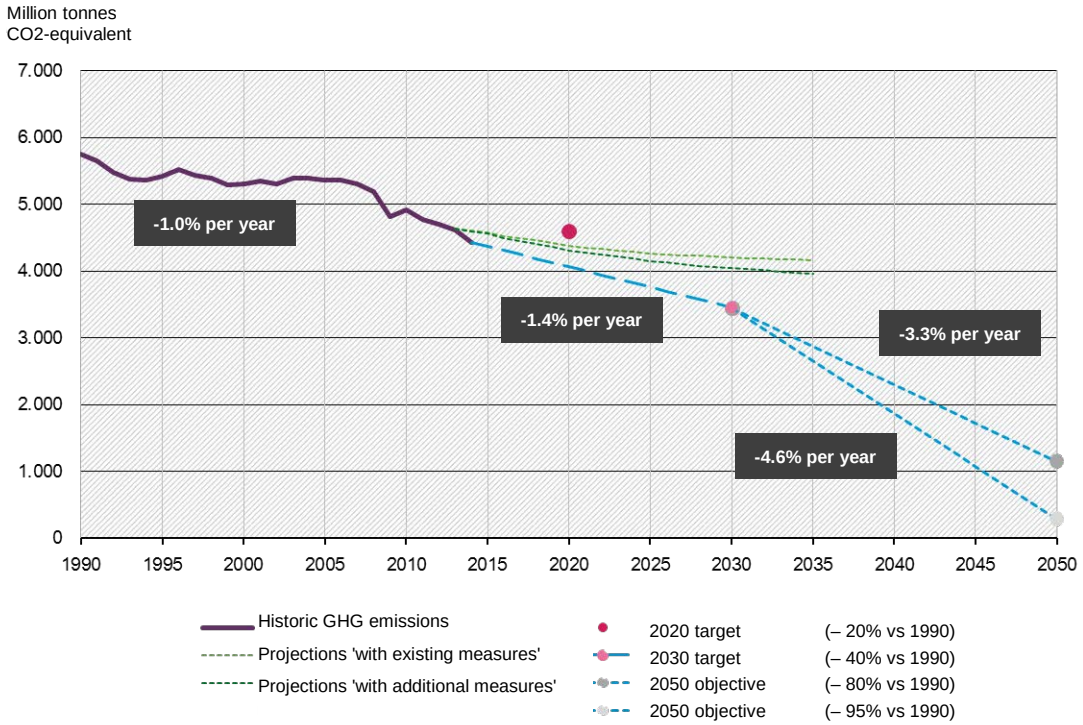
Innovate 4 Climate

Frankfurt 23.05.2018

Josef Karl – Business Development BU Energy DACH

Greenhouse gas emissions in the EU

Forecast for 2035 and reduction targets for 2050



Source: European Environment Agency (EEA), EEA Report No 4/2015, Trends and projections in Europe 2015, Figure ES.3

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Phases of the Energy-system-Transformation

Phase 1
»Development RE«

CO_2 ~ -20%

- Development of basic technologies
- Significant cost reductions
- Market introduction and expansion without implications for the whole system

Phase 2
»System integration«

CO_2 ~ -20 to -60%

- Activation of flexi-bility in electricity generation & -usage
- Demand-Side Management
- Short-term-storage
- Convergence of heat and power sector

Phase 3
»Synthetic fuels«

CO_2 ~ -60 to -80%

- Renewable Energy to generate synthetic fuels
- Used especially for mobility
- Significant negative residuals

Phase 4
»RE Import«

CO_2 ~ -80 to -100%

- Complete displacement of fossil resources
- Import of RE-carriers, e.g. from sunny regions

- Continuous expansion of renewable energy production (Solar-, Wind-, Geothermal-Energy)
- Continuous increase in efficiency e.g. through structural thermal isolation or reduction of electricity consumption (lights, pumps, driving units)
- Coupling of the sectors Electricity, Heat and Mobility

Source: Hans-Martin Henning et al., Phasen der Transformation des Energiesystems. Energiewirtschaftliche Tagesfragen, Ausgabe 01/02, 2015

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Needs site users (1/2)

Attractiveness & permanently low ancillary costs

Comfort – Well Being:

- Mobility
  - Car-Sharing, E-Car Charging
  - Parking guidance system
  - Good connection to public transport
- Fast IT infrastructure
- Event & Catering Sharing
- Marketing Effects
- Kindergarten, fitness studio
- Spontaneous living and networking

Safety:

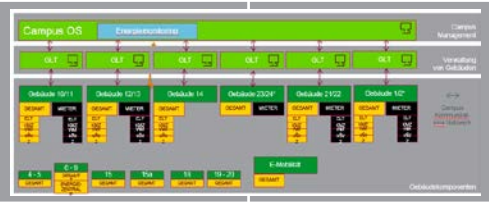
- Fast, central crisis and emergency management
- Access control
- Cyber security
- Fire prevention
- CO2 protection in e.g. basements
- Fail-safe / availability of energy supply

Asset-Management:

- Management and optimisation of real estate / campus with operational and fault management (reduction of personnel costs)
- Energy-efficient buildings / energetic construction => reduce energy consumption
- Lighting / Lighting management on campus

Areal / Campus 4.0

GLT
(building control system)



COS
(Campus Operating System)

Needs site users (2/2)

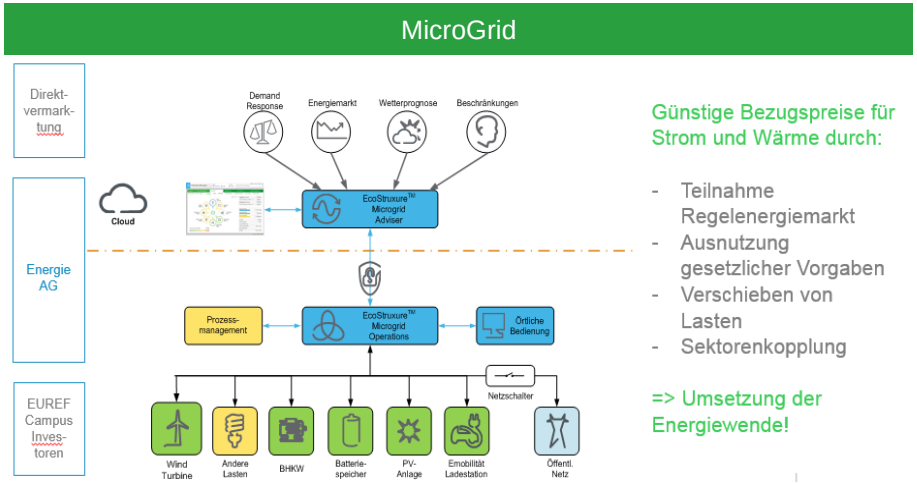
Attractiveness & permanently low ancillary costs

Bundling energy volumes to reduce procurement costs

- Cost-effective electricity & heat supply by bundling all energy quantities of the tenants & owners of the area / campus

Increase own consumption & use of possible market models

- Interaction of all producers / consumers (sector coupling) to increase own consumption (reduction of reference / delivery quantities => cost reduction)
- Further cost reduction of electricity & heat supply through participation in the balancing energy market (reduction €/kWh)



Detailed architecture

HMI

For predictive optimization and connection to third parties

EcoStruxure™ Microgrid Advisor

Customer constraints

Weather forecast

Energy market pricing

Demand response requests

Cloud

HTTPS

Customer site

DER Box

Local SCADA

EcoStruxure™ Microgrid Operation

For islanding management and DER real time optimization

Modbus, Bacnet etc

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List of available use cases

- Remote monitoring and forecasting of DER
  - Peace of mind and performance visualization
- Tariff Management
  - Consume or produce energy at the most advantageous time based on variable tariff rate
- Demand Control
  - Reduce demand charges
- Own consumption
  - Leverage your on site production capability
- Demand Response
  - Participate into the grid balancing mechanisms
- Island more preparation
  - Leverage weather forecast to anticipate on a future storm
- Islanding mode management leveraging DER
  - On and Off grid transition management
  - Power management in island mode
  - Load preservation / sharing

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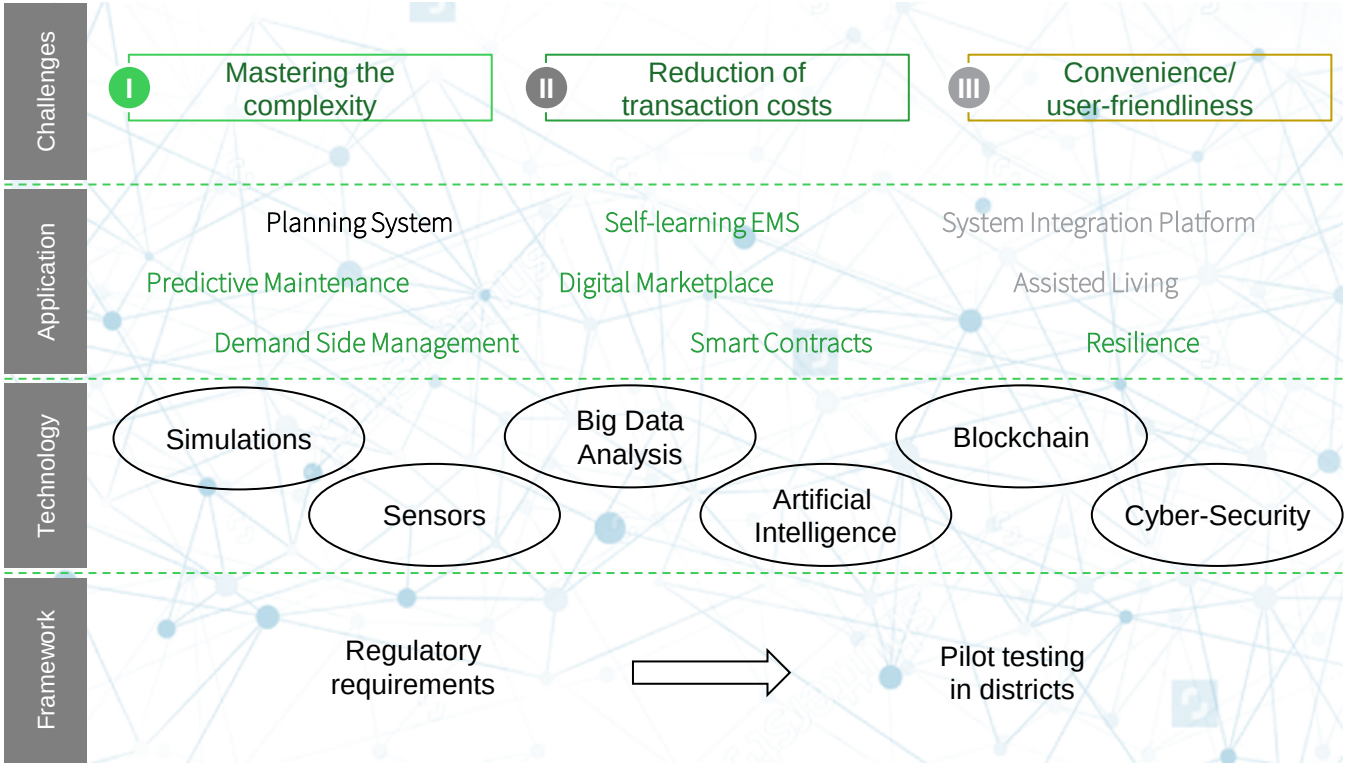
IMT Campus Microgrid

IMT is a school campus, based in Grenoble France

Schneider Electric is delivering a full microgrid solution for all the 7 buildings of the campus

- Grid connected microgrid
- DER will be EV charging stations, energy storage system, PV, BMS, CHP
- Reduction of energy costs by ~ 12%
- Reduction of CO2 Emissions by ~ 18%

Sector coupling – Challenges of a consistent implementation



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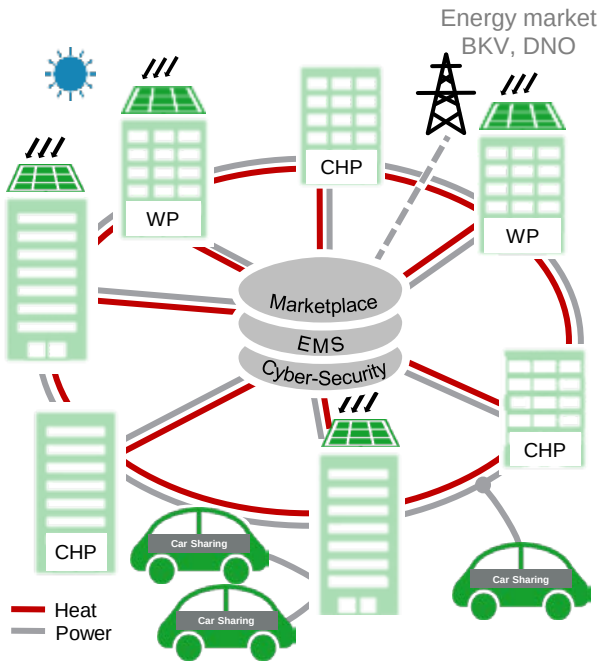
Open District Hub – Project description and development steps

Description



Gradual development in four steps

Digital Marketplace	• Fully automated processing and settlement of EMS transactions • Usage of smart contracts • Compliant to the energy market design
Self-learning EMS	• Fully integrated load management • Artificial Intelligence for forecasting and control • Optimized for eco. sector coupling
Cyber-Security	• Resilience of decentralized energy and ICT supply infrastructures • Manipulation protection for junctions • Data protection and usage control
Planning Tool	• Simulation tool for technical design of future districts • Fully integrated planning of the trades • A-priori optimized sector coupling

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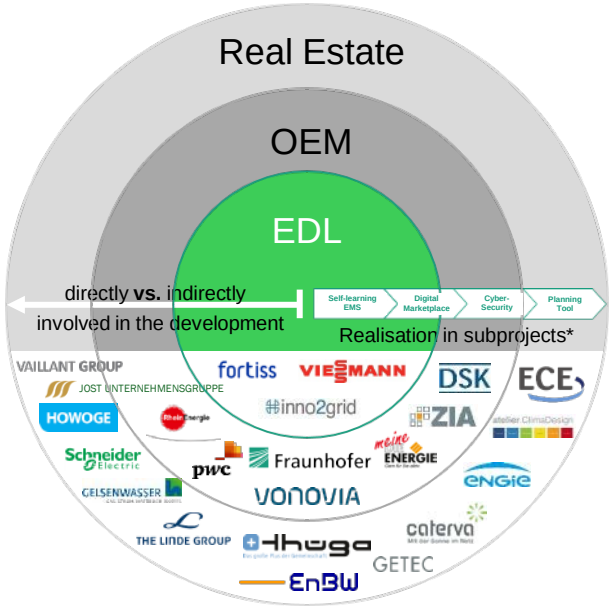
Open District Hub e.V.

Non-profit association as a guarantor of a holistic realization

Structure of the project participants



* Financed with matching promotion programs and involved companies

Reasons

- Holistic realization; integration of the entire value chain and integration of existing isolated solutions are necessary
- Enormously different interests of the value added stages (users, developers, operators)
- Non-profit association as a solution for:
  - Holism, continuity and commitment
  - Program management & coordination effort
  - Signal effect on the market (visibility)
- Benefits for members (opportunity to participate and setting standards)

Contact

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