

Glazed Office Buildings Project

Energy and Indoor climate

Introduction and background

During the nineties many office buildings with single or double glass facades were built around the world. Despite the technological improvements of glazing systems, which have made these buildings possible there is still a large potential for both energy efficiency and indoor climate improvements.

The "Glazed Office Building" project started on January 2003 and will be finished on June 2007. The project involves participants from Lund Institute of Technology, WSP Environmental and SKANSKA.

Aim of the project

The aim of the project is to gain knowledge concerning the possibilities and limitations with glazed office buildings in cold climates, mainly with regard to energy and indoor climate. The project involves the following work packages:

- Further development of calculation methods and analysis tools
- Improvement of analysis methodology
- Calculation of life cycle costs
- Development of advice and guidelines for design/construction of glazed office buildings in cold climates
- Strengthening and development of competence concerning resource efficient advanced buildings in cold climates

Project Methodology

The project methodology is described in 3 steps:

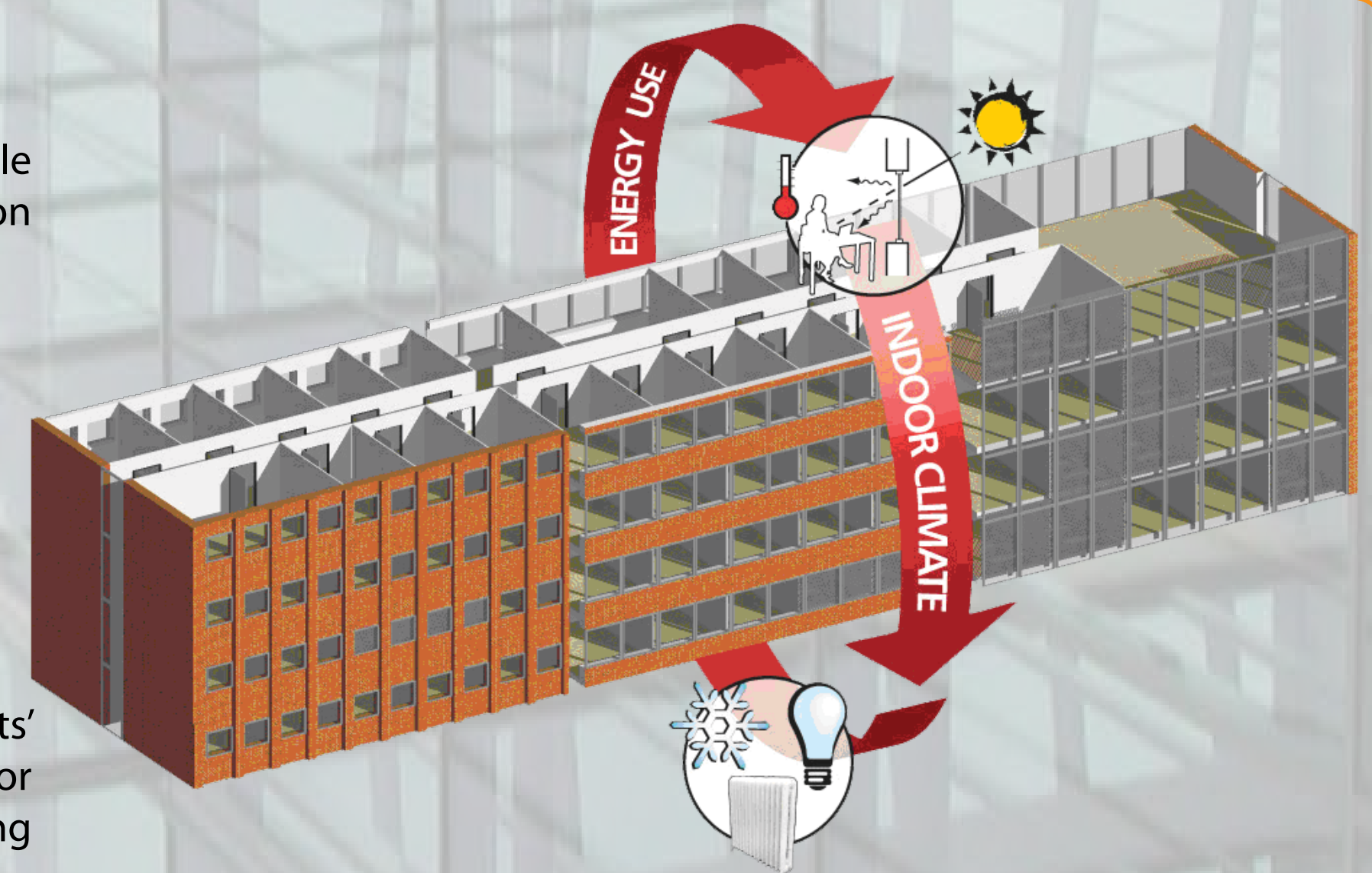
Energy Use and Indoor Climate Simulations for Single Skin Glazed Office Buildings

As reference building, an office building representative of the late nineties was chosen. Different possible glazed alternatives were determined for this building and simulated using the dynamic energy simulation program IDA ICE 3.0.

Interesting results were obtained through varying the:

- window to external wall area (30%, 60% and 100%)
- orientation of the building
- interior plan type (open plan and cell type offices)
- type of glazing and solar shading devices
- HVAC strategy

The different building models (over 100) were compared in terms of energy efficiency and occupants' comfort. Problems which occurred due to high energy use and poor indoor climate, are pointed out for different single skin alternatives. The daylight quality and quantity will be simulated. The energy use during the occupation stage will be used for the Life Cycle Cost (LCC) calculations



Parametric study of Double Skin Façade cavities

A parametric study of different Double Skin Façade cavities is carried out.

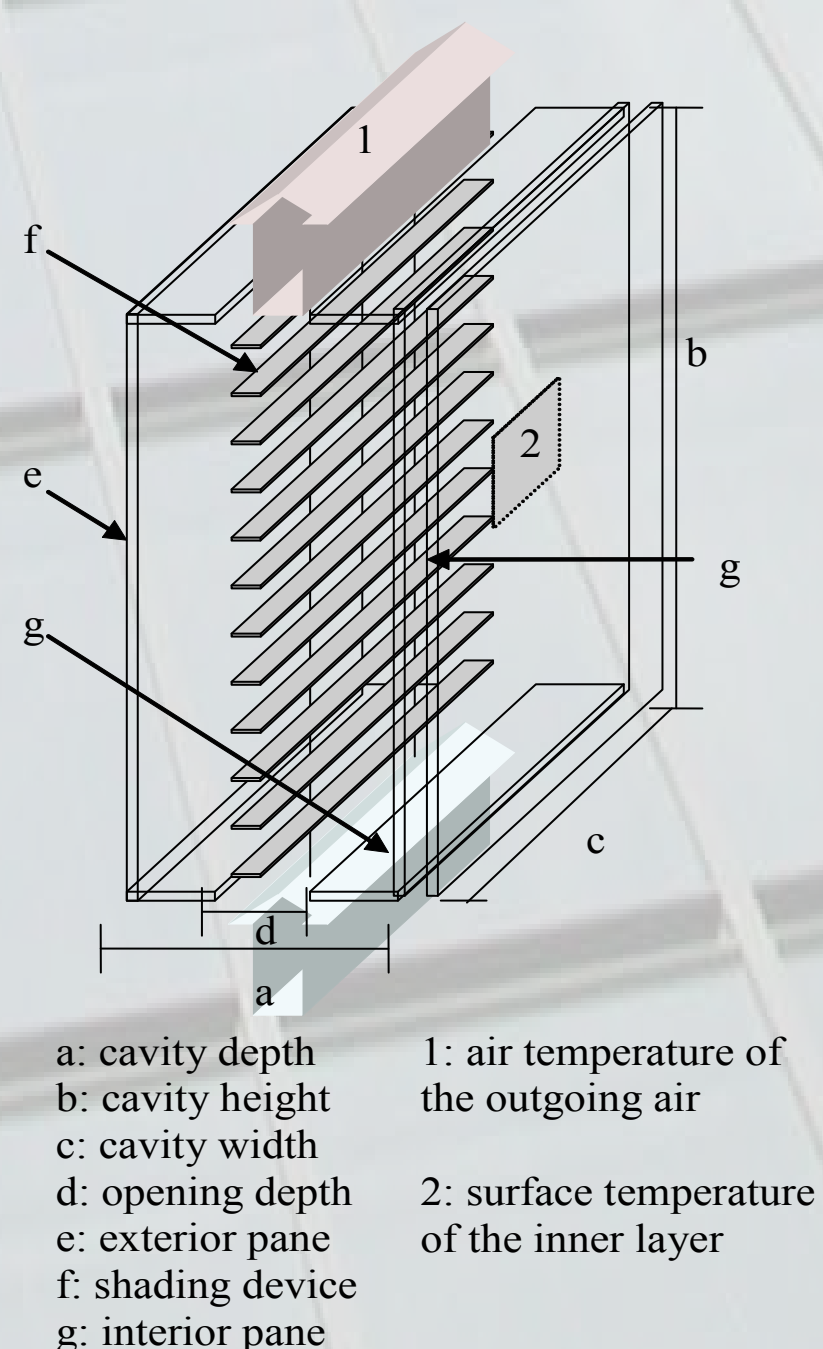
Parameters calculated are:

- ingoing and outgoing temperatures (energy use)

- temperatures at the inner layer (thermal comfort)

Parameters varied are:

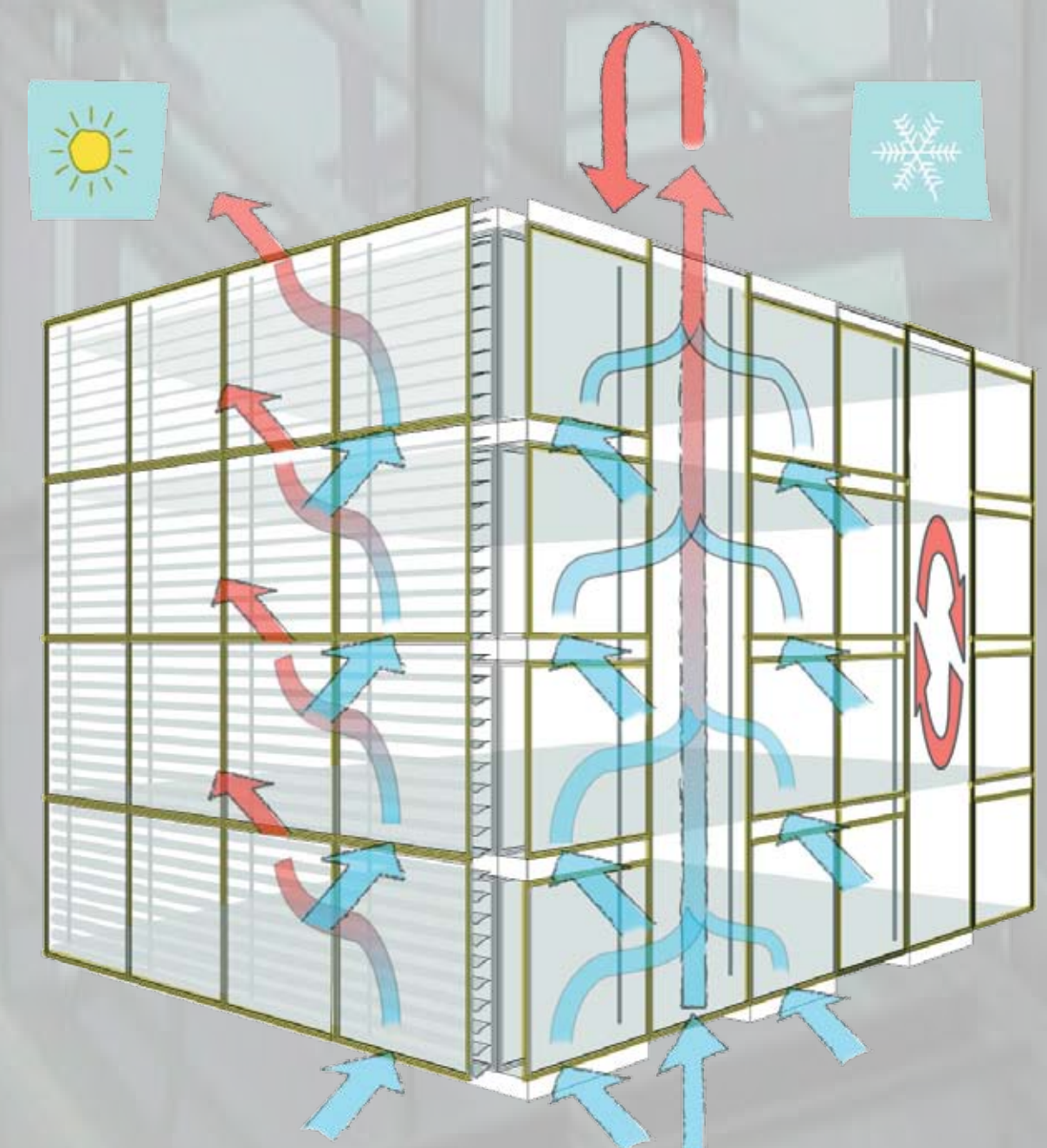
- Depth, (height) of the cavity
- Type, size and positioning of the openings
- Type and positioning of shading devices
- Type and number of inside, outside panes
- Ingoing temperature (depending on the use of the cavity)



Integration of Double Skin Façade in Buildings

The implementation of a developed Double Skin Façade model in IDA ICE 3.0 allows energy and indoor calculations during all year round. This means further development of the simulation tool.

Buildings with Double Skin Façade will be compared with ones with Single Skin facade during winter and summer conditions. Optimization (during all year round) of proper integration of Double Skin Façade systems in terms of energy use and thermal comfort will follow.



Improvements of Single Skin Glazed Office Buildings

Possible improvements will be studied e.g. Double Skin Facades, advanced glazing, daylightredirection, etc.

Publications - output of the project

1. Literature Review on Double Skin Facades for Office Buildings (2004)
2. Introduction for the Glazed Office Buildings project (2004)
3. Single Skin Glazed Office Buildings; Energy Use and Indoor climate Simulations (Licenciate thesis - 2005)
4. How to succeed with glazed office buildings in Sweden (2007)
5. Glazed Office Buildings - Energy Use and Indoor Climate (PhD Thesis - 2007)

The reports are available in the web site of the project

More information

Web address

www.ebd.lth.se (under "Glazed Office Buildings project")

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