TECHNISCHE
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Vienna University of Technology

Institut für
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Institute of
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European efforts for enabling Energy Communities

20191209 Energy Tech Meetup Vienna

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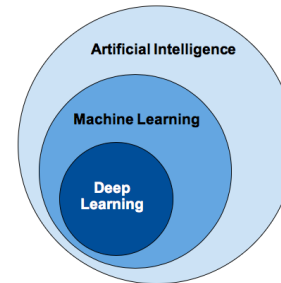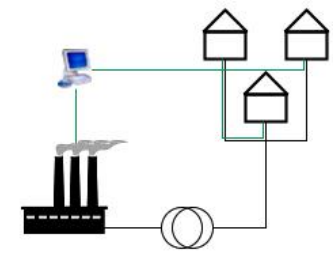# Energy & IT Group - Topics

- Smart Grids - 60%
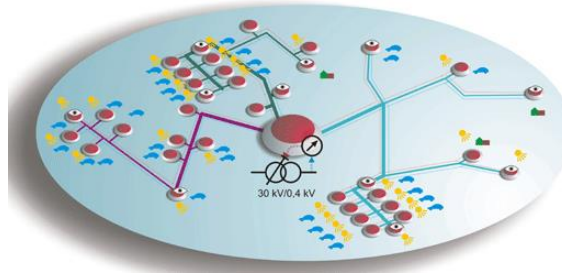
- Automation/Industry 4.0 - 20%

- AI and Machine Learning – 20%

Energy & IT Group - Competences

- Middleware solutions, communication and protocols

- Model building

- Data analysis, machine learning, agent simulations

- Teaching and dissemination

Motivation

STAYING BIG OR GETTING SMALLER

Expected structural changes in the energy system made possible by the increased use of digital tools

yesterday / **tomorrow**

production
- few large power plants
- many small power producers

market
- centralized, mostly national
- decentralized, ignoring boundaries
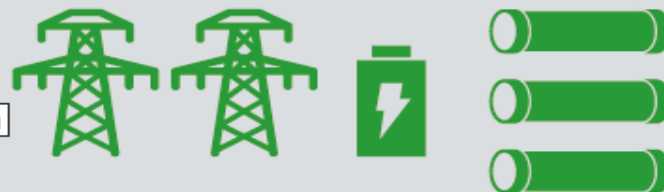
transmission
- based on large power lines and pipelines
- including small-scale transmission and regional supply compensation

distribution
- top to bottom
- both directions

consumer
- passive, only paying
- active, participating in the system

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What are Energy Communities?

Overview

Energy Community	• PV, Mieterstrom • Batteries, E-Car Charging • Load flexibility • Heat Storage • And many more
Apartment Level	• Shared solution & ownership • „Mieterstrom" - tenant electricity
Private Level	• Individual solution • PV for own use
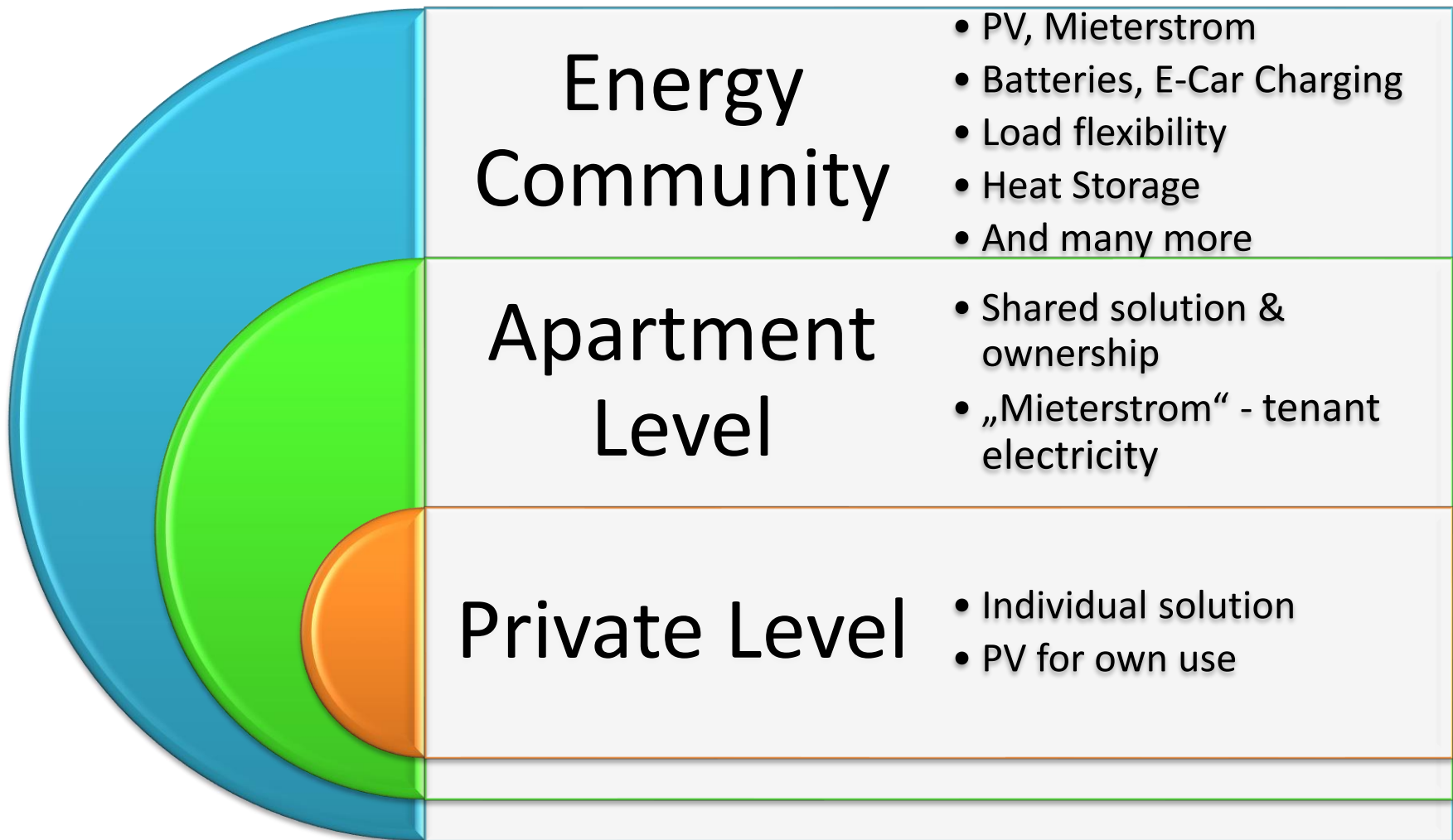
Comparison CEC - REC

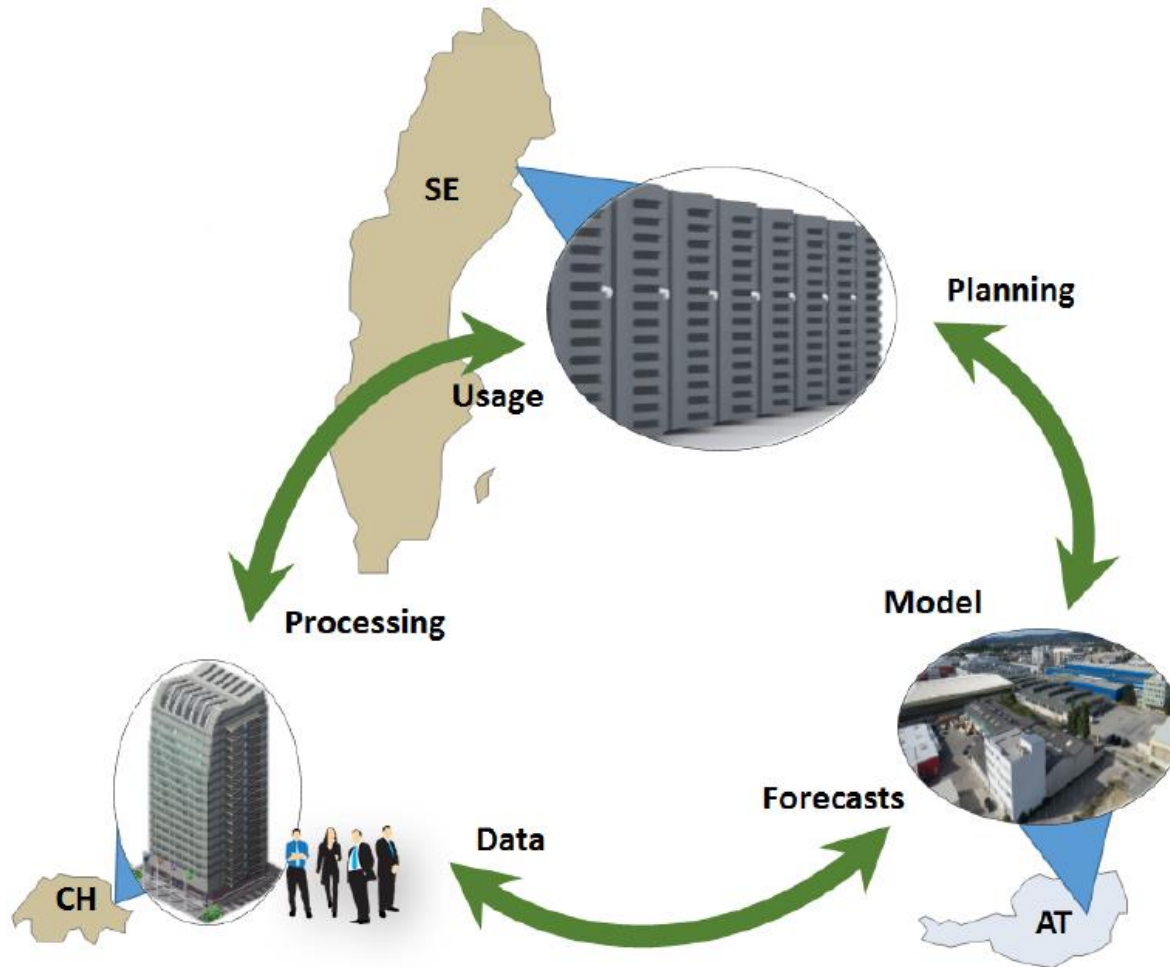| Citizen Energy Community	Renewable Energy Community
Article 2(11) Electricity Directive	Article 2(16) Renewables Directive
No geographic restriction (ie no proximity of "effective control" to the energy project required)	Approximation requirement (to be defined in national law)
Large and medium enterprises are excluded from "effective control"	Limited membership (shareholders or members do not include large companies)
Electricity only, and technology neutral (not necessarily renewable energy)	Open to all renewable energy sources (including for example heat), but limited to renewable energy sources
Main purpose of framework conditions: To create a the same playing field for the CEC as a new market player	Main purpose of framework conditions: To promote the development and growth of RECs in order to increase the share of renewable energy at national level

European projects adressing Energy Communities

ERA-Net projects

- CLUE

- EV-Chip
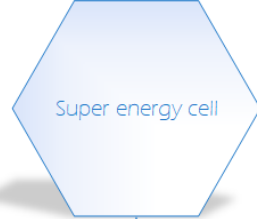
- R2EC

- SONDER

- And many more!

Horizon 2020 projects

- REScoop

- GOFLEX

- COMPILE

- MUSE GRIDS

- And many more!

SONDER

Service Optimization of Novel Distributed Energy Regions

Smart Energy Systems ERA-Net

Bundesministerium Verkehr, Innovation und Technologie

Bundesministerium Digitalisierung und Wirtschaftsstandort

FFG Promoting Innovation.

Super energy cell

Super energy cell: regions, states and associations of states, where the components are interconnected through distribution and transmission grids

Macro energy cell

Arbon
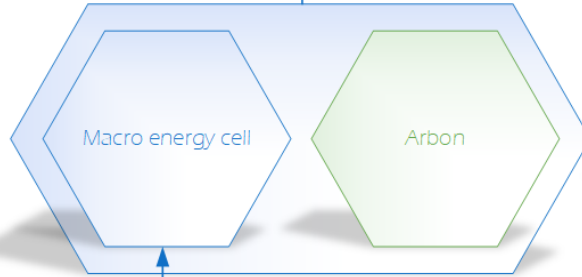
Macro energy cell: cities, towns and regions, where the components are interconnected through distribution grids

Meso energy cell

Meso energy cell

Liesing
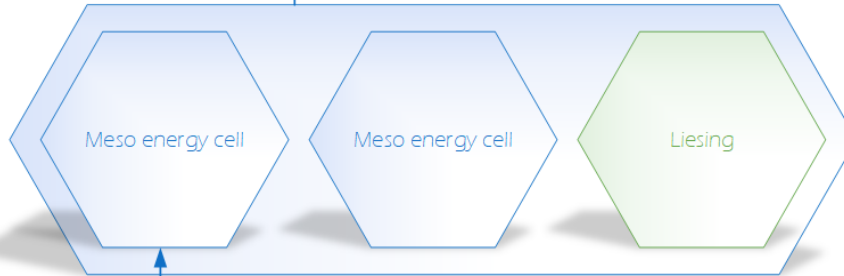
Meso energy cell: districts and quarters, where the components are interconnected through area networks

Micro energy cell

Micro energy cell

Micro energy cell

Luleå
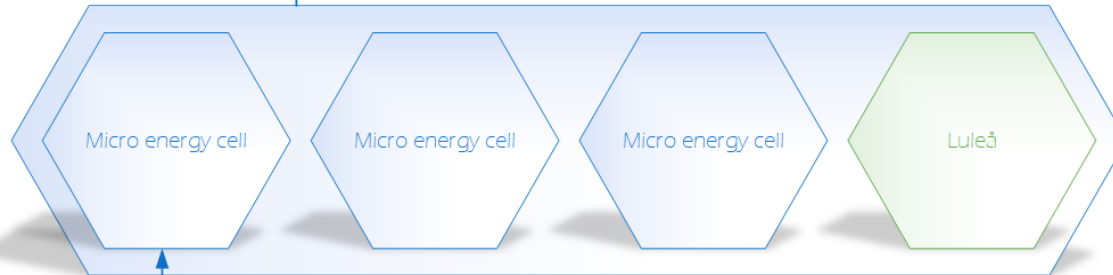
Micro energy cell: buildings, where the components are interconnected through building networks

Nano energy cell

Nano energy cell

Nano energy cell

Nano energy cell
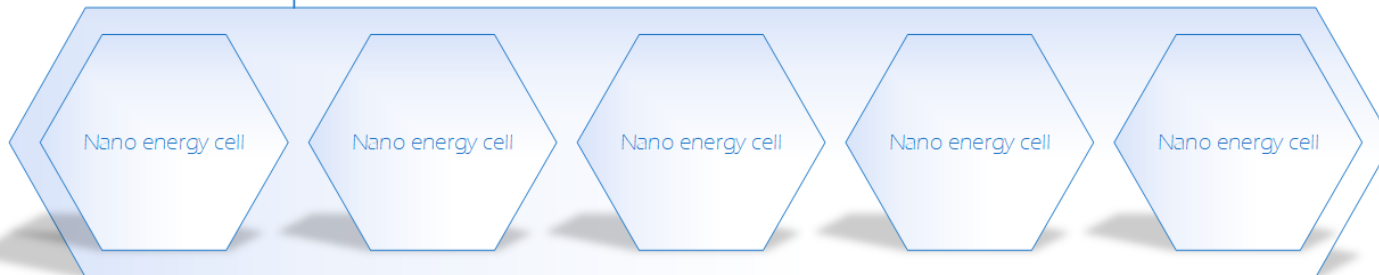
Nano energy cell

Nano energy cell: sub-buildings (plants, apartments, commercial units), where the components are interconnected through networks

Austrian Focus

- Energy Communities Battery Systems Analysis

- Profiling Interoperable Battery Storage Systems

- Modelling Demonstration Site "Standpunkt Liesing"

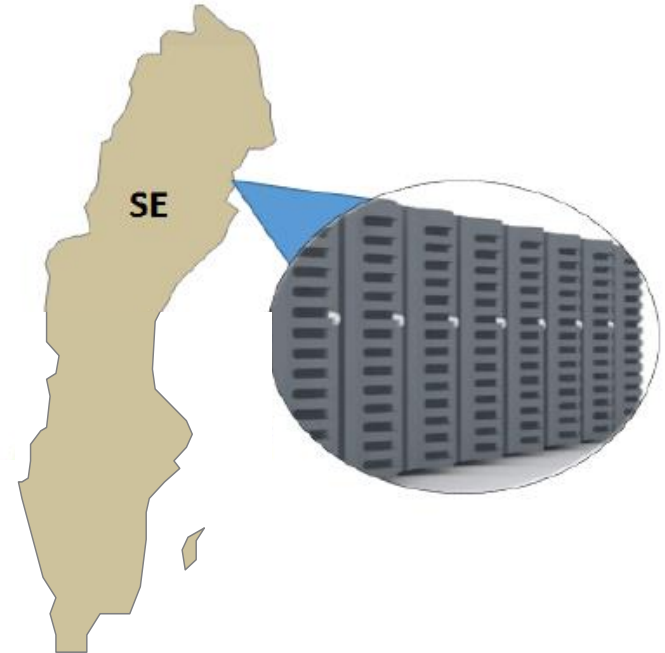- Demand Side Management Measures

Swiss Focus

- Data provision, consolidation and monitoring

- Grid model based on graph learning

- Prediction modules and related algorithms

- Sensitivity analysis

Swedish Focus

- Simulation and modeling

- Datacenter model validation

- Protocol Analysis & Harmonization

Challenges for successful Energy Communities

- Understandable „How-To" Energy Community

  - Reach broad audience, not just enthusiasts

  - Make the Energy Transistion finally happen!

- Interoperability, **Interoperability**, <u>**Interoperability**</u>!

  - Supporting the IES – Initiative to go Europe!

  - Establish Connectathons

- (Social) Return on Investment

- Research ethics and gender equality

  - Negative implications from time-based tariffs for lower income

  - „Exclusion" of community members?

IES Interoperability Testing
What is a Connectathon (Energy)?

IES | Integrating the Energy System

IES Connectathon Energy
Vienna, January 2019

© Matthias Frohner

IHE Connectathon
The Hague, April 2018

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Thank you!

What are your challenges?
What are your solutions?