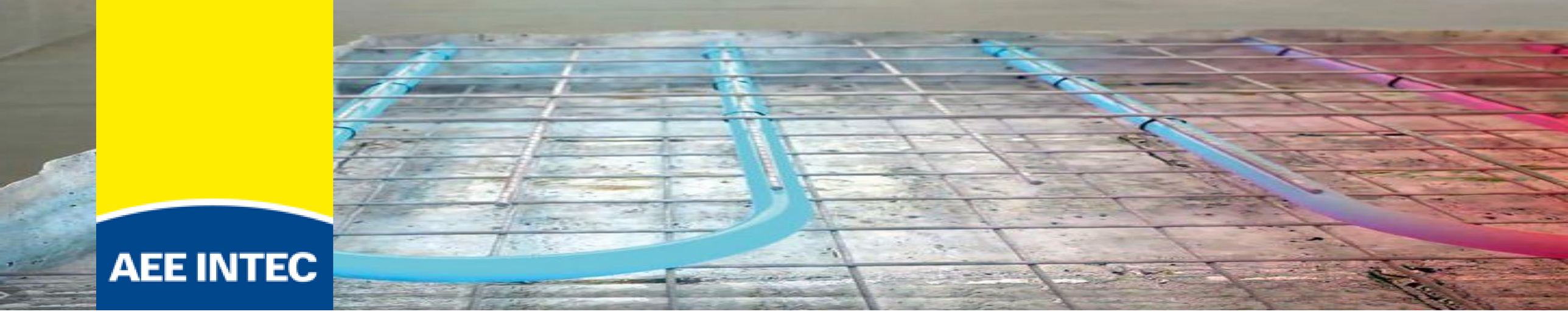


AEE INTEC

energy storage
IEA Technology Collaboration Programme

IEA

Task 43 – Unlocking the hidden potential of TAB energy storage

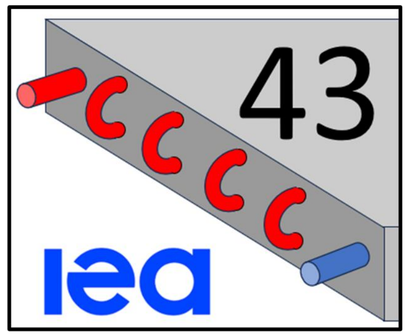
Christoph Rohringer, c.rohringer@aee.at

Federal Ministry
Innovation, Mobility
and Infrastructure
Republic of Austria

FFG
Forschung wirkt.

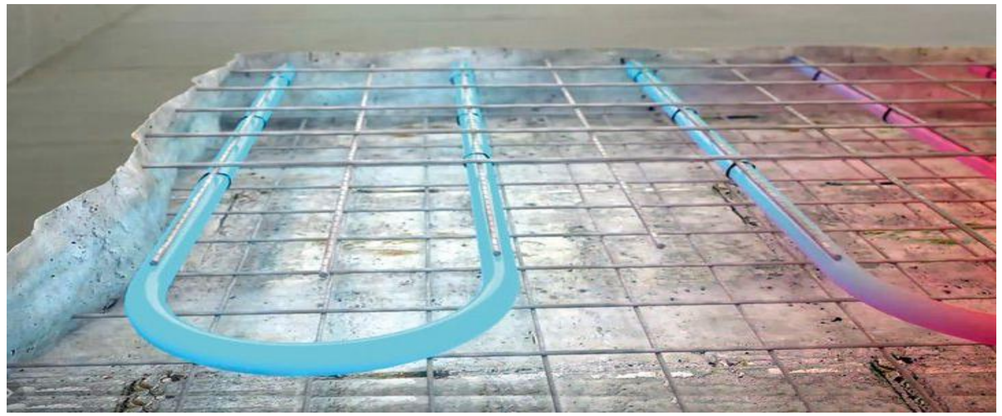
IEA Forschungskooperation
im Rahmen von open4innovation

BT TAB



Thermal building mass storage – the technology

Thermal component activation ... refers to systems that use the building masses to **regulate temperature**. These systems are used for the sole or supplementary **cooling** of a building and, to a lesser extent, in some cases also for **heating**[1].



Source: AEE INTEC

→ This allows also for the use of the building masses as abundantly available energy storage

[1]Wikipedia page on thermal building mass activation, 23.11.2021

Task 43 structure - Goals

Prepare thermal activated building mass energy storage for widespread, standardized and economically attractive integration.

A) How can such storages be **built** in new construction and refurbishment?

B) How can they be **operated** and **integrated** into systems?

C) How to do **business** and satisfy (end) **customers** and **residents**?

D) How to increase **reliability** and **trust** in the technology?

Task 43 structure - Subtasks

EBC
Energy in Buildings and Communities Programme

Annex 82
Annex 84

Subtask A
Construction & Materials

Subtask B
System Integration & Control

Subtask C
Non-technical Challenges

Scientifically oriented

KPIs and boundary conditions

Research findings

Subtask D
Standardisation and KPIs

Towards generalization and market interaction

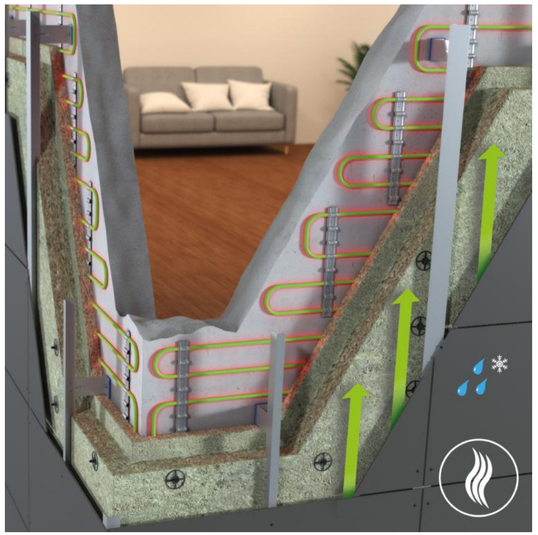
Subtask A: Construction and Materials

Subtask A Leader: TU Dresden, DE

- Materials and material combinations (concrete, wood, clay, hybrid structures)
- Construction and manufacturing strategies in new buildings
- Construction and manufacturing strategies for refurbishment
- Strategies for zoning and repurposing of buildings

source: Fachhochschule Salzburg

source: Innogration GmbH



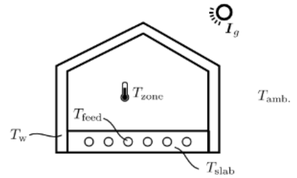
source: https://www.cepa-solutions.com/

Subtask B: System Integration and Control

Subtask B Leader: BEST Research, AT

- Different approaches to modelling and simulating thermally activated buildings
- System concepts for activated building mass storage at building, district and grid level
- Control strategies at building and district level including load prediction
- Guidelines for digital interfacing, cyber security and personal data protection

Model of the thermal zones used in optimization



$$\frac{dT_z}{dt} = k_{w,z}(T_w - T_z) + k_{slab,z}(T_{slab} - T_z) + k_{sol}^T I_g + d$$

$$\frac{dT_w}{dt} = k_{z,slab}(T_z - T_w) + k_{amb,w}(T_{amb} - T_w)$$

$$\frac{dT_{slab}}{dt} = k_{z,slab}(T_z - T_{slab}) + k_h(T_{feed} - T_{slab})u_h + k_c(T_{feed} - T_{slab})u_c$$

- RC-based model (grey-box)
- Three **states**:
  T_z…zone, T_w…wall, T_{slab}…TABS
- **External Influences**:
  I_g…solar (projected),
  T_{amb}…ambient temp.,
  T_{feed}…feed temp., d…mean internal load
- **Control inputs**:
  u_h and u_c … valve positions for heating and cooling

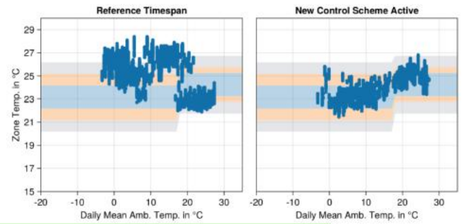
- **Measurements**
  - Zone temperature
  - (optional) Slab temp.

How to determine the coefficients?
How to obtain missing states?

Smart control improved user comfort and energy consumption

- Forecast of the zone temperatures

- Improved comfort and energy savings



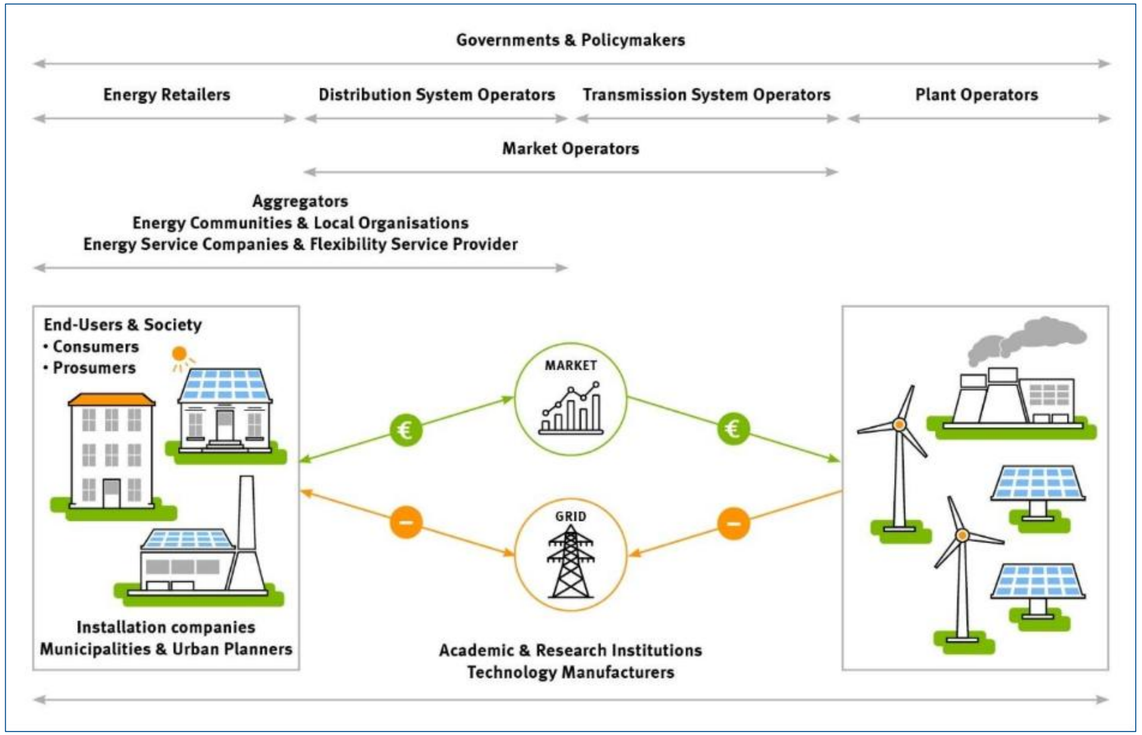
Less overheating in winter and undercooling in summer (over 250 days)

source: BEST Bioenergy and Sustainable Technologies

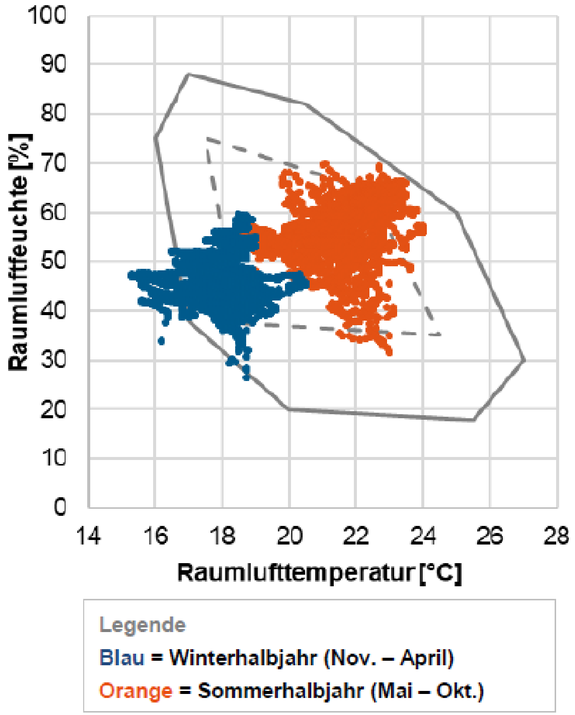
Subtask C: Non-technical Challenges

Subtask C Leader: Aalborg University, DK

- Regional boundary conditions (economic, legal, social) on local and grid level
- Successful business models, end user incentives and best practices examples
- Guidelines for indoor climate



source: Ritter et.al. Paper pre-print available https://dx.doi.org/10.2139/ssrn.5365294



source: e7 energy innovation & engineering, final workshop of BTTAB

Subtask D: Standardisation und KPIs

Subtask D Leader: TU Darmstadt, DE

- KPIs for TABs as basis for characterization and future standardization
- Design guidelines for TAB construction
- Design guidelines for automation and control
- Demo factsheets

source: AEE INTEC

Contents of the 35th ES-OnSeminar on Task 43

DI Walter Becke
AEE INTEC
Austria

Austrian initiatives and study "BTTAB" on TAB energy storage

DI Thomas Friedrich
Innogration GmbH
Germany

TAB as energy storage in new construction with prefabricated panels

DI Thomas Ramschak
Towern3000
Austria

Activating existing buildings mass energy storage in refurbishment

Prof. Shady Attia
University of Liège
Belgium

Enabling Thermal Building Mass Flexibility: EU rules, barriers, and policy pathways

Contents of the 35th ES-OnSeminar on Task 43

DI Christoph Rohringer
AEE INTEC
Task Manager

- Task 43 will be concluded end of 2025
- Publishable international report expected in summer 2026
- Use today to discuss with Subtask Leaders and experts

Prof. John Grunewald
TU Dresden
Subtask A

Dr. Daniel Muschick
BEST research
Subtask B

Prof. Alireza Afshari
Aalborg University
Subtask C

DI Joscha Reber
TU Darmstadt
Subtask D

https://iea-es.org/task-43/