

FlexOffice

By Alexander Engelmann and Timm Faulwasser

The FlexOffice system configuration consists of two office buildings which can potentially be used as thermal storages for renewable energy overproduction.

Economical aspects

EU final energy consumption

electricity, transport, ...



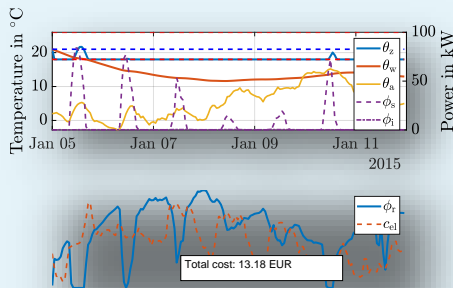
heating, cooling

- half of energy consumption in the EU in the thermal sector
- at the same time thermal storage is cheap

Use **thermal sector** for **storing energy**?

Results

- MPC reduces energy cost/energy demand while staying within thermal comfort zone
- concrete core activation increases load-shifting capabilities



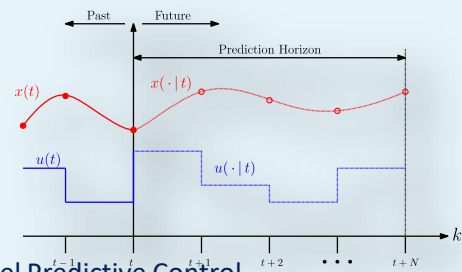
Technological aspects



The FlexOffice system configuration

- consists of two office buildings at KIT
- is equipped with heat pump, district heating connection, and concrete core activation

Idea: Use **predictive building control** to store **renewable overproduction**



Model Predictive Control

- controls heating/cooling devices
- uses weather forecasts
- considers technical limitations like the thermal comfort zone, maximum heating powers, ...
- can balance conflicting objectives like thermal comfort, low energy demand, low cost, ...

References

P. Zwickel, A. Engelmann, L. Gröll, V. Hagenmeyer, D. Sauer, T. Faulwasser, *A Comparison of Economic MPC Formulations for Thermal Building Control*, IEEE PES ISGT Europe 2019



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