



BDI



Internet
der Energie
BDI *initiativ*



Internet of Energy

Prof. Dr. Orestis Terzidis
Karlsruhe Institute of Technology

Essen, February 2012

BDI Working Group “Internet of Energy”

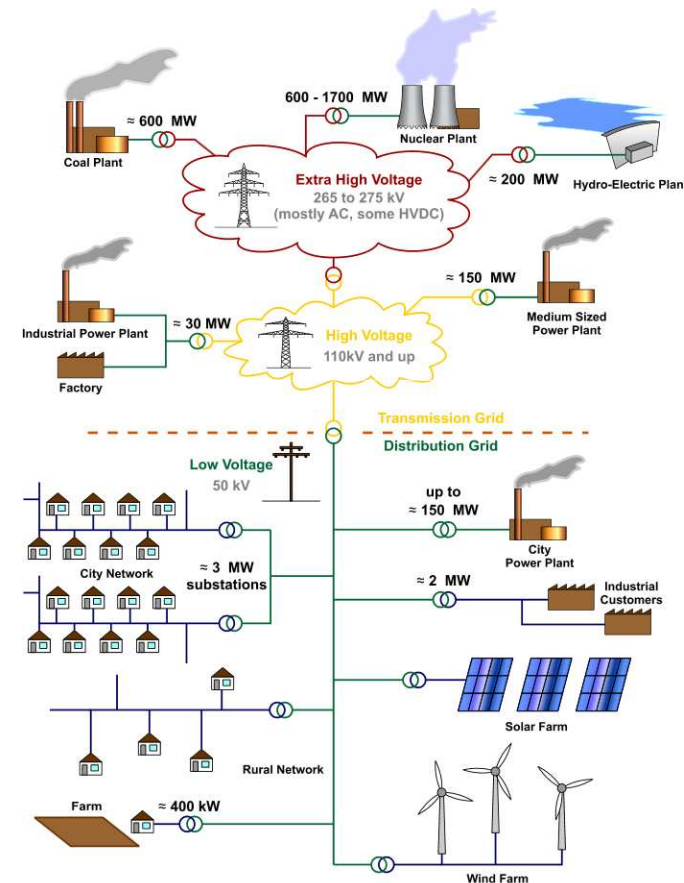
- Expert Group
 - 5 years of consultations
 - Business, Science, Politics
- 2 Publications



<http://bdi-ide.de>

The Transformation of the Energy System

- Increasing de-central production
 - Combined heat & power
 - De-central PV
- Fluctuating solar and wind power will increase
- New requirements for grid infrastructure & operations
- New business processes & business models



Source: Wikipedia

Some Facts & Statements



In 2009, **newly installed power capacity** from **renewables** tops fossil fuel generators in the US and Europe. (> \$ 100 bn of investments).

United Nations Environment Program, REN 21
August 2010



China had the biggest **wind power** addition in 2009, namely **13,8 GW** followed by the **US** with **10 GW**.

United Nations Environment Program, REN 21
August 2010



In 2050, **solar power** could deliver
20-25% of global electricity.

**International Energy Agency
Technology Roadmap Reports2010**



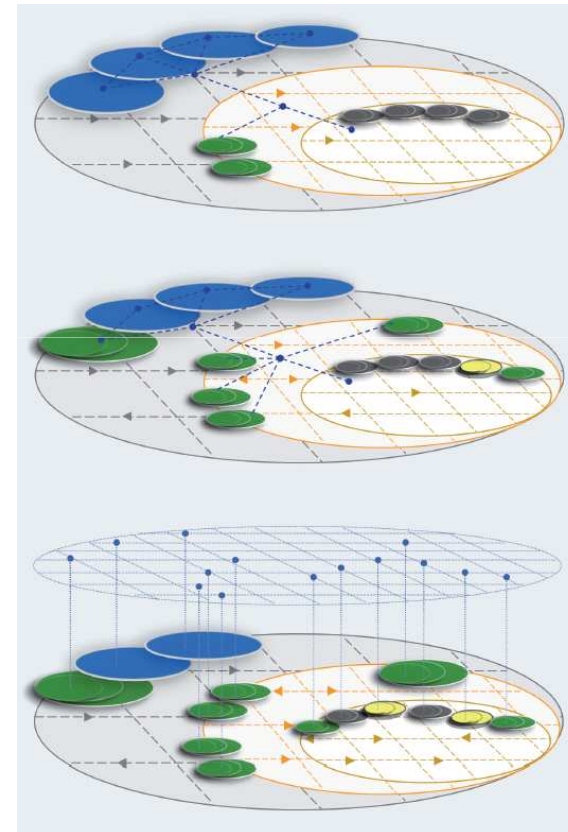
**The price for Concentrated Solar Power will
drop by 76% until 2030.**

**International Energy Agency
Technology Roadmap Reports2010**

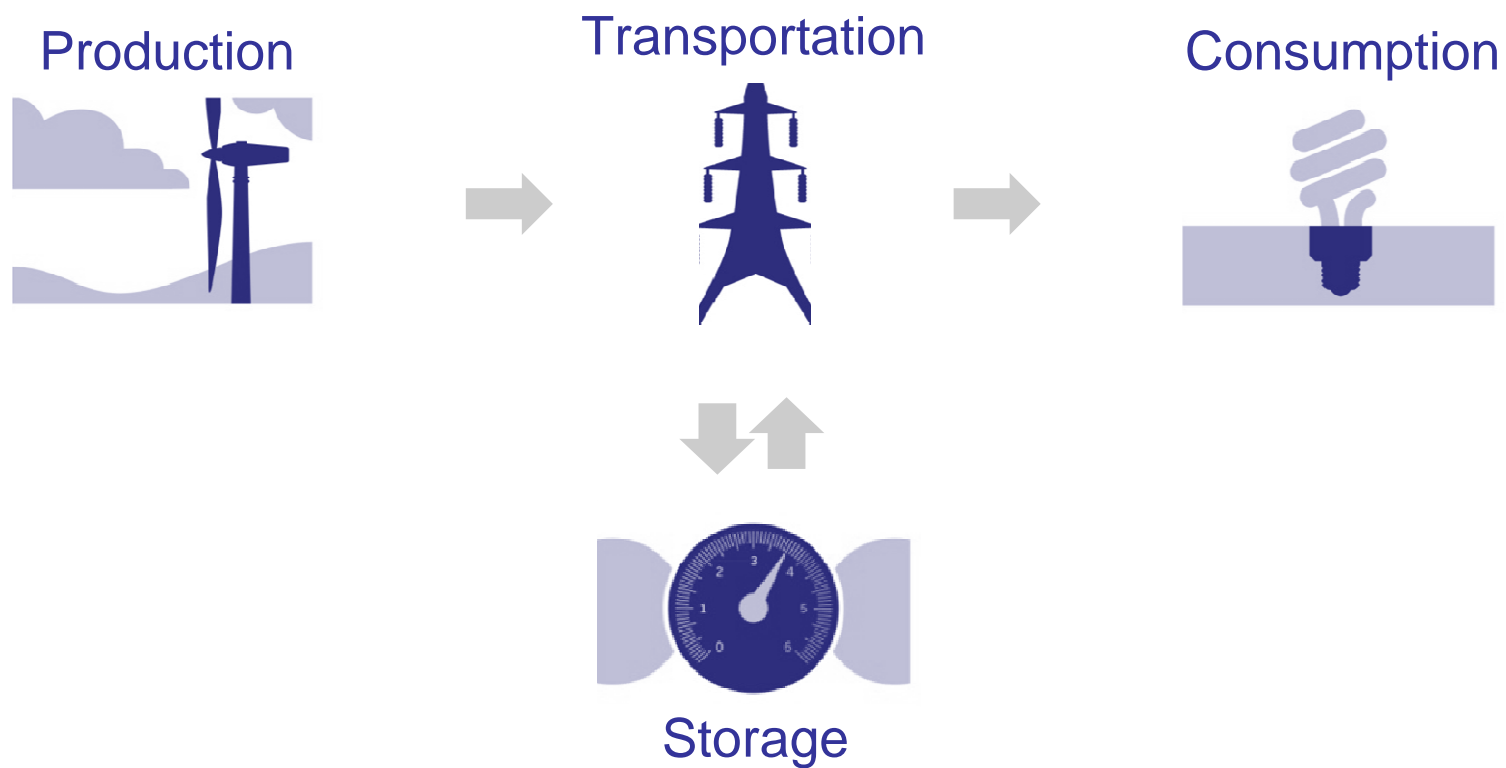


Information Flows can Optimize Energy Flows

- Three tier grids transport power from central plants
- Fluctuating plants and pro-sumers emerge
- All components of the energy system are interconnected and form an “Internet of Energy”



Overall Energy System: $4 \times 3 \times 3 = 36$ Technology Fields

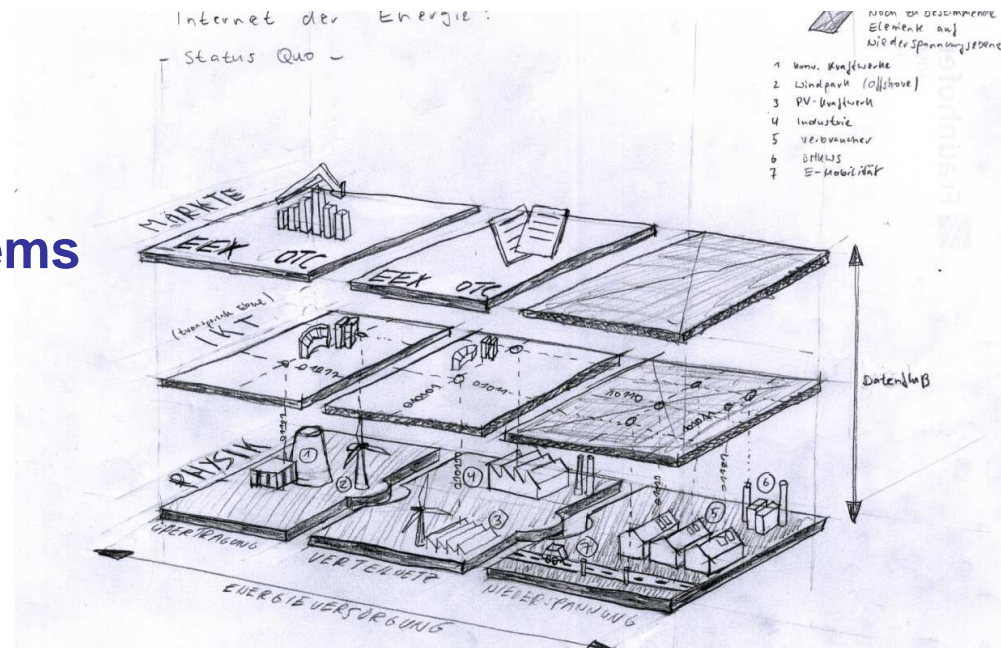


Transportation 3 x 3 Matrix

Information Systems

Technical IT

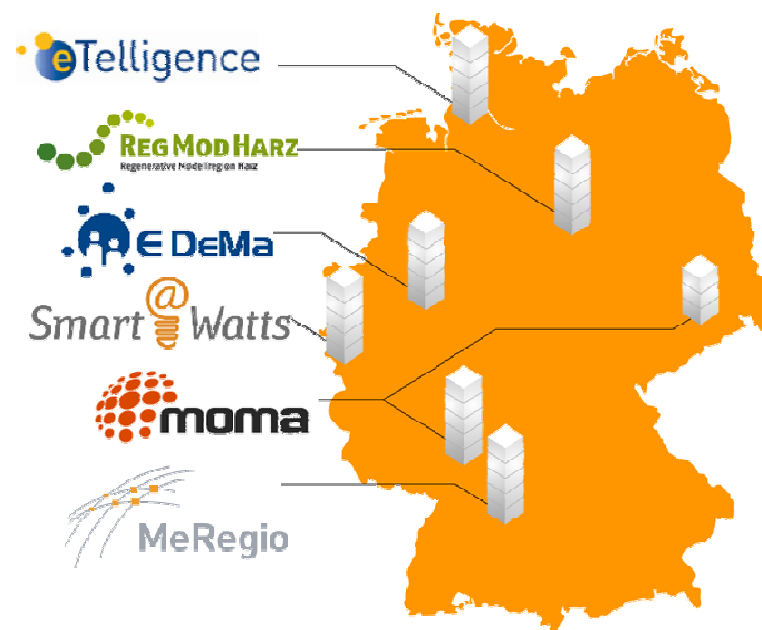
Physical Assets



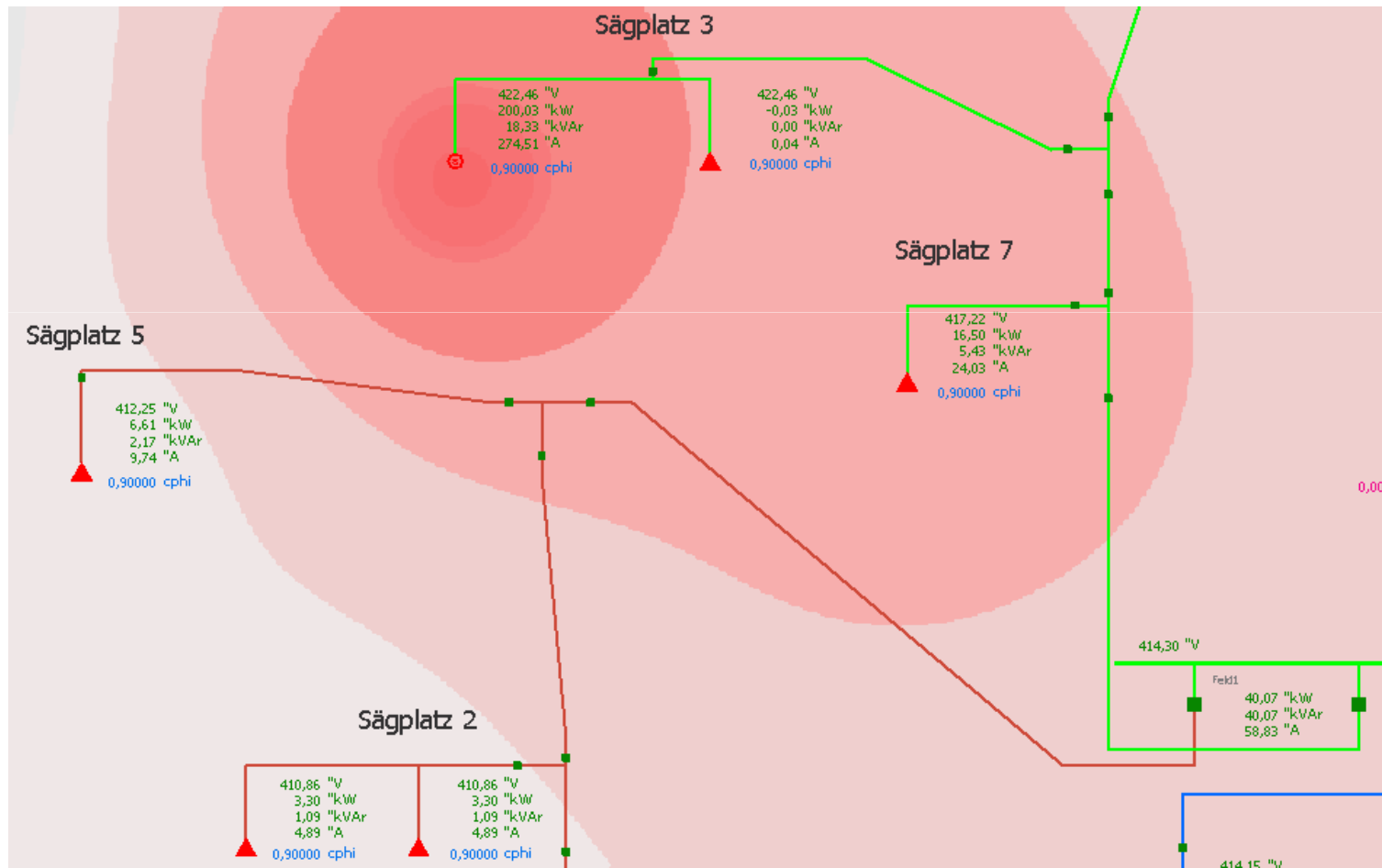
Large Medium Small

E-Energy – Field Trials in 6 Regions

- Virtual Power Plants, households and SMEs of various sizes
- Next generation technical operations
- Novel business processes & business models

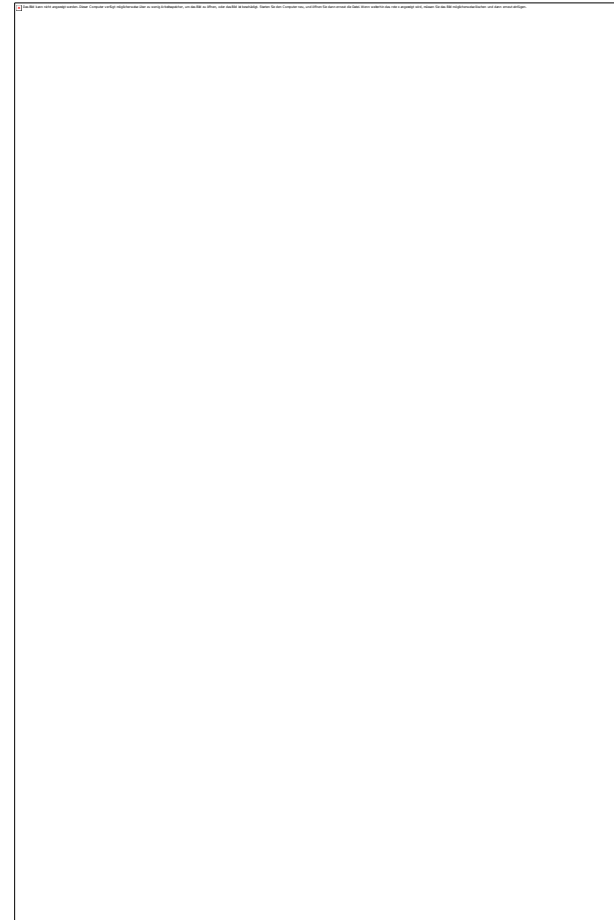


Example from Meregio



Conclusions for Urban Regions

- A Smart Energy System connects all components to dynamically match demand & supply
- New challenges for the technical grid operation
- Novel business models
- New security paradigms





BDI



Internet
der Energie
BDI *initiativ*



Thank you!

Prof. Dr. Orestis Terzidis
BDI Working Group “Internet of Energy”

orestis.terzidis@kit.edu
