

The “Building Design Days + Energy” Method

Introduction

The *Building Design Days + Energy (BDD+E)* method is a new approach for sizing heating and cooling systems in buildings based on extreme daily profiles—more accurately and realistically than with conventional standard-based methods. This enables efficient planning of heating and cooling systems, from the energy generators (e.g. heat pumps) to the room distribution systems—without the usual oversizing.

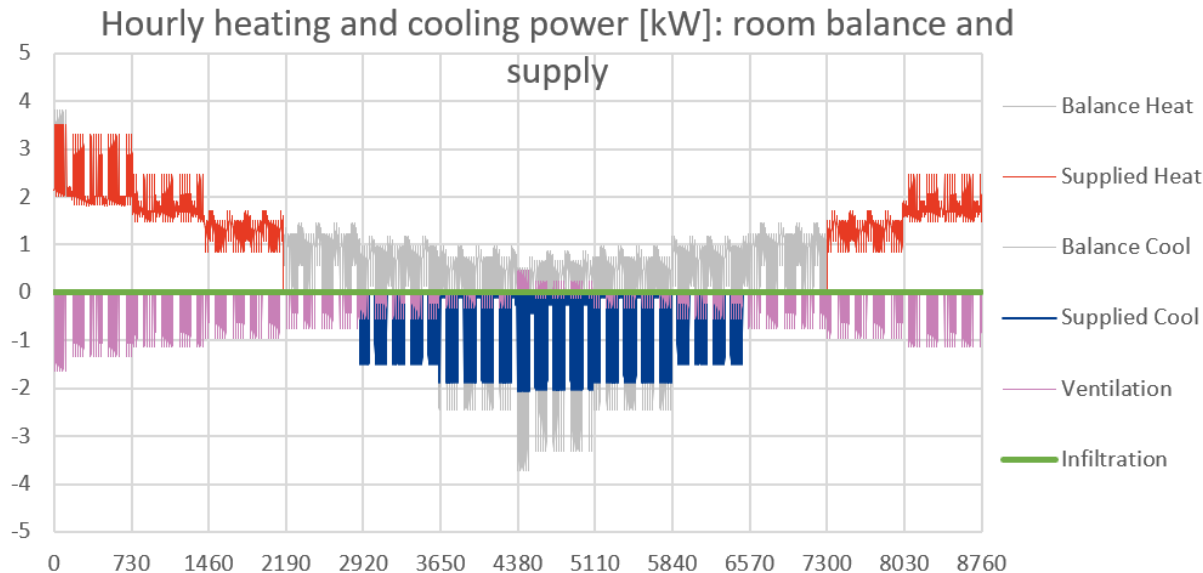
Sizing Heating and Cooling Based on Daily Profiles

The Building Design Days + Energy (BDD+E) method is a new procedure for design-oriented sizing of heating and cooling systems, extending all the way to room-side distribution and operating strategies, from which concrete specifications for building automation can also be derived.

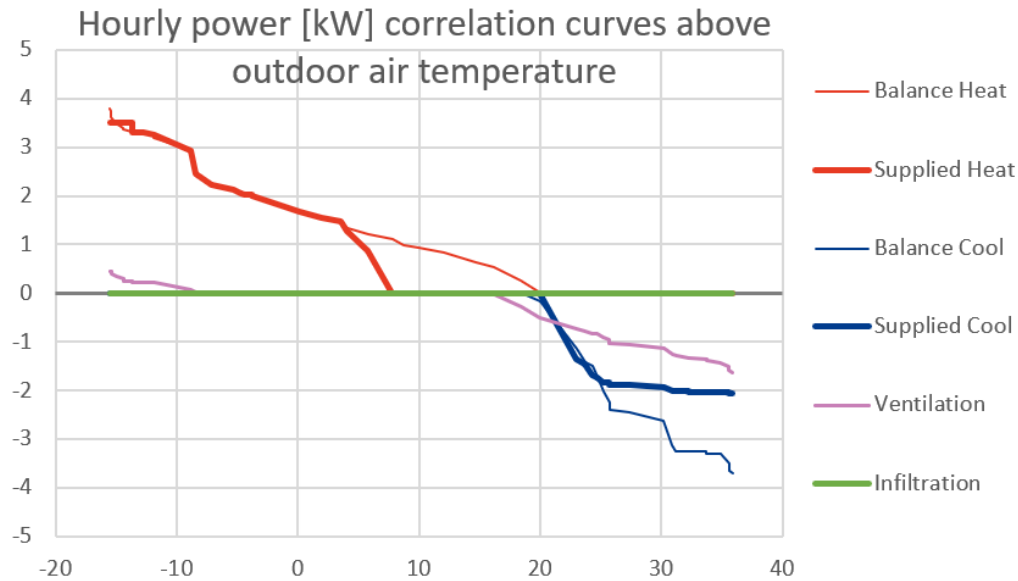
Although it uses the mathematical formulations from established standards (e.g. the equations for transmission and ventilation), it follows a fundamentally different approach: instead of relying on peak values from conventional heating and cooling load calculations—which typically result in oversizing—it focuses exclusively on the extreme daily profile in winter and in summer. The guiding principle is: If the system is properly sized for the extreme day, it will work for the entire year.

Accordingly, heating is sized on the basis of the extreme winter daily profile, and cooling on the extreme summer daily profile. The basis is an hourly static balance of heat sources and sinks, from which hourly load curves are derived for each of the 8,760 hours of the year.

This results in a more precise, realistic, and economically sustainable sizing—particularly relevant for heat pumps. Using manufacturer data (performance curves), efficiencies, capacities, and annual energy requirements can be determined.



▲ Fig. 1: Representation of the hourly heat balance with heating and cooling loads shown as annual curves.



▲ Fig. 2: Representation of the correlation between the heating loads (Supplied Heat) and cooling loads (Supplied Cool) provided by the room distribution systems and the outdoor air temperature.

Building Design Days + Energy: Relationship to Standards

Up to now, separate regulations exist for the calculation of heating, cooling, capacity, and energy (e.g. DIN EN 12831, VDI 2078, and DIN EN 18599 for the German Building Energy Act, as well as DIN 4108 Part 2), each with its own—and sometimes unrealistic—boundary conditions.

In contrast, the *BDD+E* method integrates capacity and energy calculation into one consistent framework based on a unified data set—providing an alternative to current regulations.

Further information and contact

The current state of development can be found in more detail here:

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