Flexibility potential of buildings with thermal building mass activation

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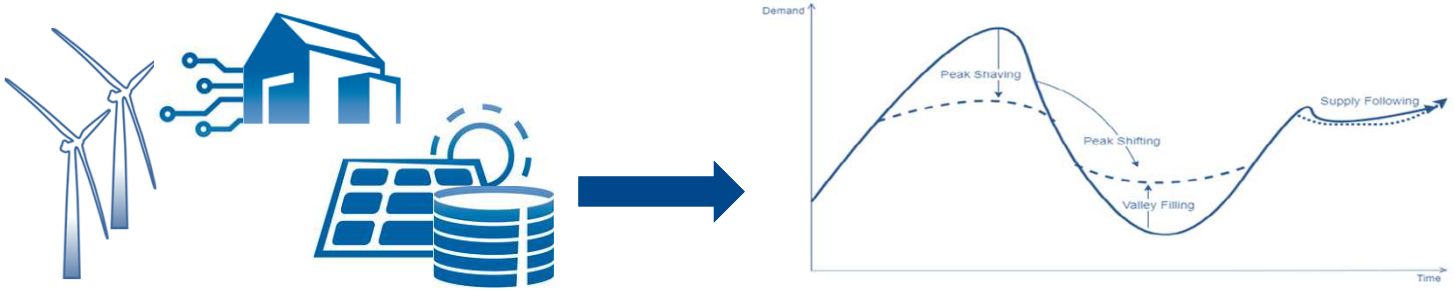
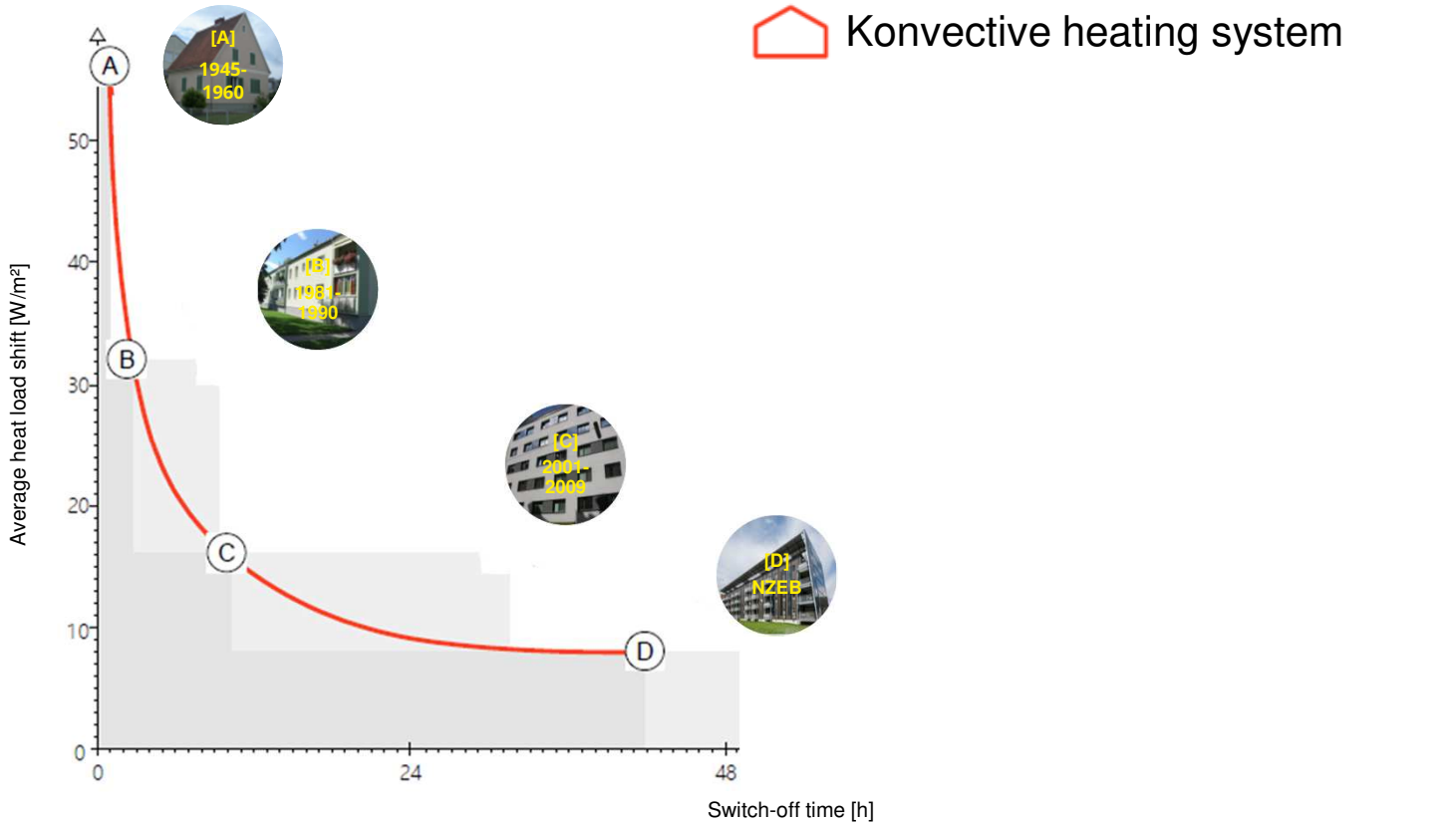
Renewable based, integrated energy system in the future

The Challenge

- Increasing share of renewables in the energy system
- Central and decentral feed in, consumers transforming to prosumers
- Both thermal and electricity systems are affected
- Storage is greatly needed to match production and demand



Storage potential of buildings

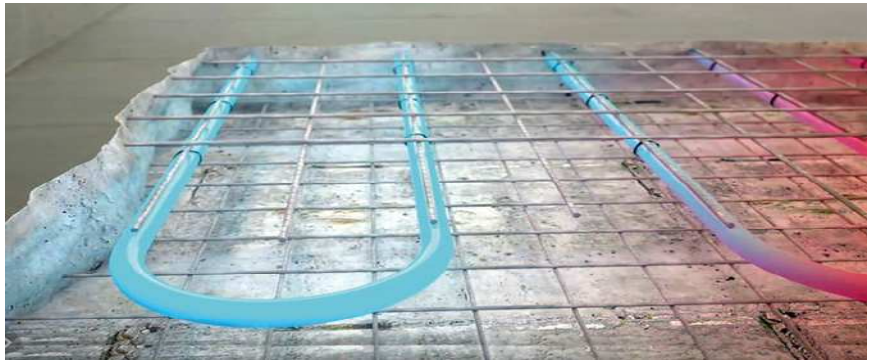


Annahmen dynamische Gebäudesimulation: Annahmen u.a. Mittelschwere Bauweise, Temperaturband 22°C-20°C, Referenzgebäude basierend auf Tabula Episcope Gebäudetypologie Österreich

Quelle: Tobias Weiß - AEE INTEC - weitere informationen unter: (https://doi.org/10.1080/17512549.2017.1420606)

Thermal building mass activation

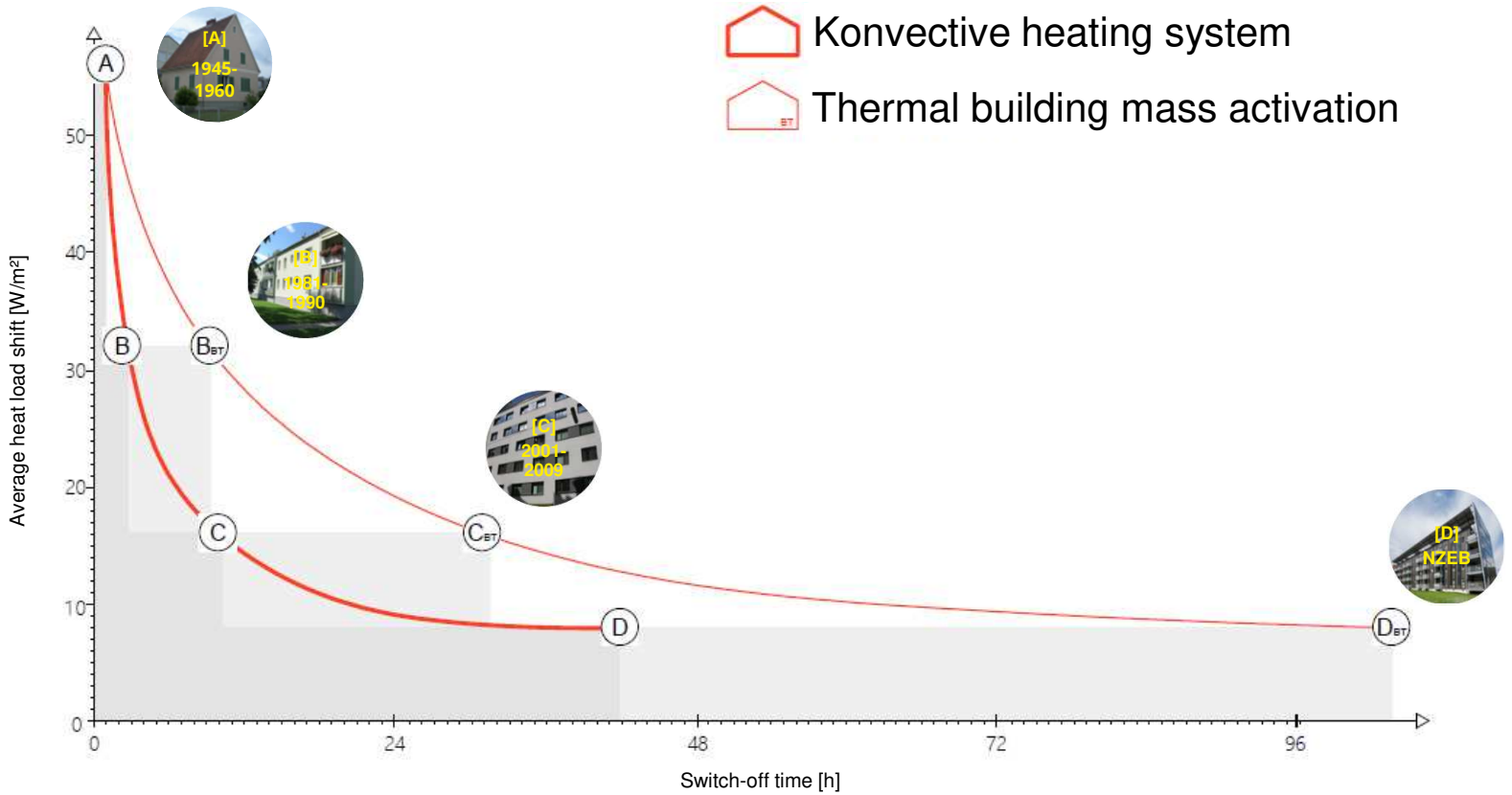
Thermal component activation ... refers to systems that use the building masses to **regulate temperature**. These systems are used for the sole or supplementary **cooling** of a building and, to a lesser extent, in some cases also for **heating**[1].



Source: AEE INTEC

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

Storage potential of buildings – with thermal building mass activation



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Thermal building mass activation - As flexible energy storage

On-site energy production

- Solar energy (Solarthermal, PV + HP)
- Others e.g. small-scale wind or water power (+ HP)
- High levels of self-consumption and relief of grid infrastructures

Quelle: Anzberger

Quelle: haustec.de

Use of renewable surplus electricity from the power grid

- Storage of surplus wind or solar power
- relief of grid infrastructures
- Cost advantages in connection with future electricity tariff models

Quelle: heizsparer.de

Flexibility option in micro, local and district heating networks

- Storage of excess heat from renewables or waste heat
- Increasing the power capacities of existing network sections and generation plants
- Cost advantages in connection with future heat tariff models

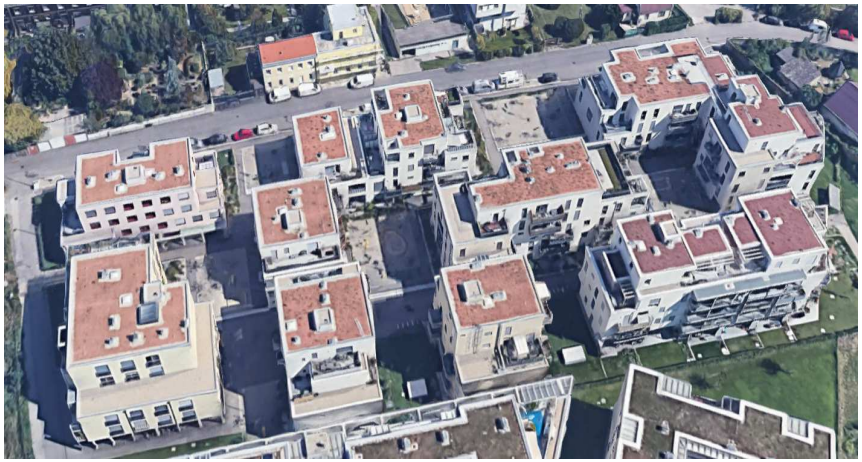
Thermal building mass activation – Built solutions

Source: Thaler Architekten, Rendering: vdx

Residential use in Vienna

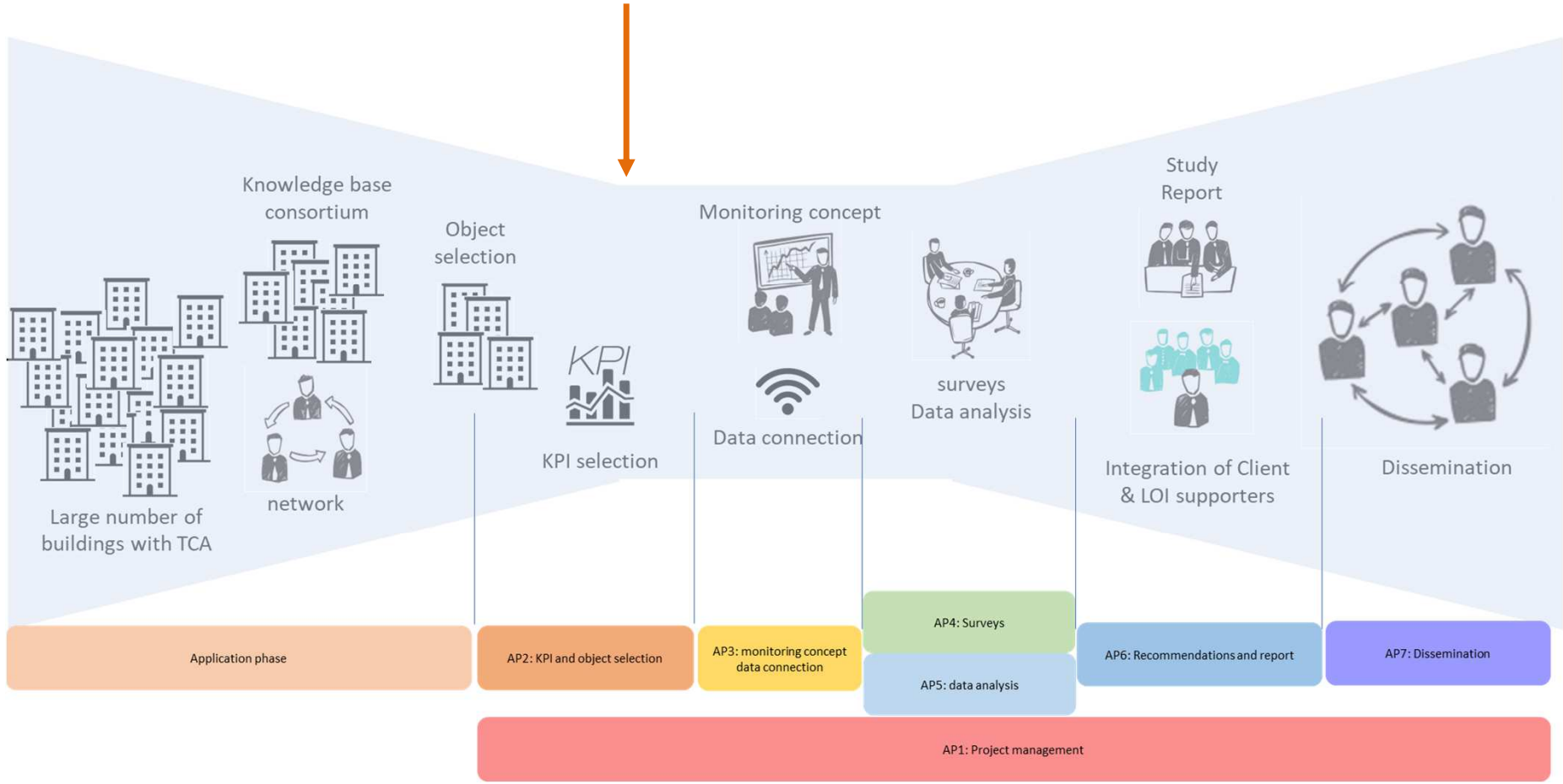
160 flats, ~ 25 kWh/m²a

Supply: Geothermal, HP and Wind Turbines



Source: Google Maps

BTTAB – National Monitoring Project



Source: AEE INTEC

BTTAB – National Monitoring Project


Training building


Production building

Apartment building
(under construction)


Apartment building

Production building
(under construction)


Apartment building


Museum


Office, trade


University


Office


Office


Assisted living, kindergarden


Single family house

Office

Apartment building

Hosting, dormitory


Office, laboratory


Office

Source: AEE INTEC

BTTAB – KPIs and evaluation criteria

- Technical
  - Construction techniques and building integration
  - Zoning and flexible building use
  - Construction materials
  - Grid interaction, flexibility potential and digital interfaces
  - Control strategies

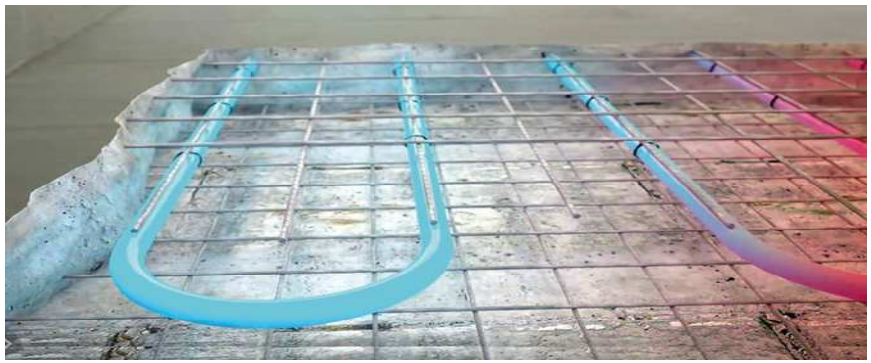
- Economic and ecologic
  - CO_2 footprint in comparison to regular buildings
  - Cost of implementation and cost savings potential
  - Cost of flexibility

- Non-technical
  - User comfort
  - User incentives for partaking in flexbility schemes

Ongoing

Conclusion

- Thermal building mass activation offers increased energy flexibility in the building sector
- The technology is already being implemented, however standardized and widespread market uptake is pending
- BTTAB will provide insights into successful implementations and prepare those results for relevant target audiences



Source: AEE INTEC

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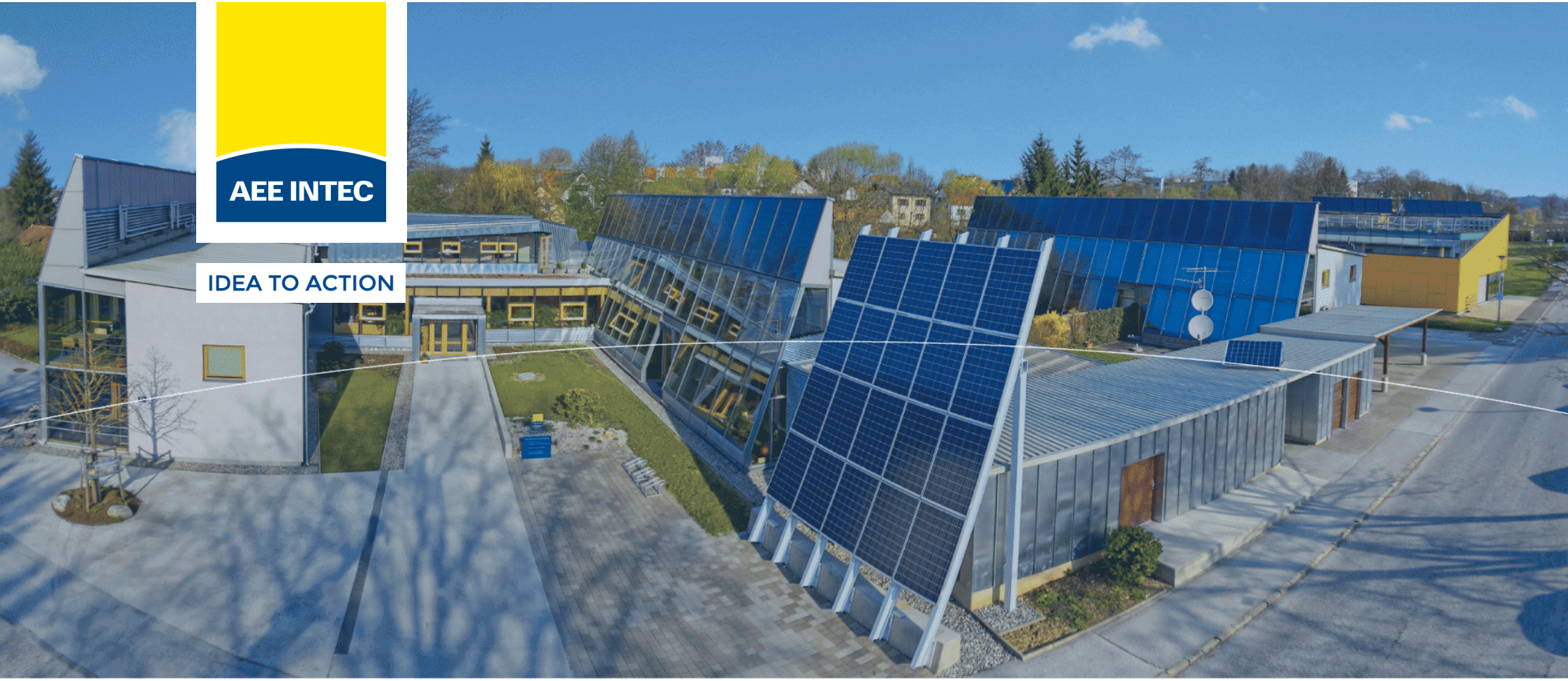

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