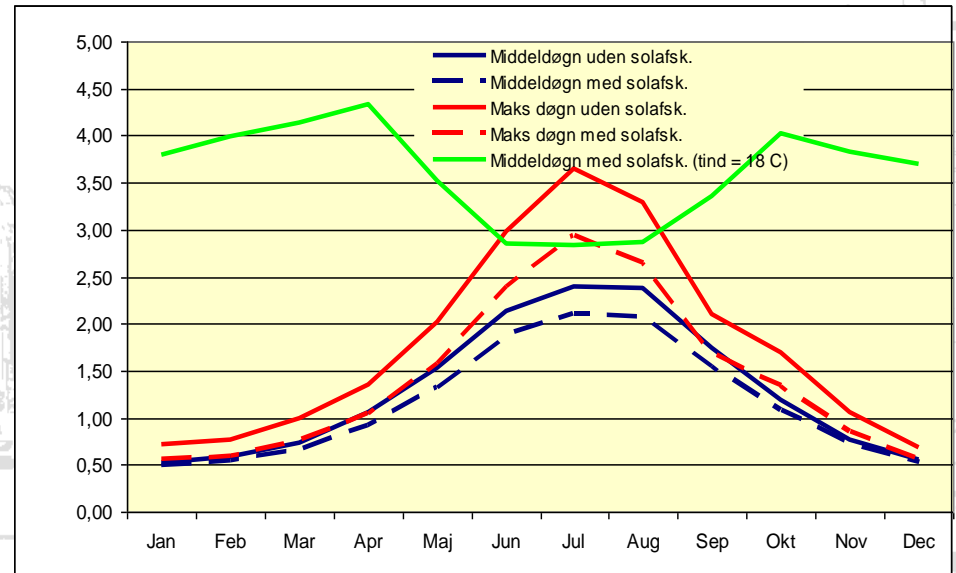
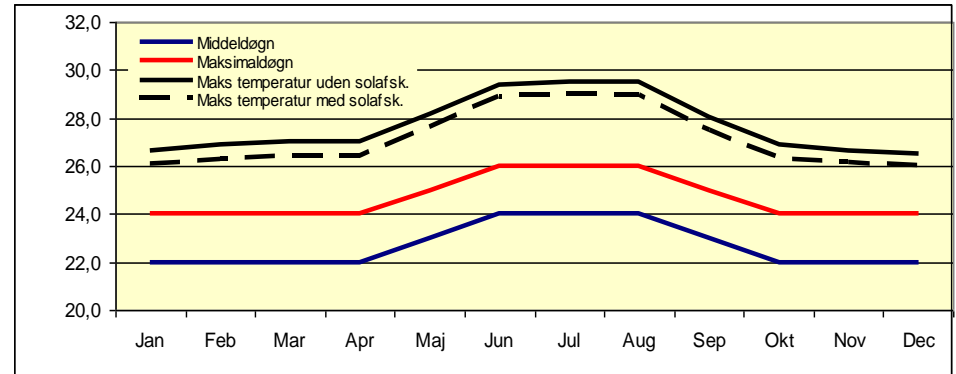


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Offices in Cold Climate



Challenges in a Cold Climate



IEA ECBCS Annex 62

Ventilative Cooling

A new international project under preparation



International
Energy Agency



International Energy Agency
Energy Conservation in
Buildings and Community
Systems Programme

A step on the way

In order to address these challenges we propose a new international research activity with the scope:

“How and when can strategies for energy-efficient ventilation reduce the cooling load while maintaining good indoor environmental quality?”

The Projects Definition of Ventilative Cooling

- Ventilative Cooling is application (distribution in time and space) of outdoor 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

Annex Objectives

- To analyse, develop and evaluate suitable design methods and tools for prediction of cooling need, ventilative cooling performance and risk of overheating in buildings (Subtask A).
- To give guidelines for integration of ventilative cooling in energy performance calculation methods and regulations including specification and verification of key performance indicators (Subtask A).
- 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 (Subtask B).
- To demonstrate the performance of ventilative cooling solutions through analysis and evaluation of well-documented case studies. (Subtask C).

Annex Outcome

- Guidelines for energy-efficient reduction of risk of overheating
- 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: Tools and guidelines
- Subtask B: Solutions
- Subtask C: Case studies

