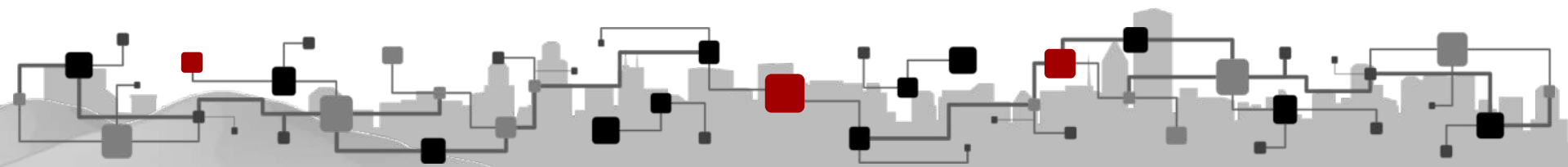


Optimieren von Energieflüssen im Gebäude und im Quartier

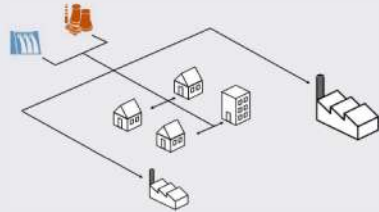
Swissbau, 14.01.2020

Philipp Heer, Leiter Energy Hub, Empa
Urban Energy Systems Laboratory



STATUS QUO

CENTRAL GENERATION



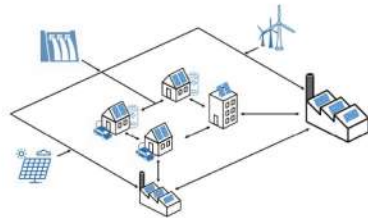
STATUS QUO

DOMINATING FOSSILE ENERGY CARRIERS



2050

DECENTRAL GENERATION

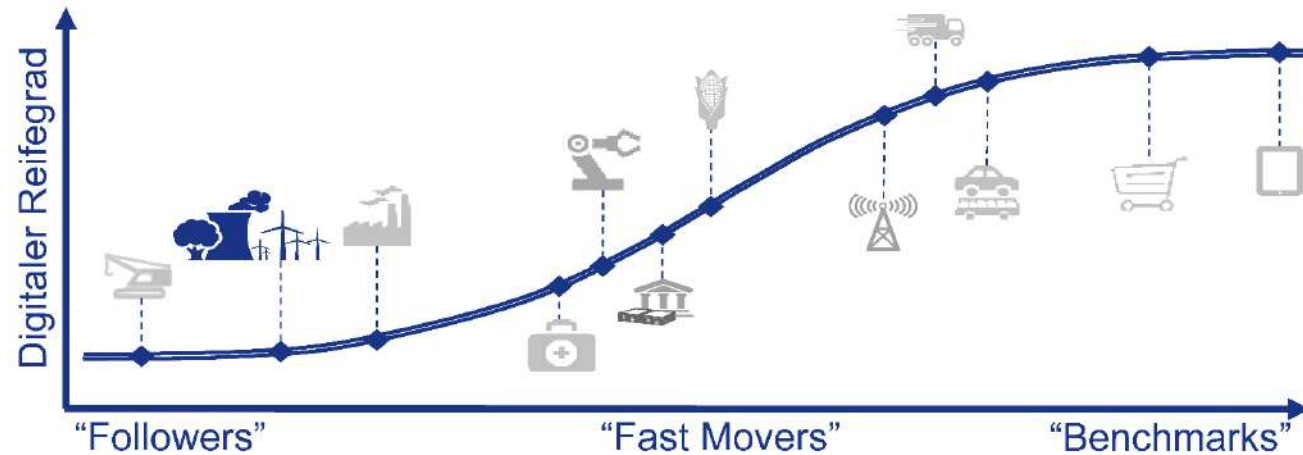


2050

DOMINATING ELECTRICITY AS ENERGY CARRIER

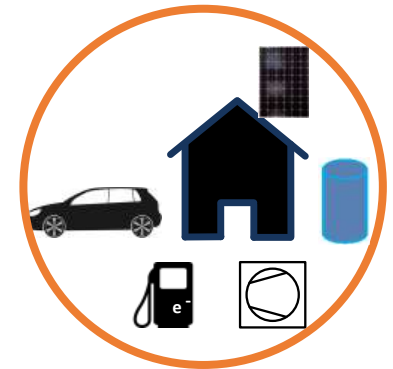
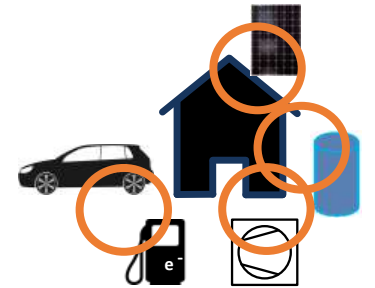
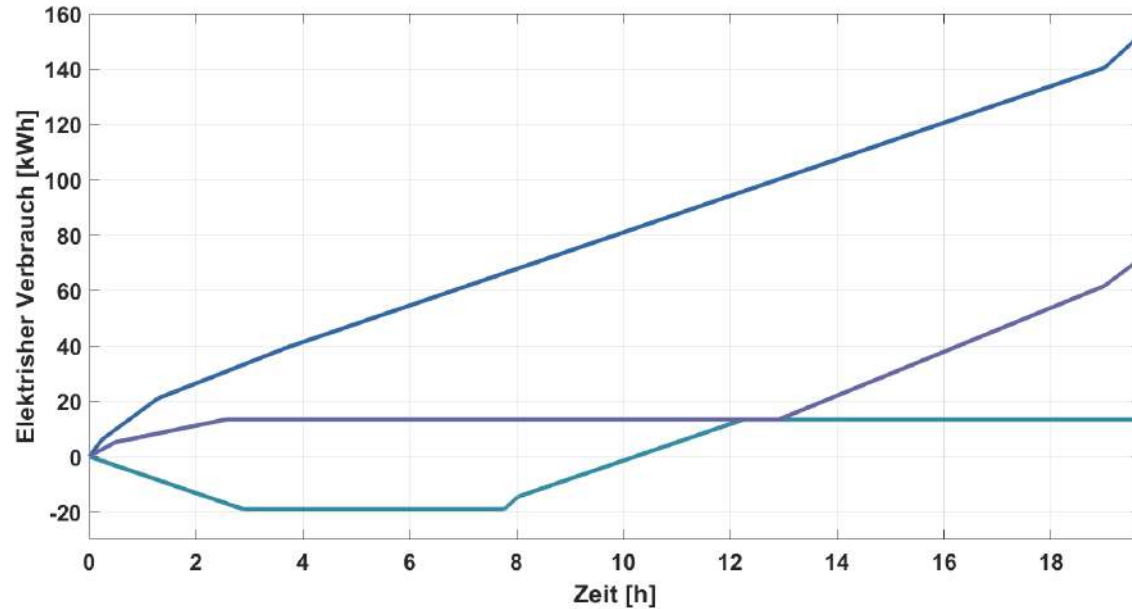


Der digitale Reifegrad nach Branche

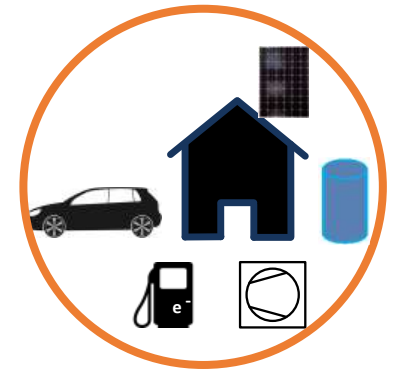
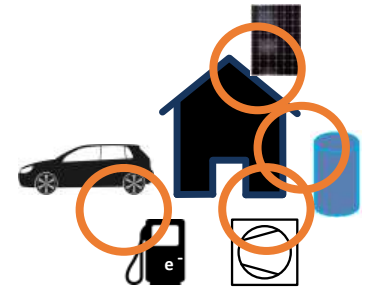
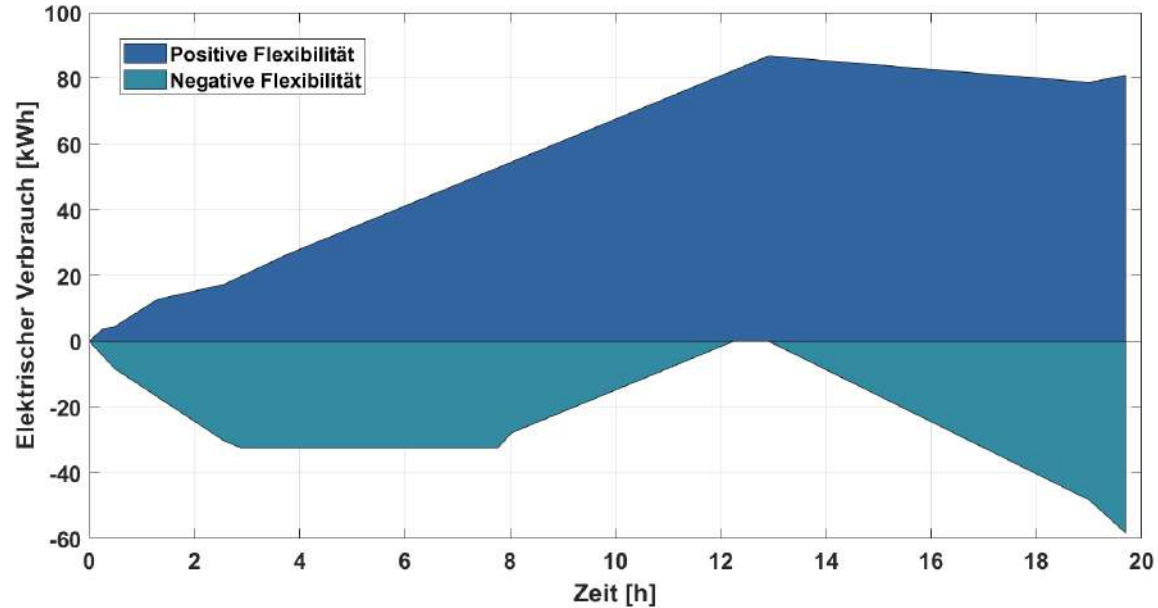


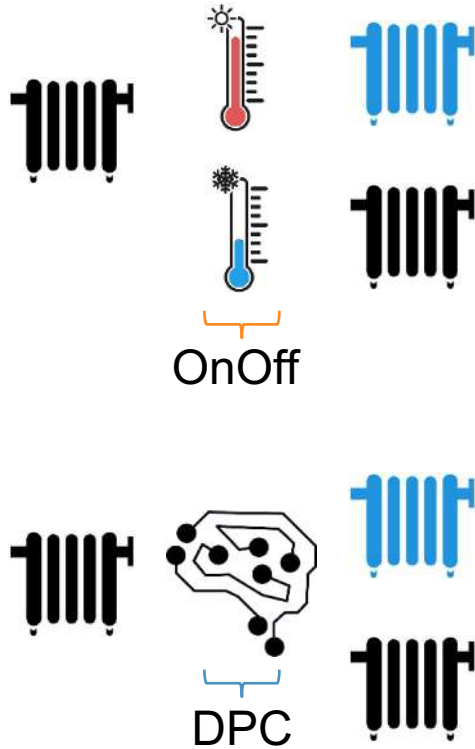
Quelle: Digital Maturity Assessment des TM Forum 2018

Kombinieren und Jonglieren



Kombinieren und Jonglieren

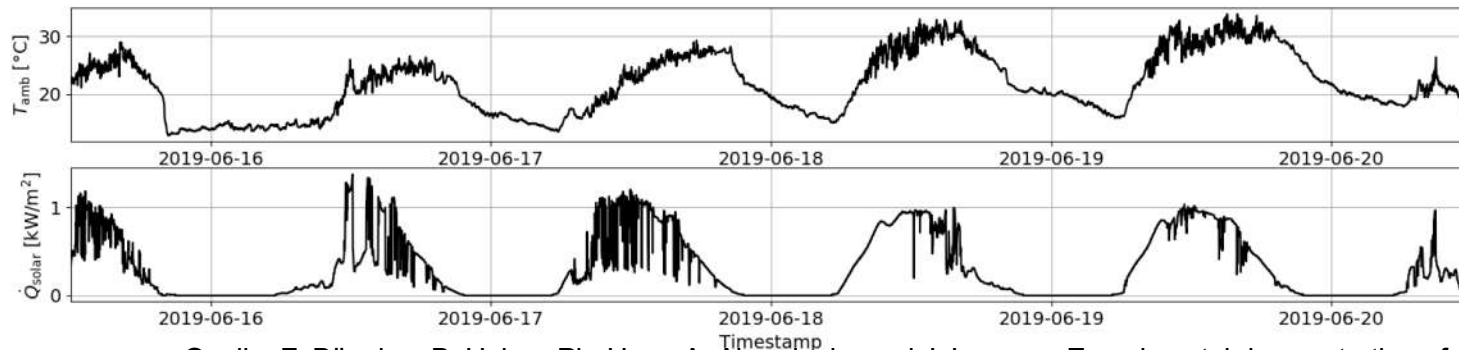




- Heiz-/Kühldecken
- Fenstersensoren
- Temperatursensoren
- Wettervorhersage

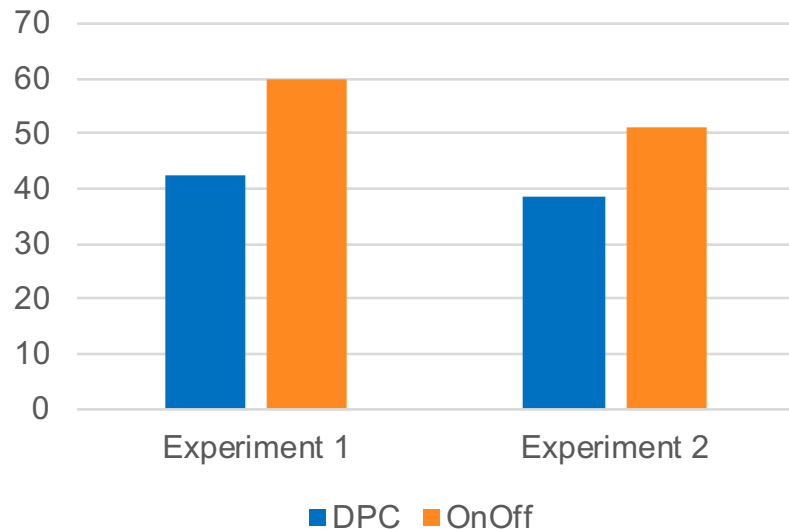


Quelle: F. Bünning, B. Huber, Ph. Heer, A. Aboudonia, and J. Lygeros. Experimental demonstration of data predictive control for energy optimization and thermal comfort in buildings. 2019. Preprint.

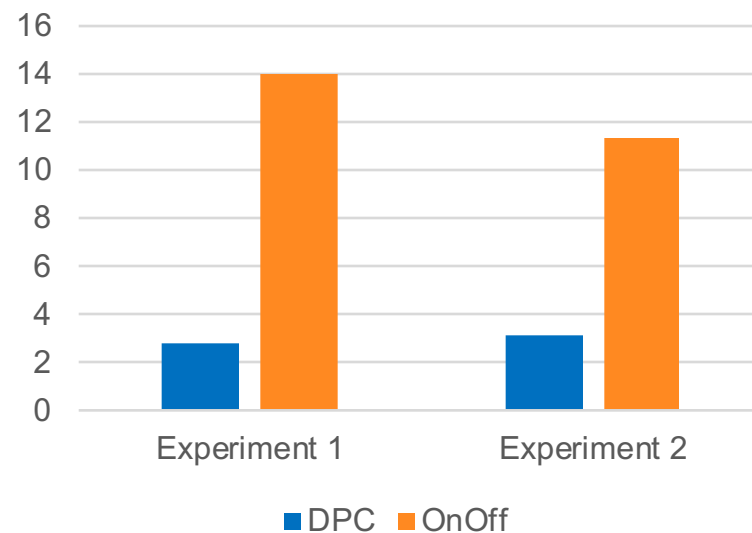


Quelle: F. Bünning, B. Huber, Ph. Heer, A. Aboudonia, and J. Lygeros. Experimental demonstration of data predictive control for energy optimization and thermal comfort in buildings. 2019. Preprint.

Kühlenergie

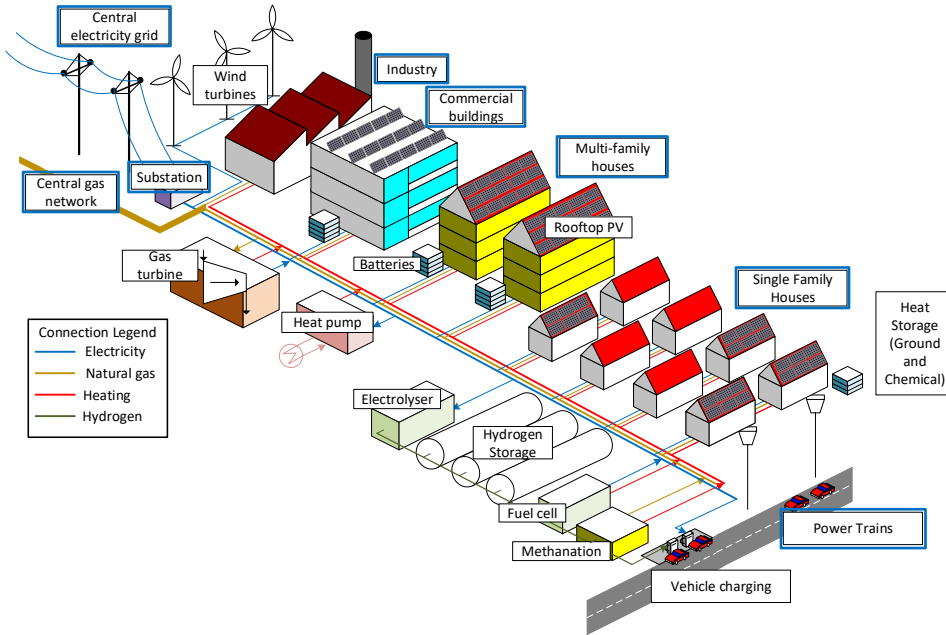


Komfortverletzung



Quelle: F. Bünning, B. Huber, Ph. Heer, A. Aboudonia, and J. Lygeros. Experimental demonstration of data predictive control for energy optimization and thermal comfort in buildings. 2019. Preprint.

Der ehub Demonstrator der Empa



- 6 Wärmepumpen
- 7 Thermische Speicher
- 1 Eis Speicher
- ⋮
- 2 Batterie Systeme
- 7 PV und thermische Systeme
- 1 E-Ladestationen
- ⋮
- 4 Thermische Netze
- 4 Elektrische Netze

340+ Aktoren
 750+ Sensoren
 9000+ Datenpunkte

multi energy system

Danke für Ihre Aufmerksamkeit!

Philipp Heer - Leader ehub

philipp.heer@empa.ch

ehub.empa.ch

