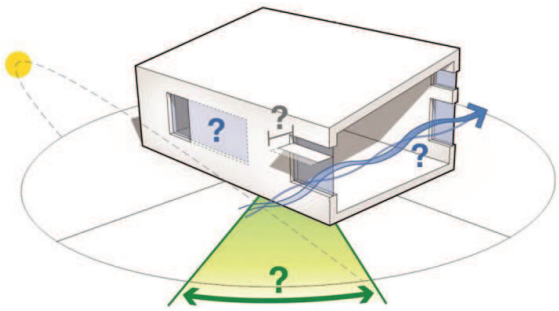
BLUE ENGINEERING

Dynamic building simulation

The development of energy-efficient buildings which are equipped to meet the challenges of the future requires the use of innovative design instruments. Dynamic simulations can optimally illustrate the combination of the many factors which influence building design as a result of which they are an indispensable tool of the integrated design process.

The use of energy for the thermal conditioning of a building is affected by a series of changing parameters throughout the year. Orientation and location, the form of the building and the characteristics of the building envelope determine the external influences. The use of the building services infrastructure and the internal heating loads affect energy demand in different ways during the course of the year.



Static calculations are unable to take account of the impact of the storage masses of a building.
This means that building plant is often oversized as a result of which investment costs are unnecessarily high and the plant operates inefficiently. Dynamic simulations can investigate how these dependencies vary over time and permit more realistic estimates of plant performance and the annual energy need of a building.

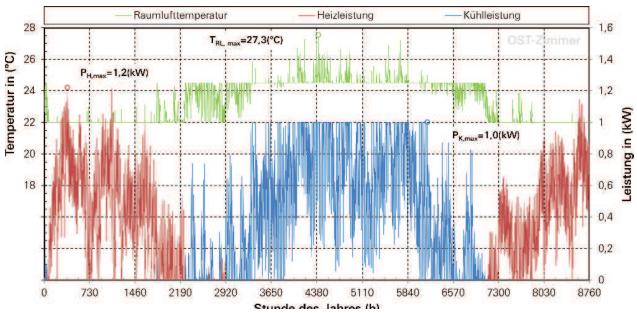
Approach

A prerequisite of dynamic thermal investigation is the creation of a three-dimensional model (e.g. from a BIM model). This model is fed with information about all parameters (such as room use, storage masses, controls, etc.). The heat generated internally by sources such as people, artificial light and equipment is realistically illustrated in the thermal zonal model.

The model is dynamically simulated on an hourly basis with the help of static weather data.

Advantages for clients and users

- Visualization of comfort conditions
- Annual energy demand for heating and cooling
- Simple investigation of alternative systems
- Help in decision-making for the design of optimized buildings including estimation of risk
- Optimization of plant operating hours
- Lowering of investment and operating costs through the analysis of variants (What if...?)



KEY FACTS

- **Visualization of thermal comfort**
- **Calculation of annual energy demand for heating and cooling**
- **Maximum summer temperatures in exposed areas**
- **Investigation of variants and alternative design approaches**
- **Investigation of alternative systems via the analysis of variants**
- **Thermal simulation for purposes of building certification**

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