CEPS Construction Day 2025

Building innovation in a whole-life carbon perspective

Towards a new understanding of buildings

The fundamental role of the built stock for climate and social objectives

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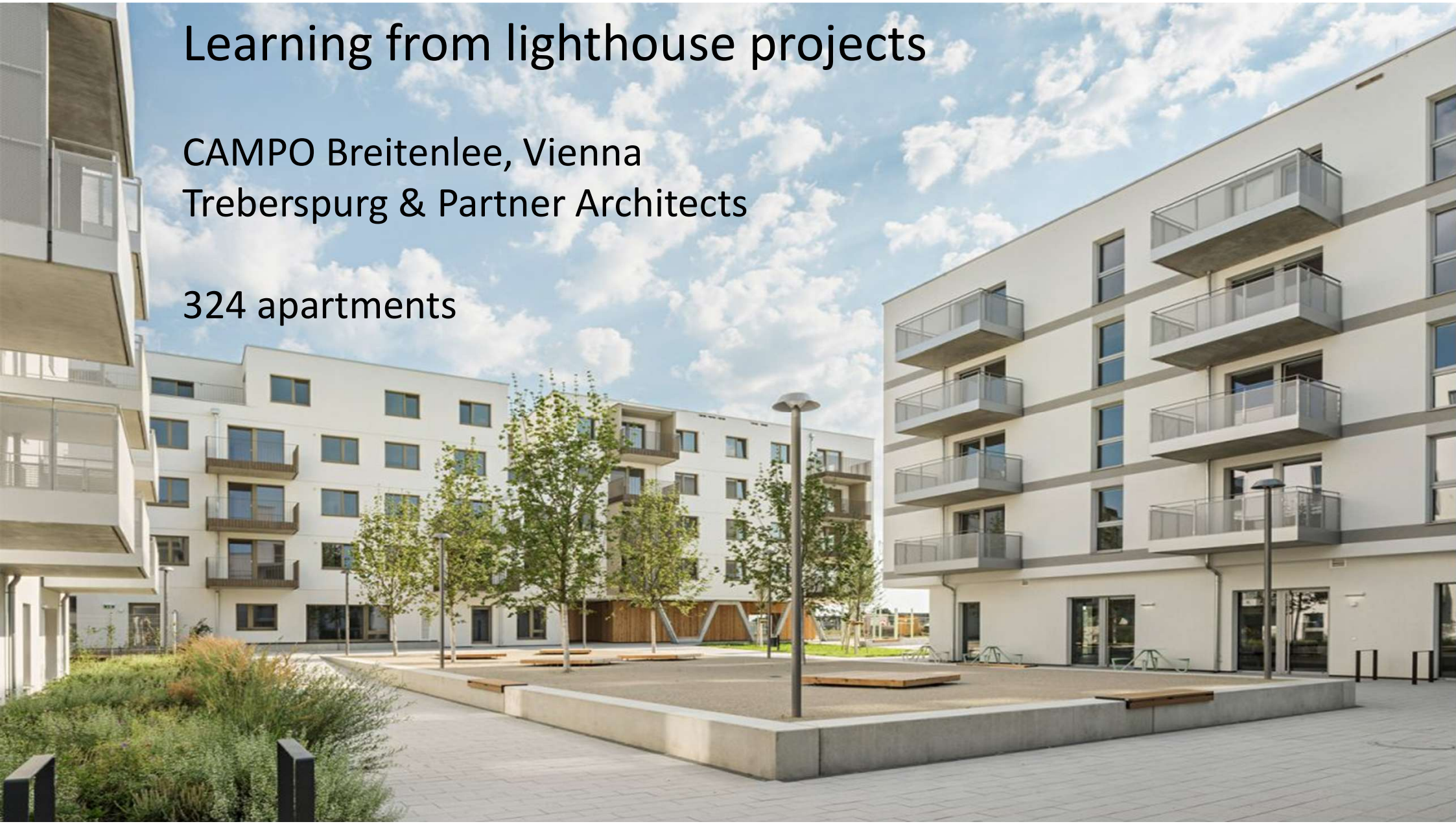
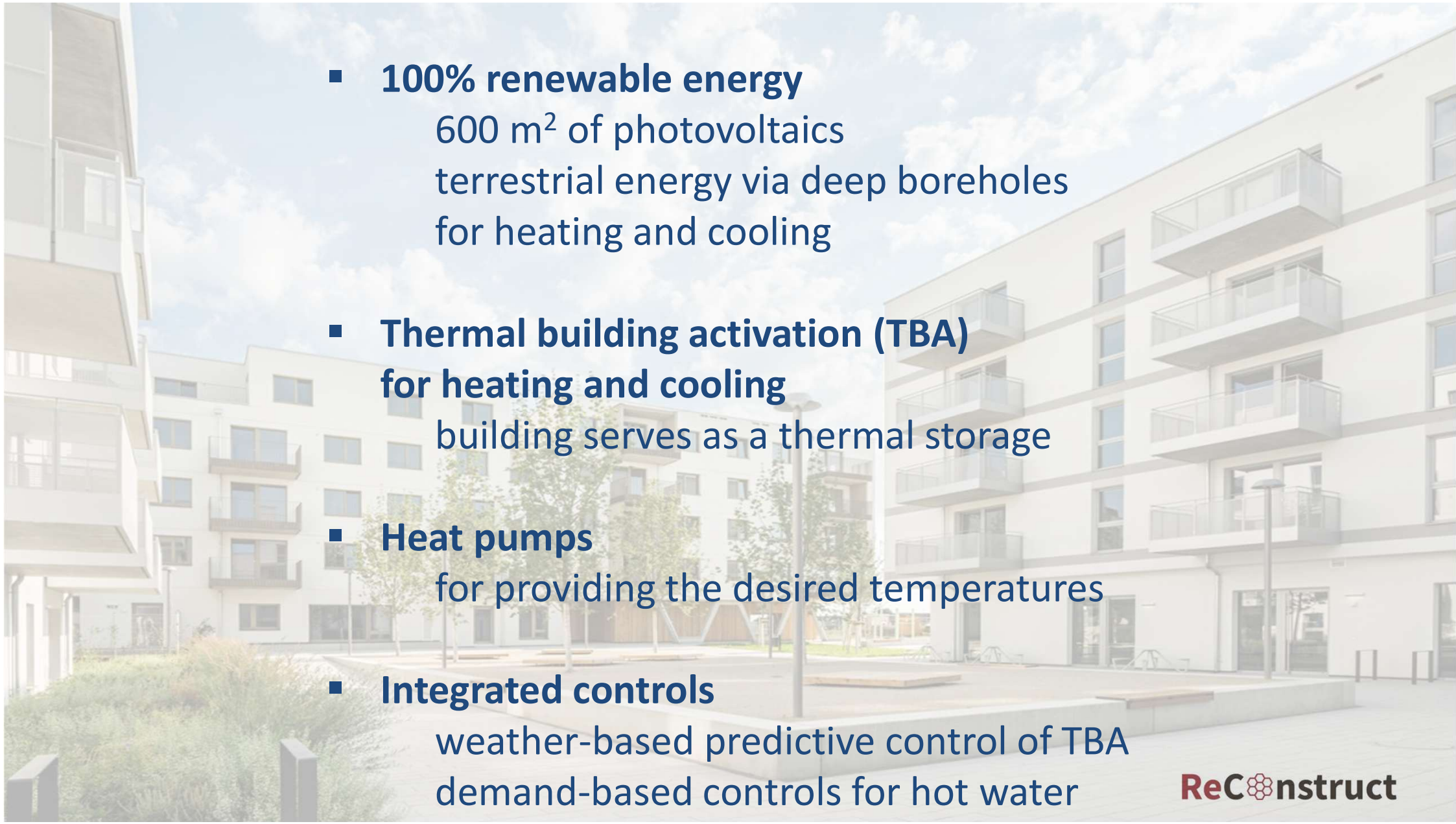
Learning from lighthouse projects

CAMPO Breitenlee, Vienna
Treberspurg & Partner Architects

324 apartments





- **100% renewable energy**
  600 m^2 of photovoltaics
  terrestrial energy via deep boreholes
  for heating and cooling

- **Thermal building activation (TBA) for heating and cooling**
  building serves as a thermal storage

- **Heat pumps**
  for providing the desired temperatures

- **Integrated controls**
  weather-based predictive control of TBA
  demand-based controls for hot water

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Innovations for the built stock

A new perspective of buildings

Key developments for understanding the built stock and policy responses

- **Deepening our understanding of the built stock**
  From materials to ensembles of buildings
- **Tackling affordability**
  Integrating all cost components
- **Implications for policies**
  Linking EU and national competences

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Evolving innovations

The evolution of system scope
and ambition level

Evolving innovations for the built stock

Targeting scope and ambition

		Dimension **Ambition Level**		
		average	**advanced**	**targeted**
Dimension **System Scope**	**Materials**	substitution with low emission materials	recycling and productivity of building materials	carbon capture and storage in cement
	Single Buildings	high thermal standards and efficient energy use	building designs with high material productivity	thermal building components
	Ensembles of Buildings	coupling buildings via localised energy systems	digital control of these energy systems	connecting buildings through mixed use

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Tackling affordability

Searching for adequate cost indicators

Impacts on housing affordability

The key indicator of user cost

User costs represent the annual cost of ownership or use

$$User\ cost = cost_{operating} + investment*(interest\ rate + depreciation\ rate)_{cost_{investment}} + cost_{maintenance}$$

Operating

- Volume and price of energy
- Controls for energy use

Investment

- Construction technologies
- Length of depreciation
- Interest rate
- Costs for land

Maintenance

- Durability and longevity of the building components

Topics for action on housing affordability

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Whole-life emissions of a building investment

Analogous to user cost

Total emissions are calculated per annum and summed over the life cycle

$$\textit{Total emissions} = \textit{emissions}_{operating} + \textit{emissions}_{investment} * \textit{depreciation rate} + \textit{emissions}_{maintenance}$$

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Implications for policy

From guidance-based to performance-based incentives

Policy implications

Guidance-based policies

- **Fostering building designs for high standards**
  EU guidance for Member States creates an environment for innovation.

- **Lead markets for innovative materials**
  provide guidance for upscaling value chains for innovative buildings made for Europe.
  Use the potential of public procurement.
  (Industrial Decarbonisation Accelerator Act, Industrial Acceleration Act)

- **Targeted zoning regulation**
  Careful spatial planning exhibits a high potential at the national level.

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Policy implications
Performance-based policies

- **Performance-based support for social housing**
  Provide evidence for best-practice examples.

- **Performance-based support for buildings**
  Differences to a reference indicator (for energy, emissions) entitle to a reward.

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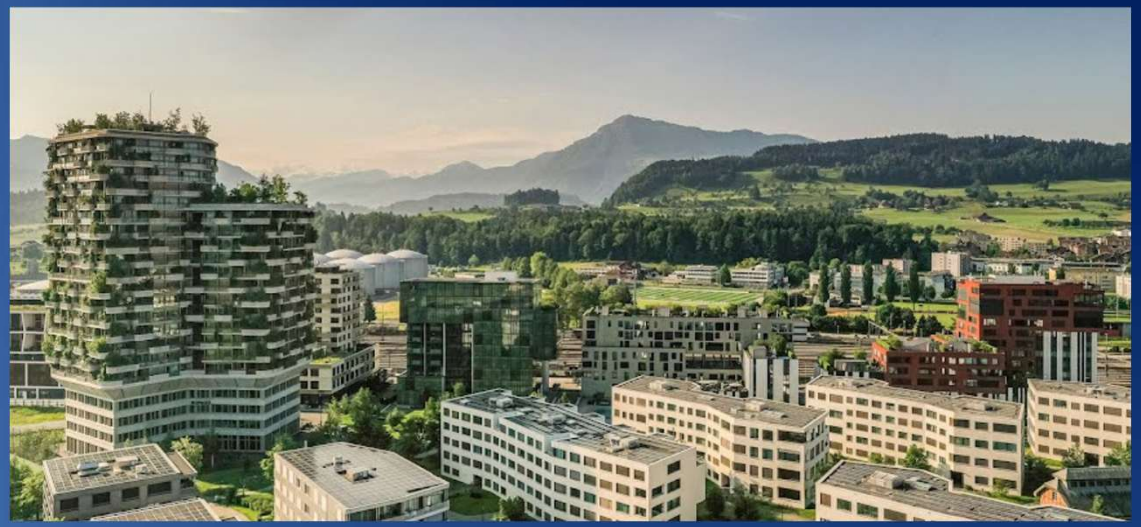
Ultimate targets for the built stock



Existing and new buildings are integrated to quarters

by mixed use for living, working, leisure, and energy self-sufficiency

Suurstoffi

Buildings can serve as carbon sinks

by adding carbon pellets via biochar or captured carbon to concrete

EMPA