

# HiT - Häuser als interaktive Teilnehmer im Smart Grid (Building as interactive participants in the smart grid)

Utility Week 2015, Florian Judex



# Planning and construction

Design and optimization of the heating system

Planning of end user involvement

Overall construction



## Basic Idea

- Design, build and operate an apartment complex to operate grid friendly and cost effective
- Integrate the tenants as well





# Heating System



## CHP Unit



## Heat Pump

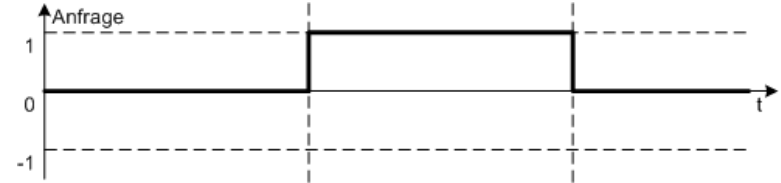


## District Heating



# Additionally

- Optimization of energy consumption (temperature levels)
- Software Agent for grid friendly operation
- Feedback Devices





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# Field Test and evaluation

One year field test

Continuous monitoring of over 500 parameters

Involvement of the tenants

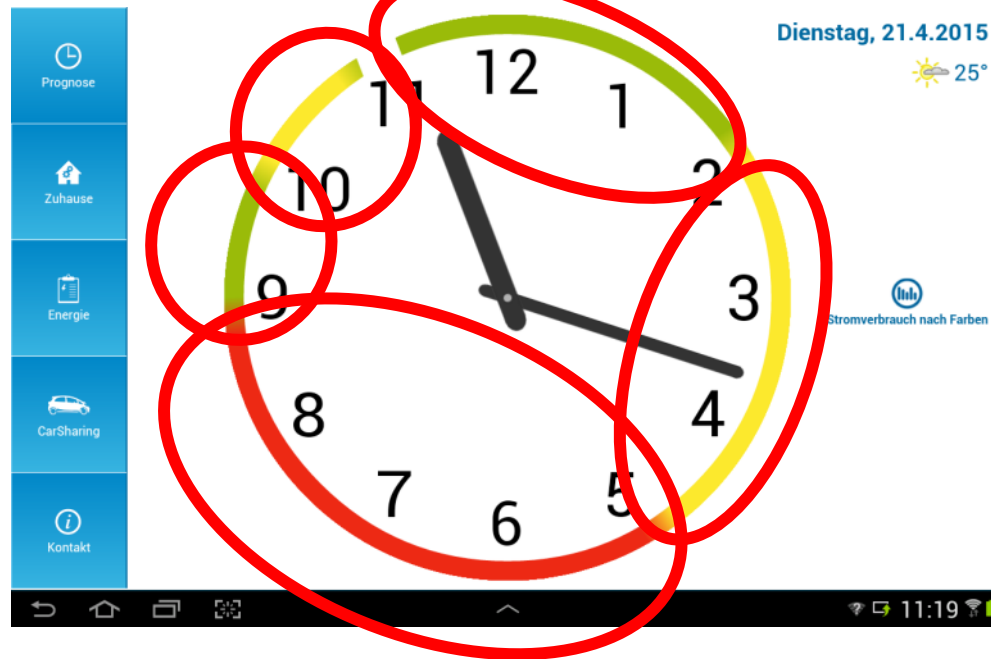
Load shifting successful





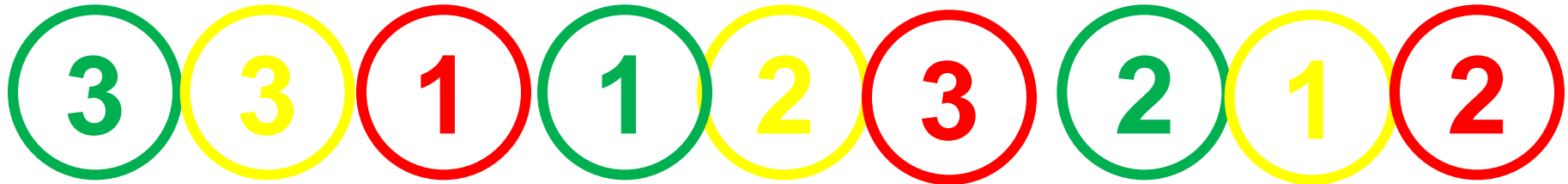
## Price Based, Traffic Light Style

- „Fore Watch“ on tablet for each participating household (30)
- **Green:** low price, grid operator wants you to consume
- **Yellow:** medium price, indifferent
- **Red:** High price, save energy





# Building, operated smart grid friendly





# Load Shifting - building

comparing

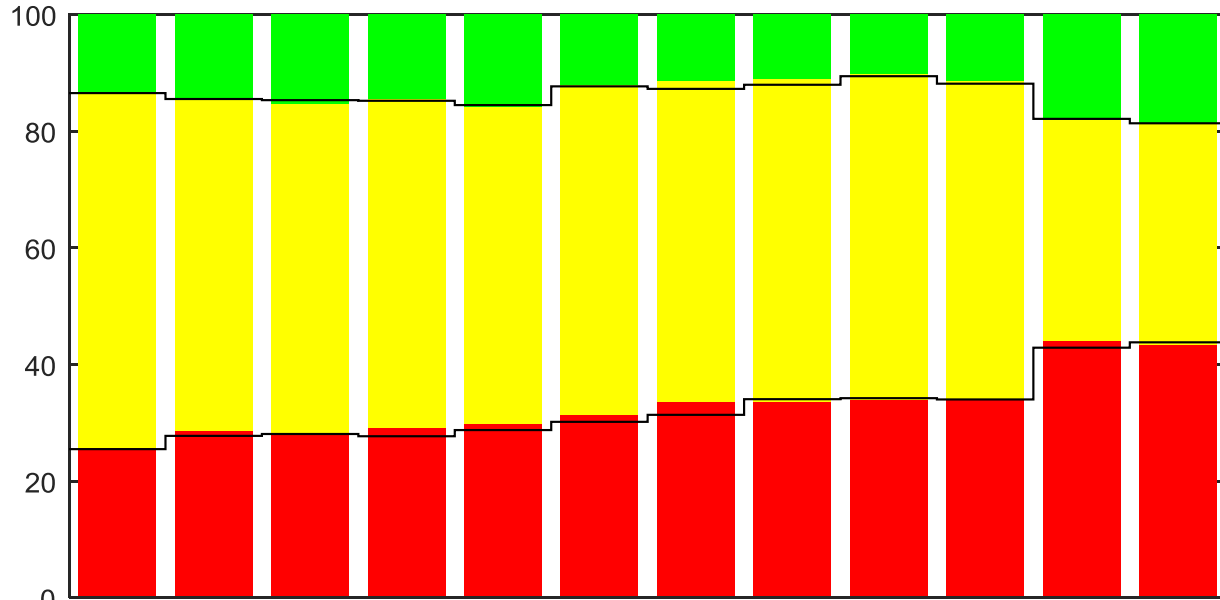
- normal operation (max. energy efficiency)
- smart grid optimized operation (run by software agent)

Heat Source	red	yellow	green
CHP	+17 %	-11 %	-6 %
HP	-12 %	+9 %	+3 %



# Load Shifting, Tenants

- Monthly comparison with control group – 14.9% less energy consumption
- No measurable effect (although change in behavior claimed by participants)
- But also no complaints during grid friendly operation





# Thank you for your attention

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