

TAB as energy storage in new construction with prefabricated panels

Dipl.-Ing. Thomas Friedrich
Innograti on GmbH
Bernkastel-Kues



Rhenania office building in Munich: prefabricated ceiling panels with TAB and integrated acoustics

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**Modern buildings with all-glass facades:
Heating and cooling only via the ceiling surface
No additional air conditioning units**

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Baramundi office building, Augsburg (Henn Architects)

All-glass facade, central courtyard for exhaust air

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Baramundi: Visible concrete soffit with component activation (TAB) and integrated acoustics (+ sprinklers)

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Flat slabs in in-situ concrete with embedded pipe registers for component activation (TAB) (starting in 1980)

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Alternative air conditioning with split units! Facade design?

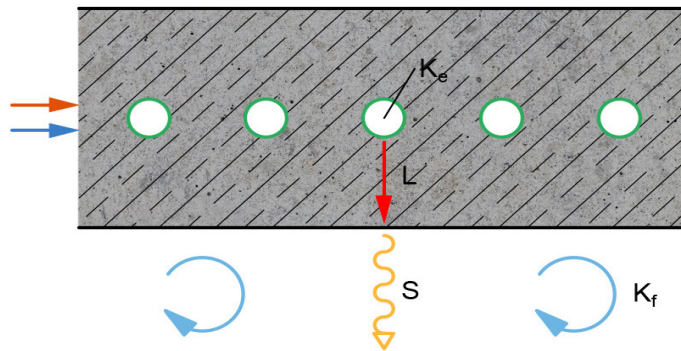
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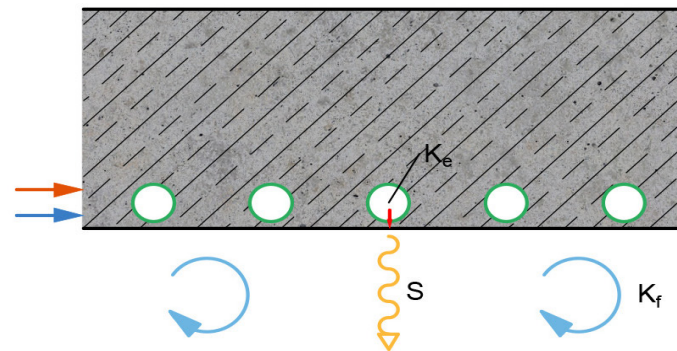
Comparison of ceiling cross-sections for optimal component activation (TAB)

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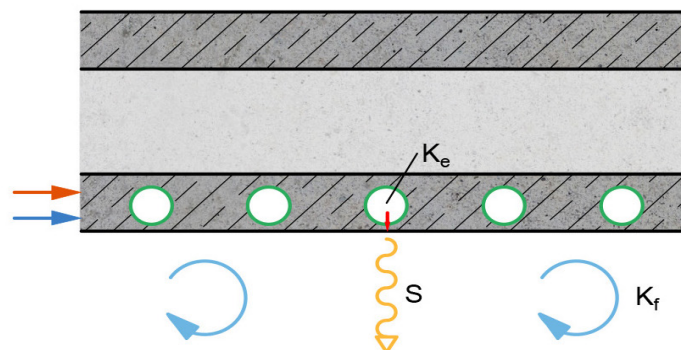


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K_e = erzwungene Konvektion

K_f = freie Konvektion

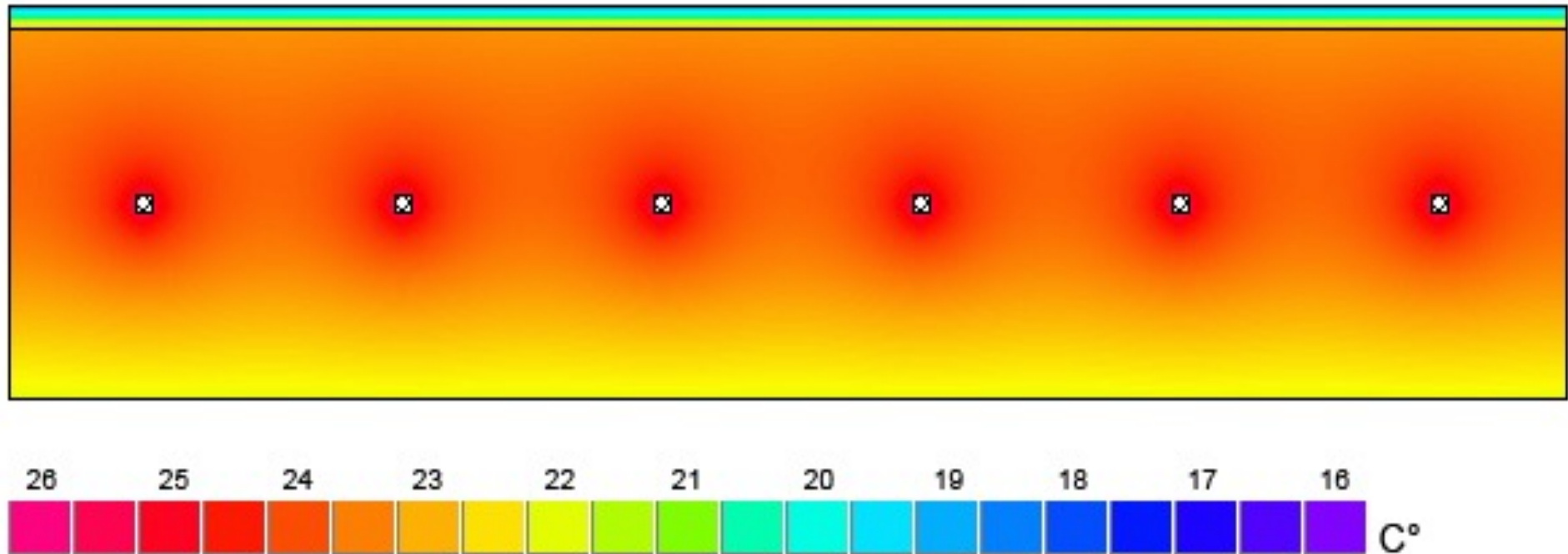
S = Wärmestrahlung

L = Wärmeleitung

Full cross-section:

Component activation (TAB) in the middle of the cross-section

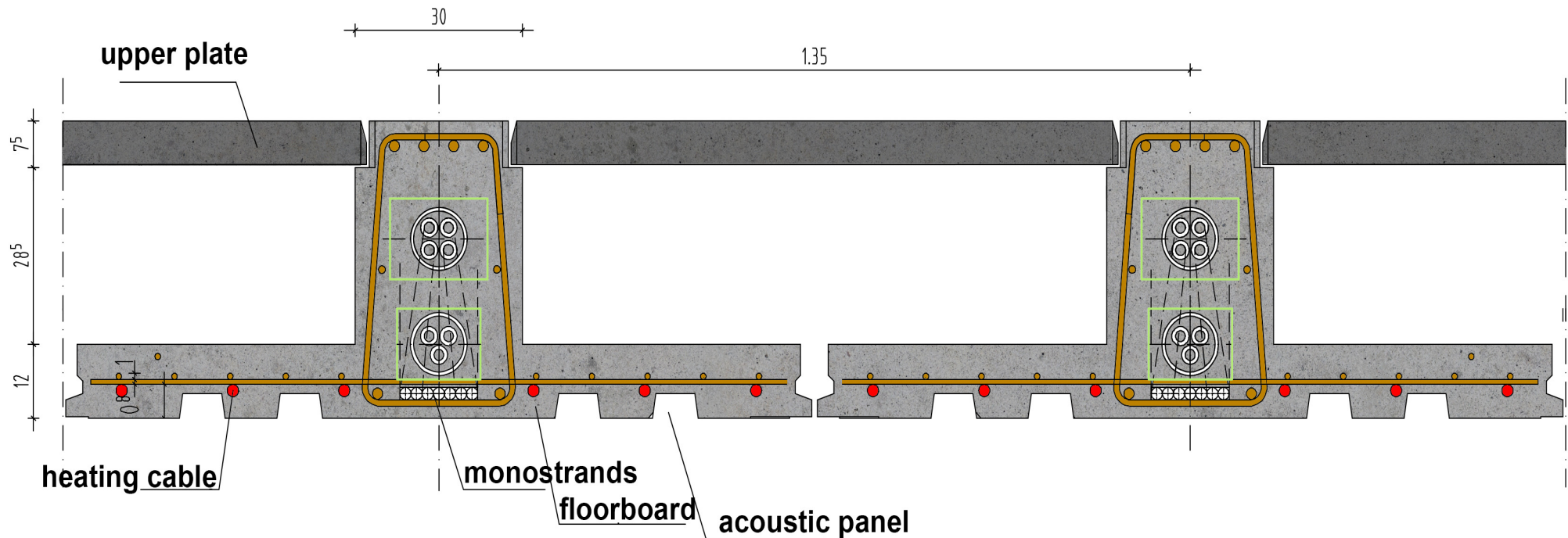
Heat rises in the mass of the concrete cross-section – but it is needed at the bottom



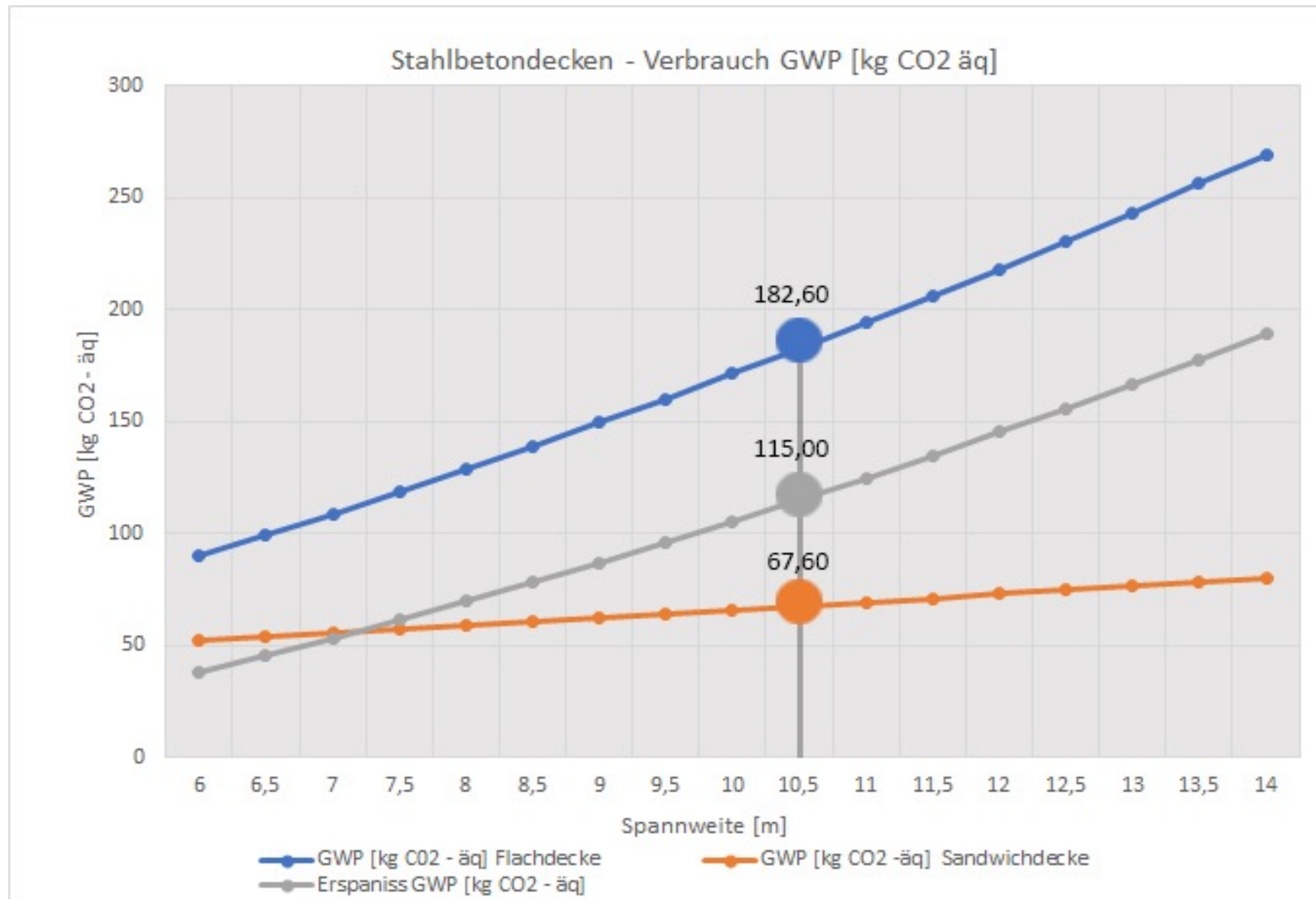
Alternative sandwich cross-section design:

- Two separate shells
- Usable cavity for installations
- Component activation in the lower shell near the surface
- Integrated acoustic elements

Cross-section

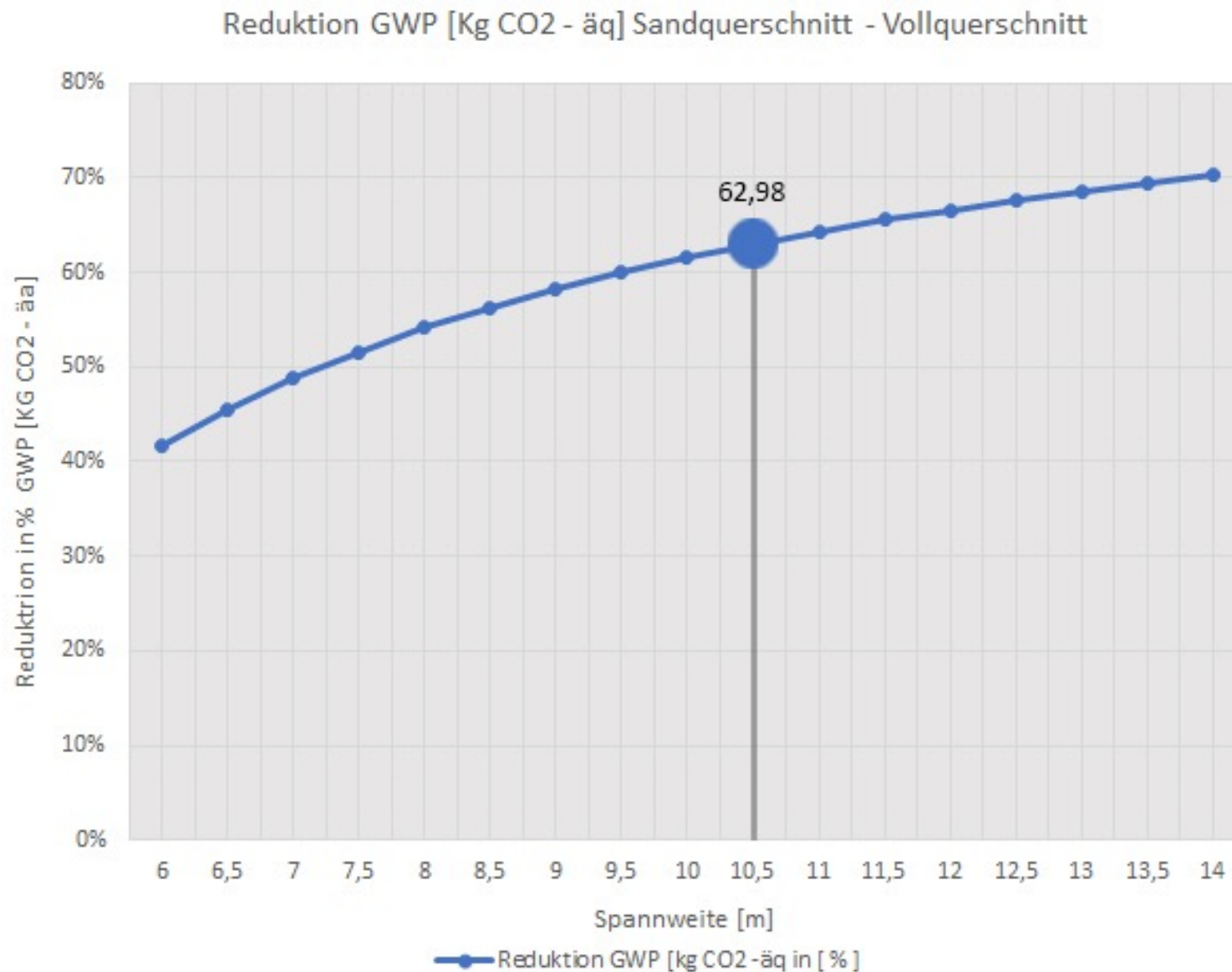


Comparison of solid cross-section and sandwich cross-section: GWP share [kg CO2 äq]

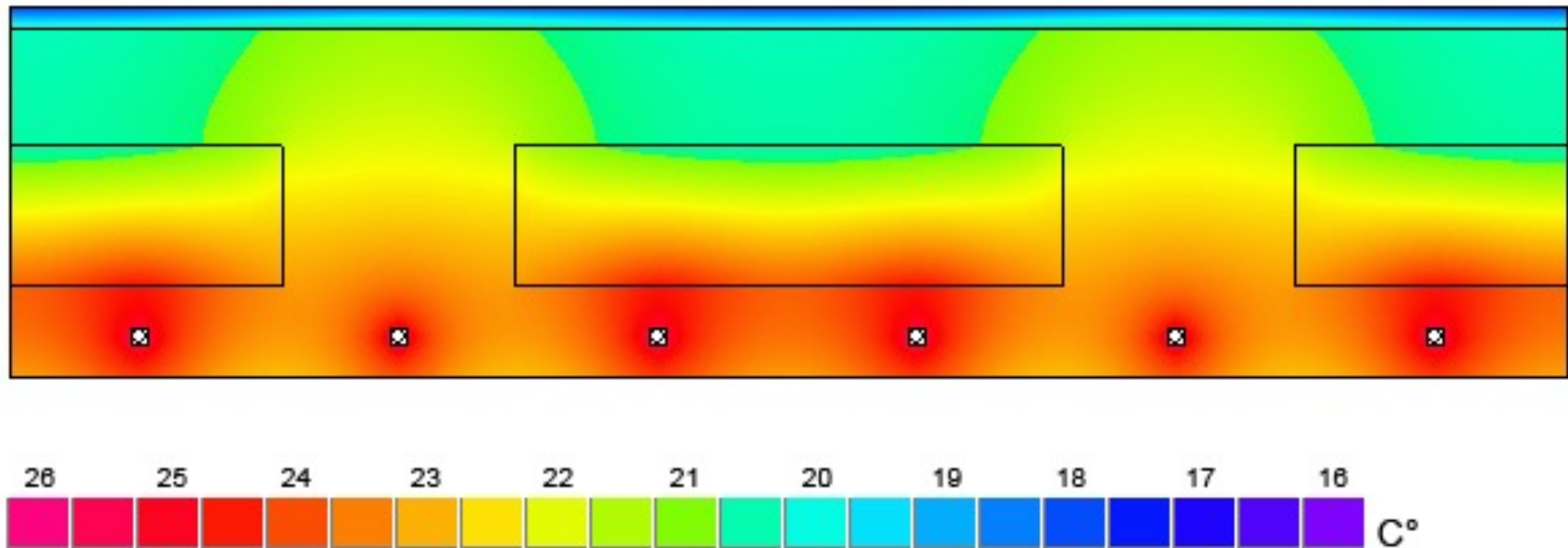


Advantage of sandwich cross-section over solid cross-section;

Reduction in GWP [kg CO₂ eq]

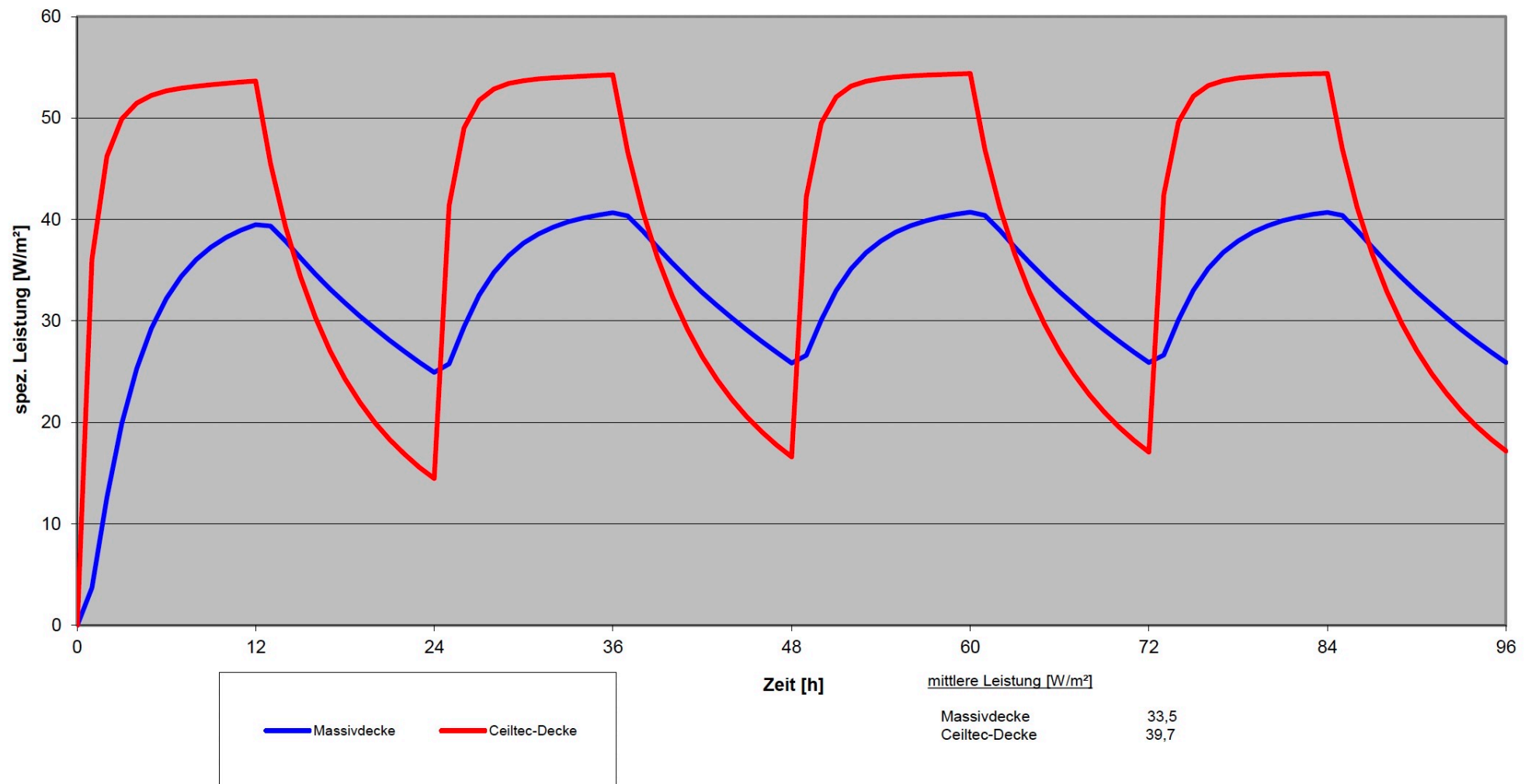


Advantage of sandwich cross-section:
Component activation (TAB) with pipes in the lower shell.
Heat remains in the lower shell.



Performance comparison: classic component activation (TAB) with full cross-section and sandwich cross-section

Vergleich Kühlleistung nach unten



Requirements for the sandwich cross-section Installation of prefabricated ceiling panels on site

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**Advantages of sandwich cross-section:
Reduction of CO2; installation space; fast response; optimal
heat storage (TAB)**

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Component activation (TAB) in ceilings versus underfloor heating:

- Distribution of thermal energy via the ceiling with radiant heat across the large open area
- Radiation means: all objects are heated
- Underfloor heating via convection restricts the open area due to furniture
- Convection means: the air is heated



Prerequisite for component activation (TAB) Integrated pipe registers for cooling + heating for the lower concrete shell

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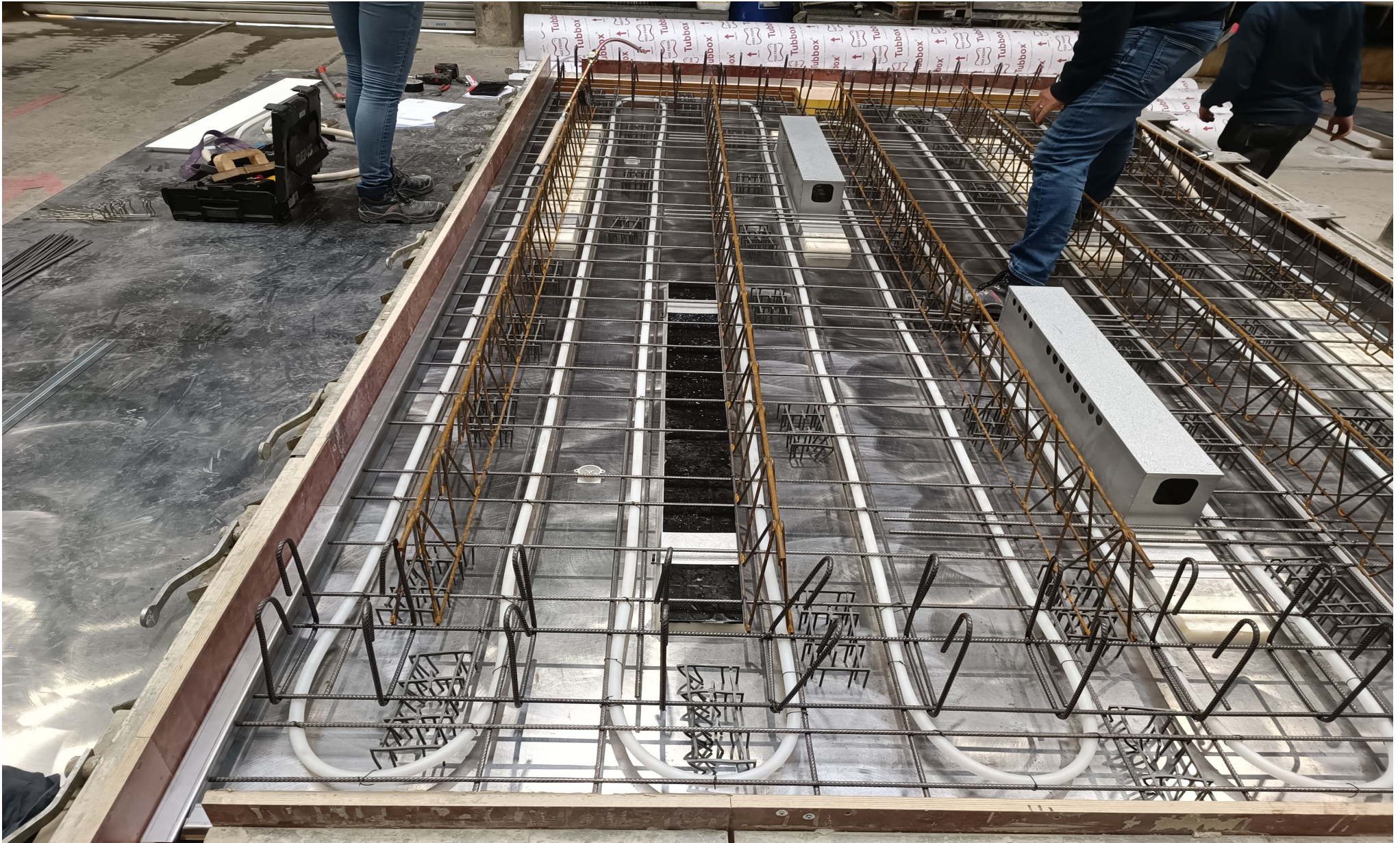
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**Prerequisite for complete prefabrication at the factory:
Building services and construction working together!**

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Prefabricated ceiling elements with integrated pipe registers for cooling and heating buildings represent a large and free radiator in the room.

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Distribution of thermal energy via concrete ceilings

- Connection of all pipes to a controllable building services system

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Distribution of thermal energy via concrete ceilings

- All installation pipes (heating/cooling) and distributors in the ceiling cavity

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Alternative: Complete ceiling (Plant) with sandwich cross-section - Pipes in the upper and lower shells
- Radiant ceiling heating + underfloor heating



Tests on our Innoliving® model house with all thermal functions of concrete components

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Prefabricated concrete ceilings with sandwich cross-section: Transfer of thermal energy from the ceiling into the room

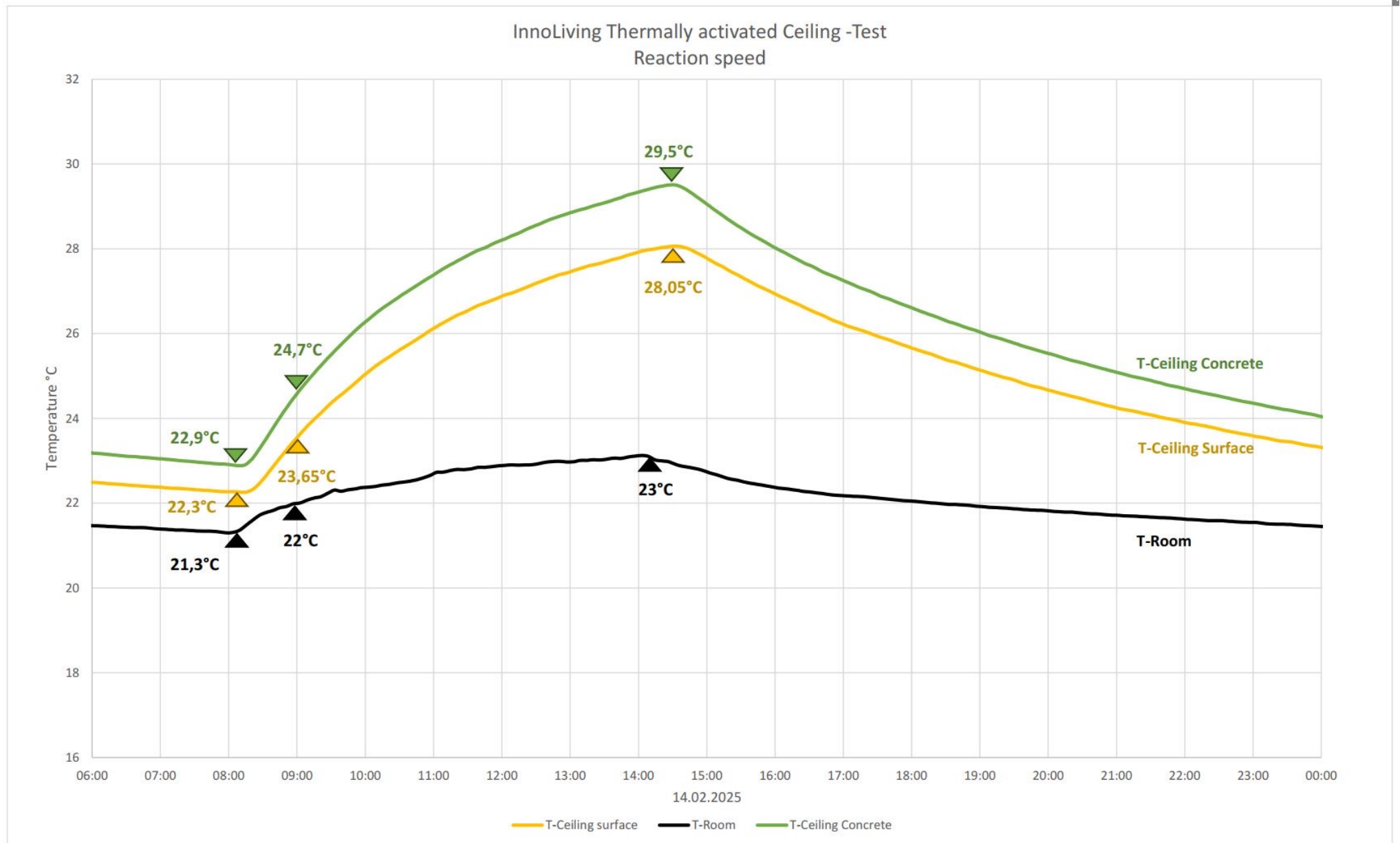
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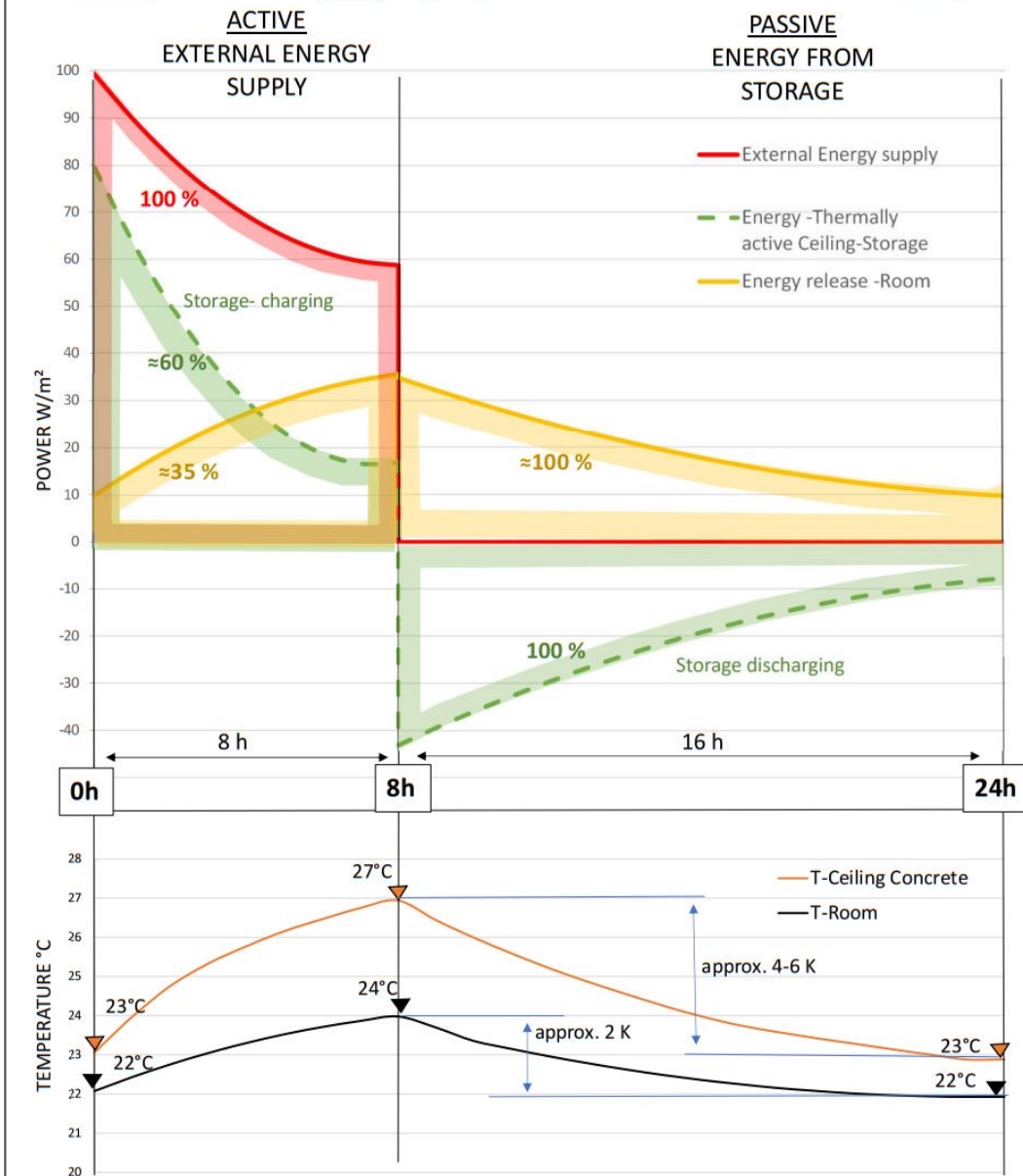
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Fast response time of component activation (TAB) in the ceiling with sandwich cross-section

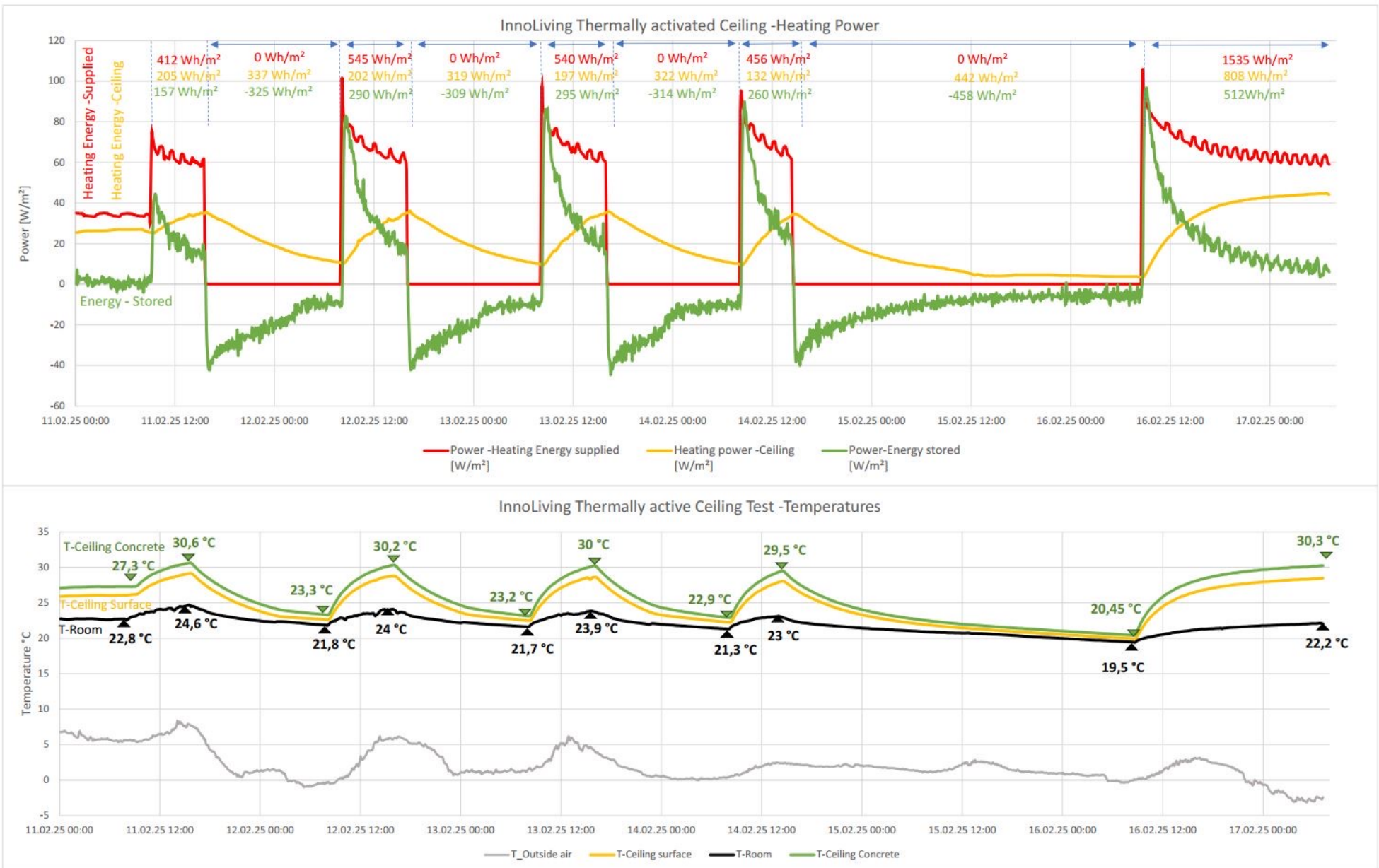


Thermal behavior of a component activation (TAB) in a concrete ceiling:

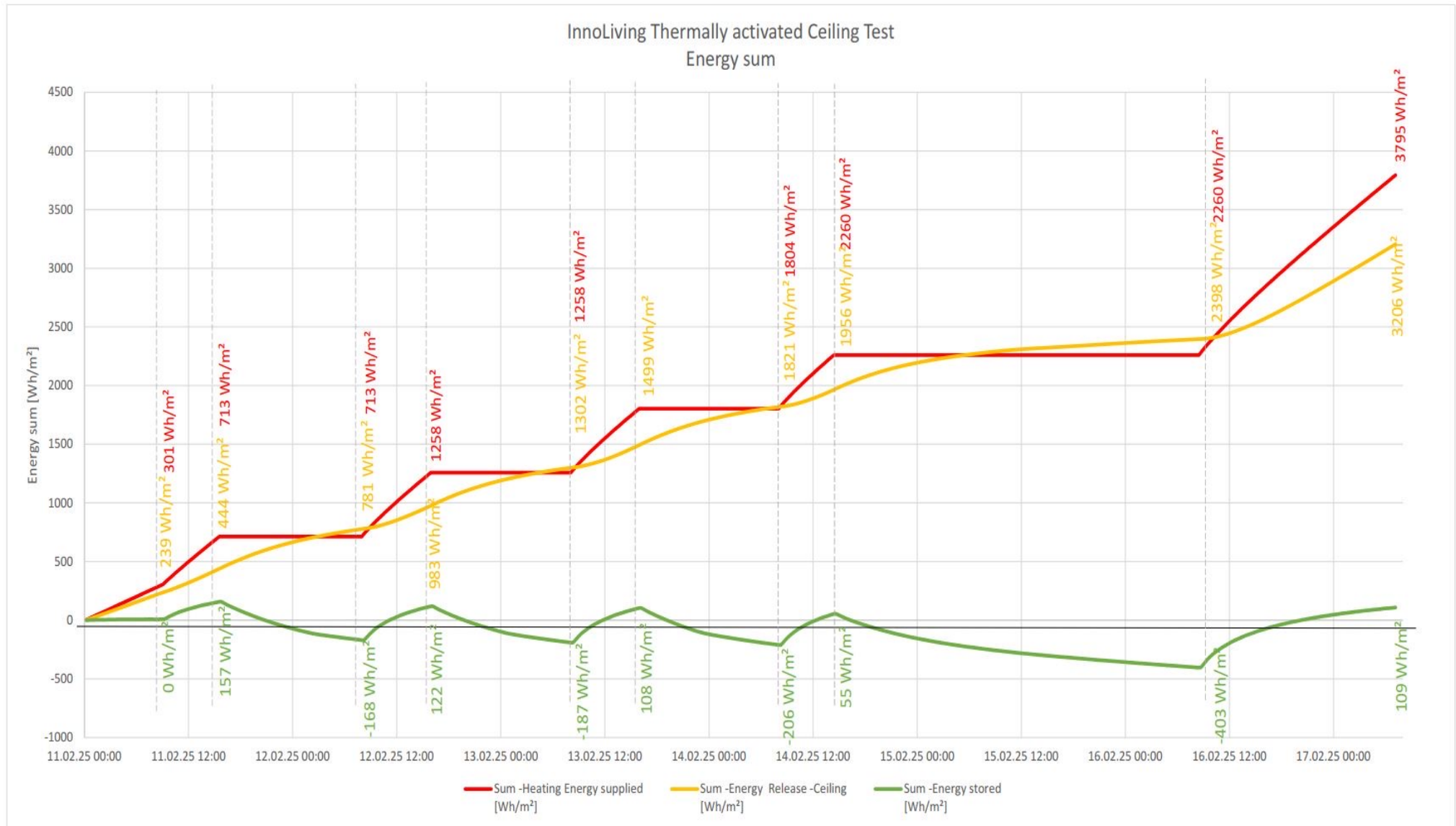
- Energy release via radiation
- Self-regulating effect
- Energy storage
- Release of stored energy
- Minimal temperature change in the room



Storage capacity of component activation (TAB): Measured values over a longer period of time

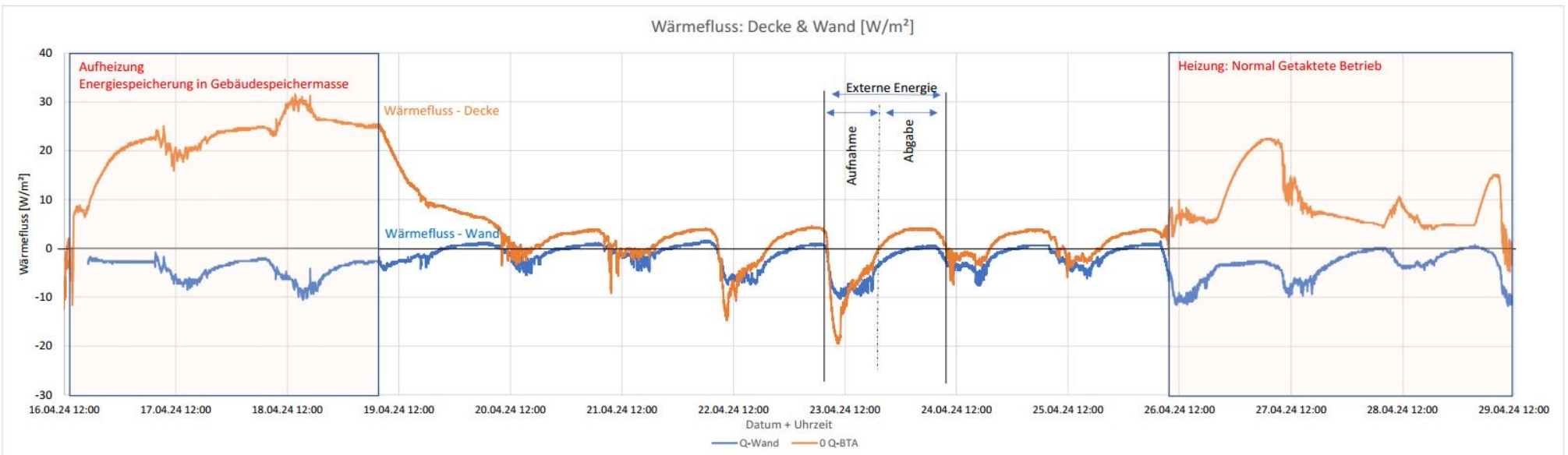
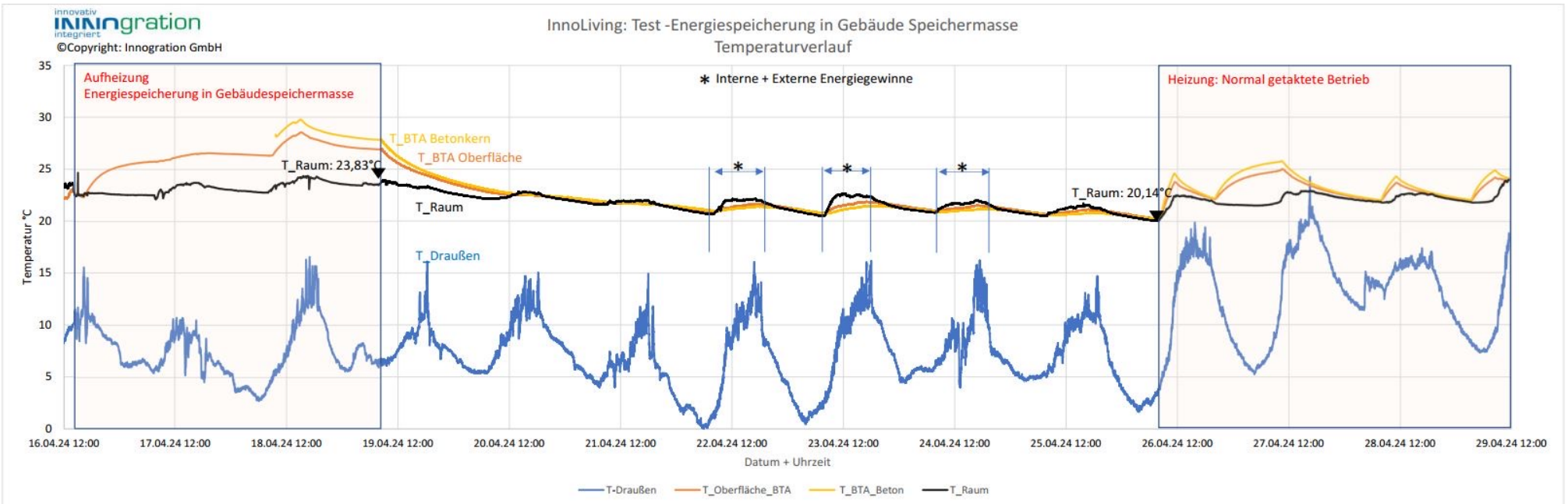


Advantage of component activation in ceilings: Energy supply – Energy storage – Energy release Concrete ceilings with TAB distribute and store energy

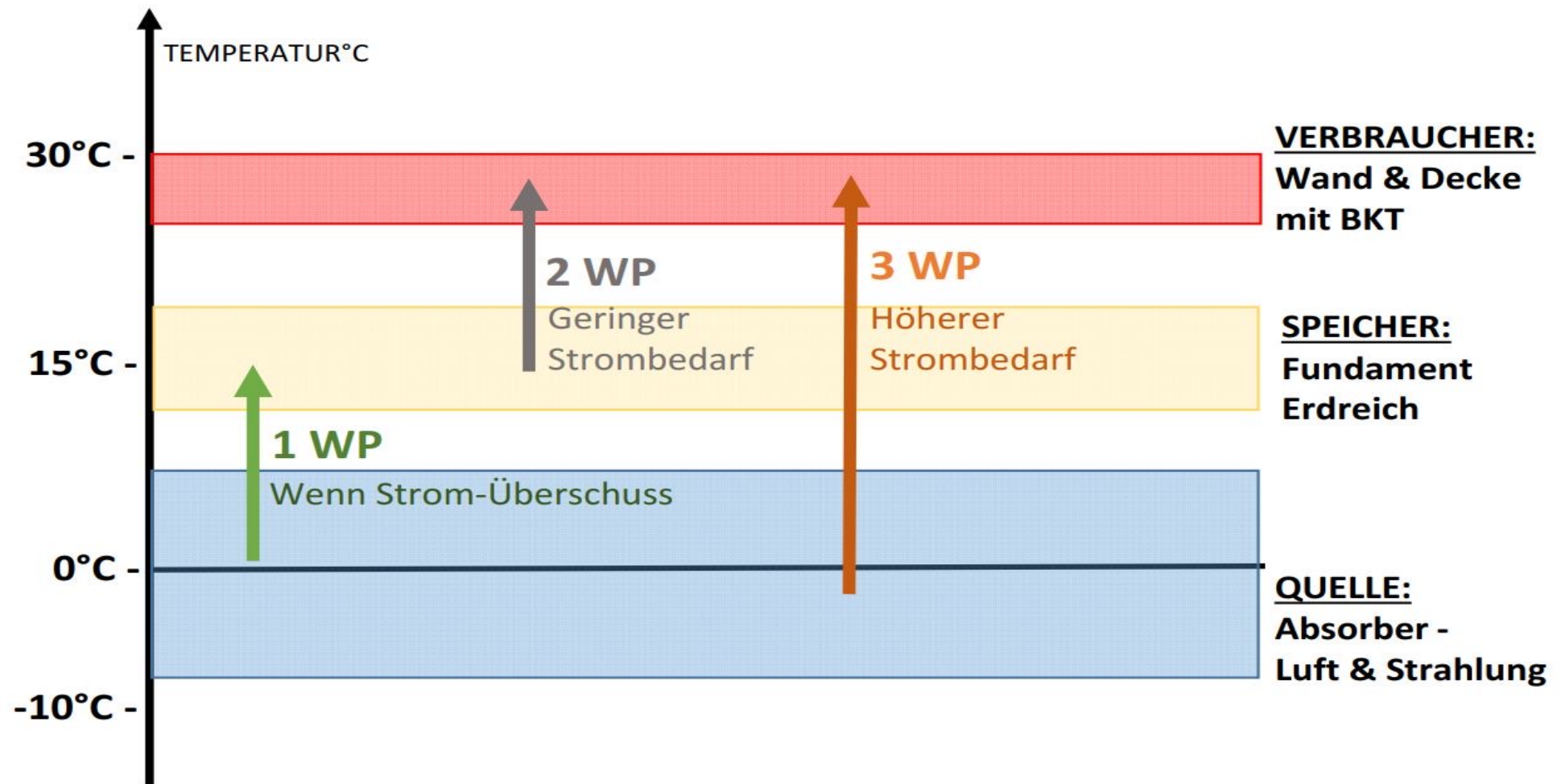


Concrete ceiling: Short- and long-term heat storage

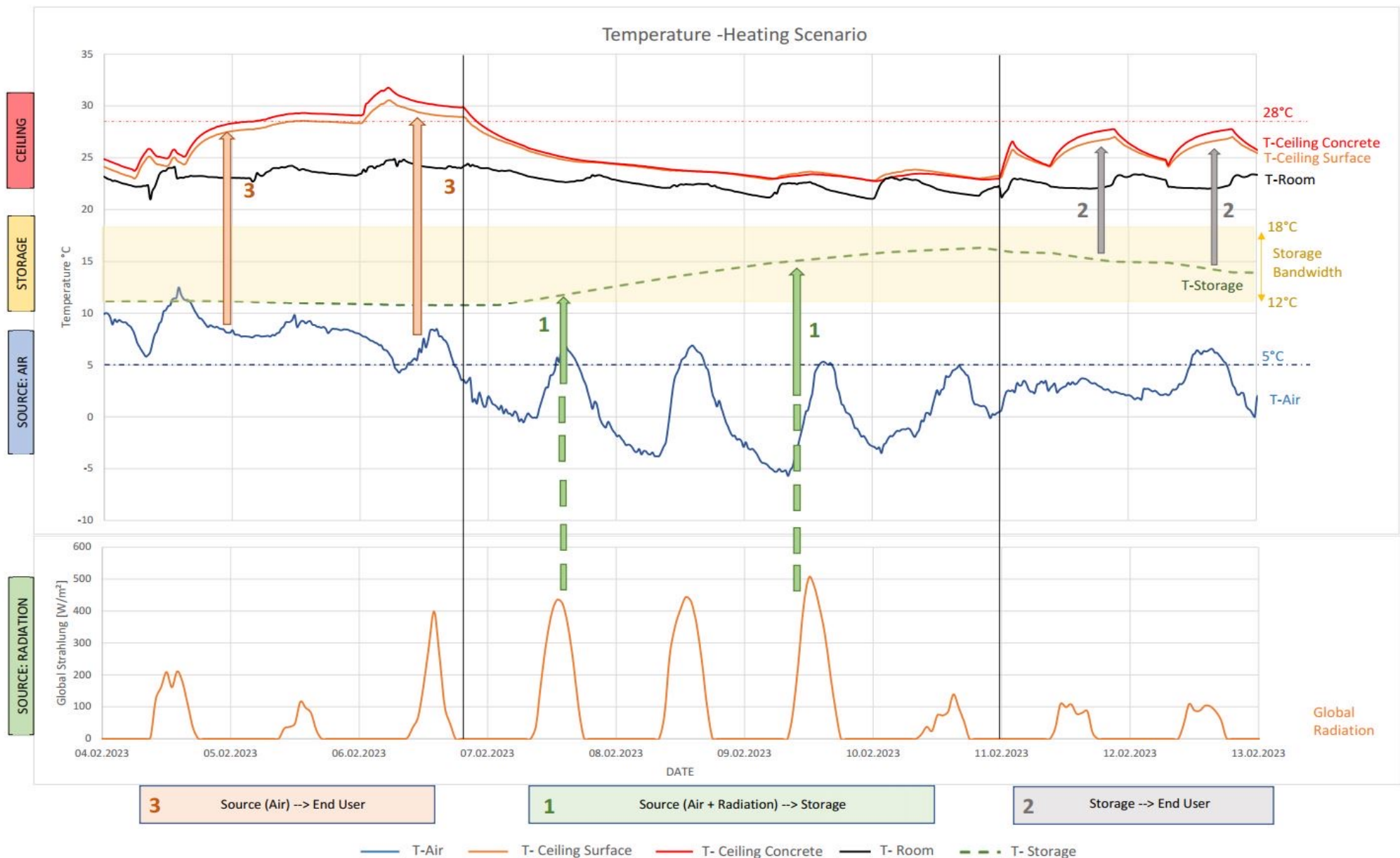
Automatic temperature control (self-regulating effect)



Concept for a self-sufficient energy supply: interaction between energy source, heat storage, and consumers with efficient use of heat pumps

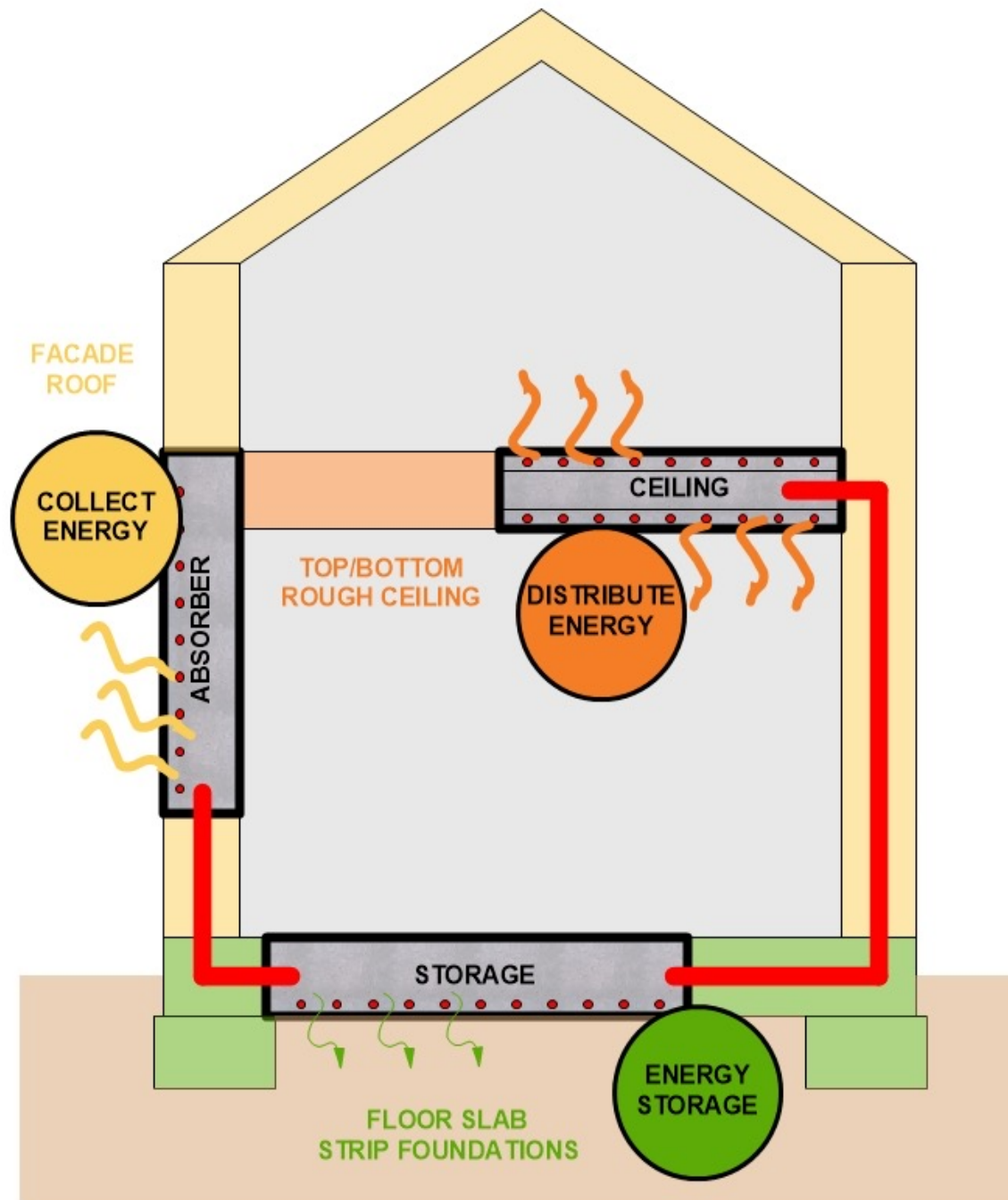


Prerequisite for energy supply: the importance of collecting, storing, and distributing thermal energy



**Supplement with
components for energy
supply:**

- Distribution (ceiling, wall) (TAB)
- Collection (absorber)
- Storage (concrete mass)



Thank you for your attention.

Let's connect and follow us



Innograti0n GmbH | CusanusstraÙe 23 | 54470 Bernkastel-Kues | Germany
www.innograti0n.de | office@innograti0n.de

