

“SmartGrids” and Grid Integration of DG: R&D in Europe

**3rd EPRI International Workshop on ADA
and the Distribution System of the Future
Raleigh, NC, 2007-10-15**

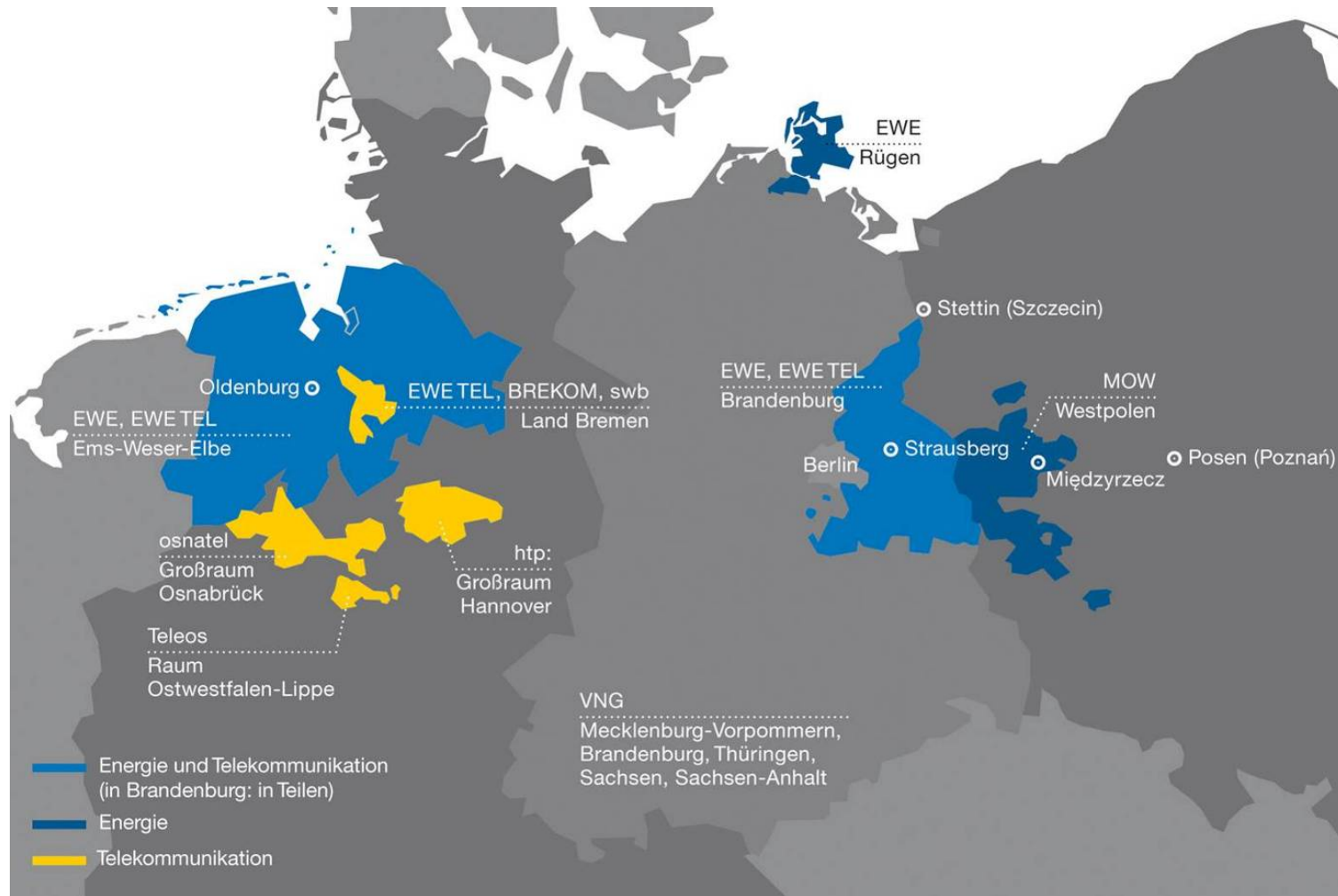
Dr. Wolfram Krause, EWE AG

Overview

- EWE AG, Oldenburg, Germany
- R&D Programs on Advanced Distribution
 - Europe
 - Germany
 - Denmark
- Main R&D Tasks

EWE Grid Areas

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R&D Programs on Advanced Distribution

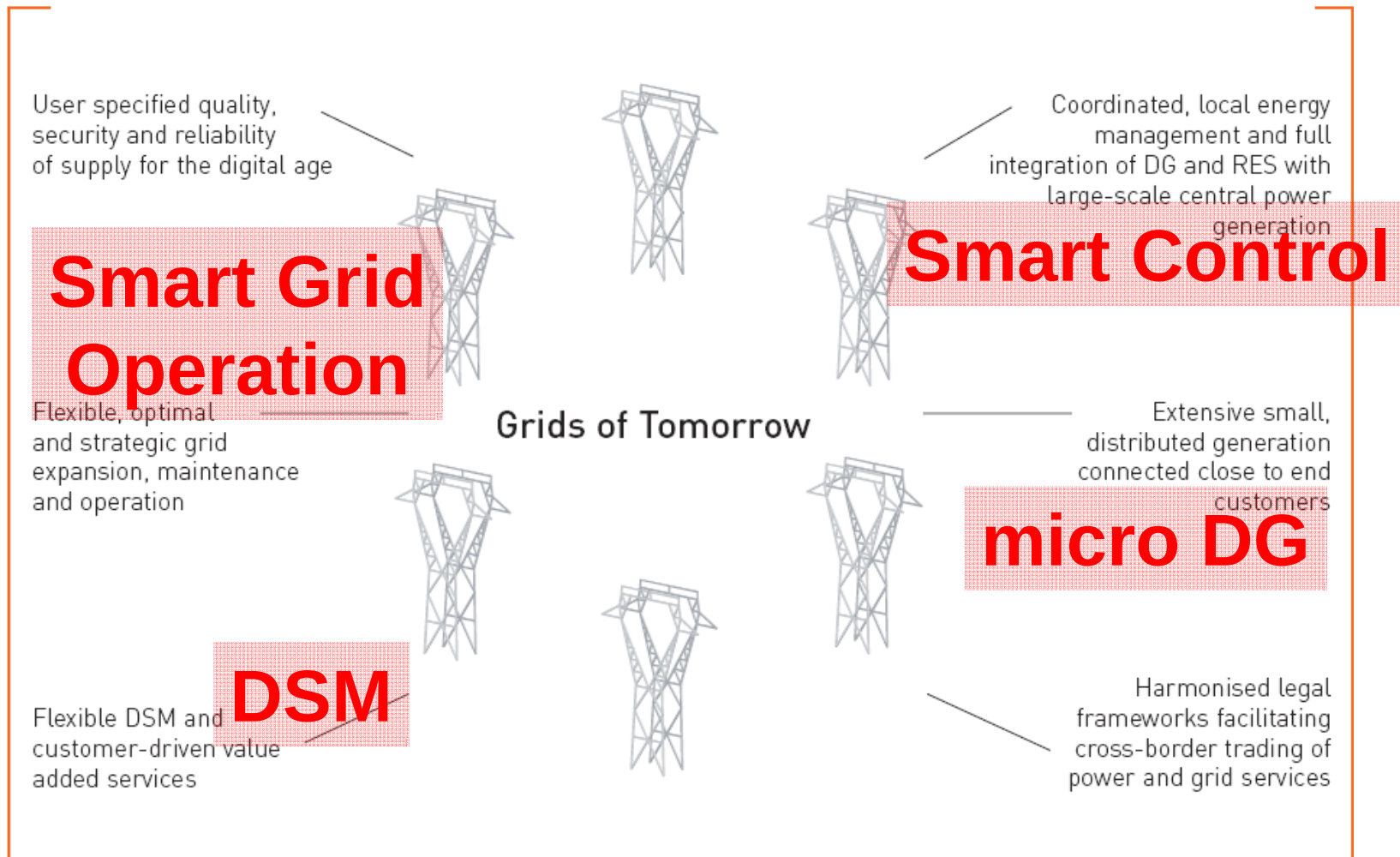
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- European Technology Platform “SmartGrids”
- “E-Energy” (Germany)
- “Cell-Project” (Denmark)

- European Union
 - DISPOWER, CRISP, Microgrids, ANEMOS

- Germany
 - EDISON, DINAR, WISENT, FC4DEMS

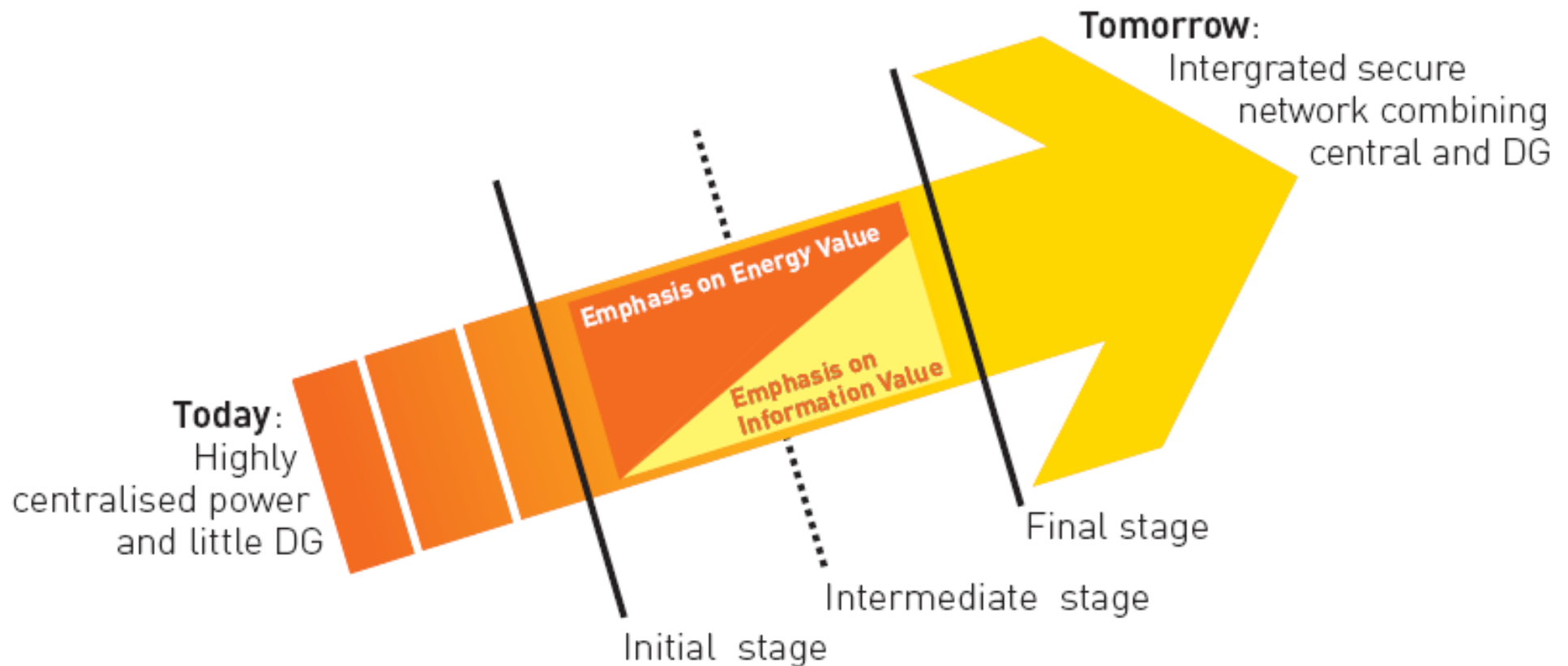
European Technology Platform SmartGrids



Source: EU Publication EUR 22040

European Technology Platform SmartGrids

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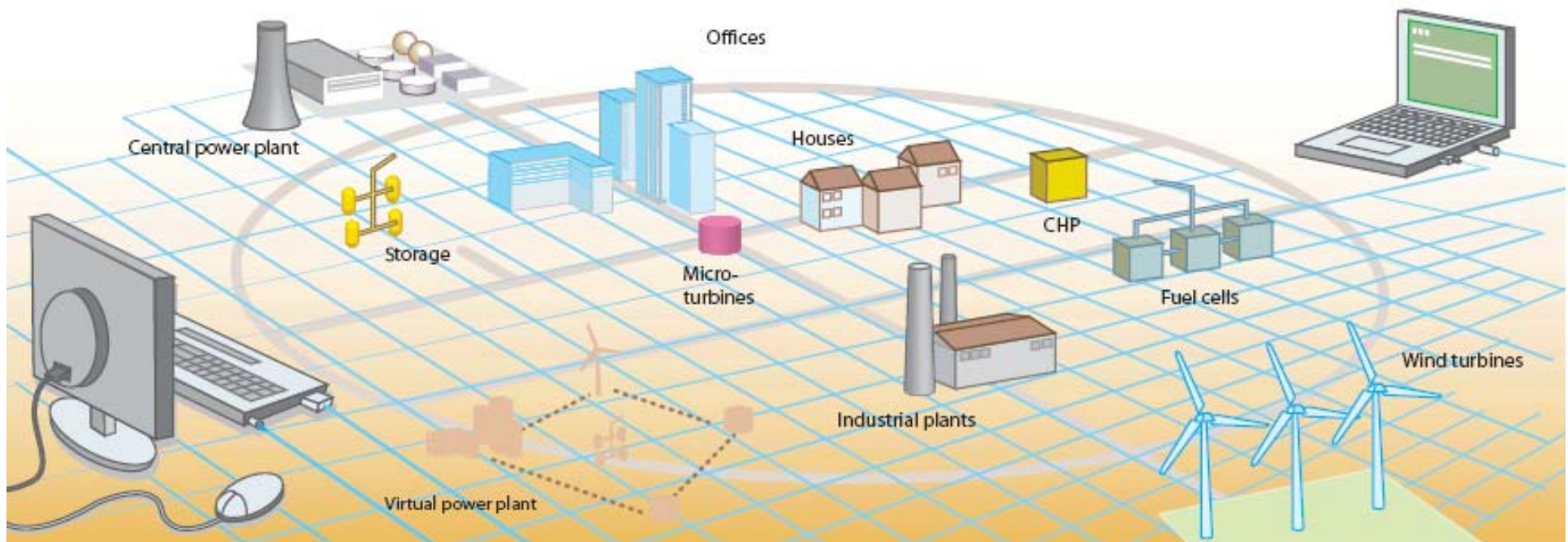


Source: EU Publication EUR 22040

European Technology Platform SmartGrids

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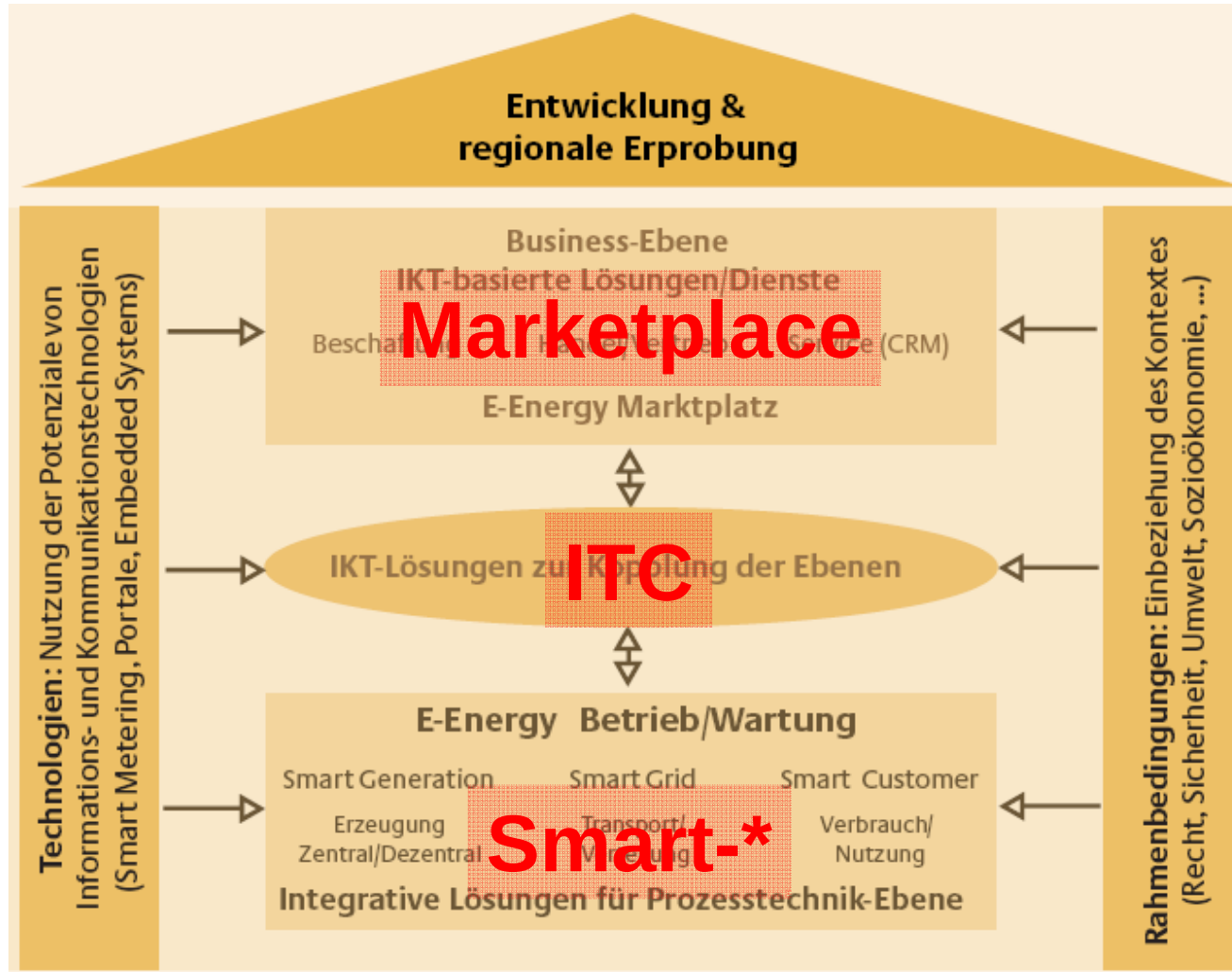
- “SmartGrids” vision of the future energy system



Source: Ausschreibungsrichtlinie E-Energy



German Ministry of Economy: “E-Energy”



Source: Ausschreibungsrichtlinie E-Energy

“Cell-Project” (Denmark)

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- DG connected to Distribution Grid
 - 44 % of electricity production
 - 25 % non controllable
- Dependency on Im- and Exports!
- Cell-Project
 - Decentralized control: Cells on MV level
 - Cells locally balance production and consumption
 - National TSO communicates with cells

R&D Programs on Advanced Distribution

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- DISPOWER (EU), EDISON, DINAR (Germany)
- Microgrids (EU)
- ANEMOS (EU), WISENT (Germany)
- FC4DEMS (Germany)

Major Problems

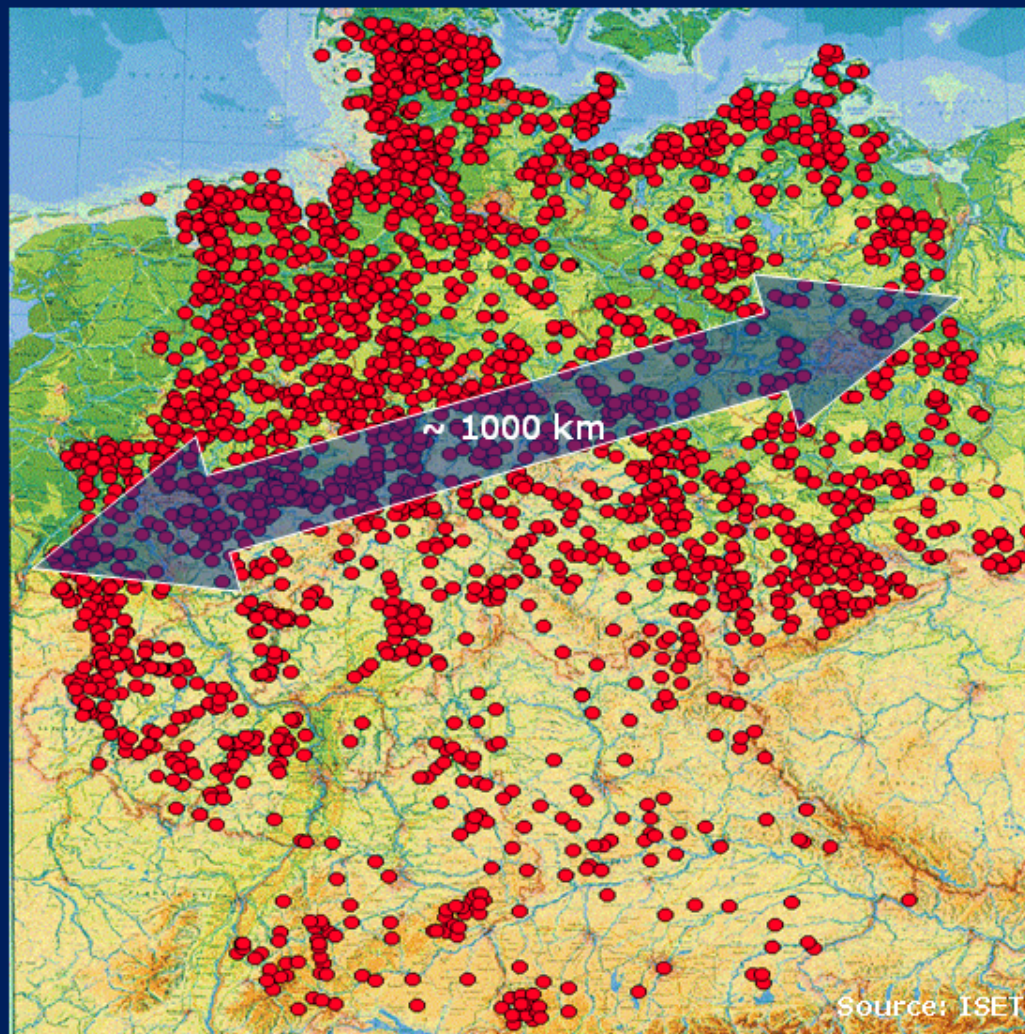
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- Communication
- Price
 - Technology available, but integration, communication and transaction costs too high!
- Grid Technology and Operation
 - Reversal of Load Flows (Protection, ...)
 - Variability of Wind and PV
 - Voltage Quality
 - Power Quality



Communication for SmartGrids and DER

- Task:
 - Intelligent grid integration (e.g. react. power control)
 - Protection and smart grid operation
- IEC 61850
 - Substation
 - DER (Part 7-420: PV, CHP, Recip. Engine, Fuel Cell)
- Wind: IEC 61400-25
- Control Center Communication: CIM (IEC 61970)



The German „Wind Power Plant“ 06/ 2007

Total wind turbine number:

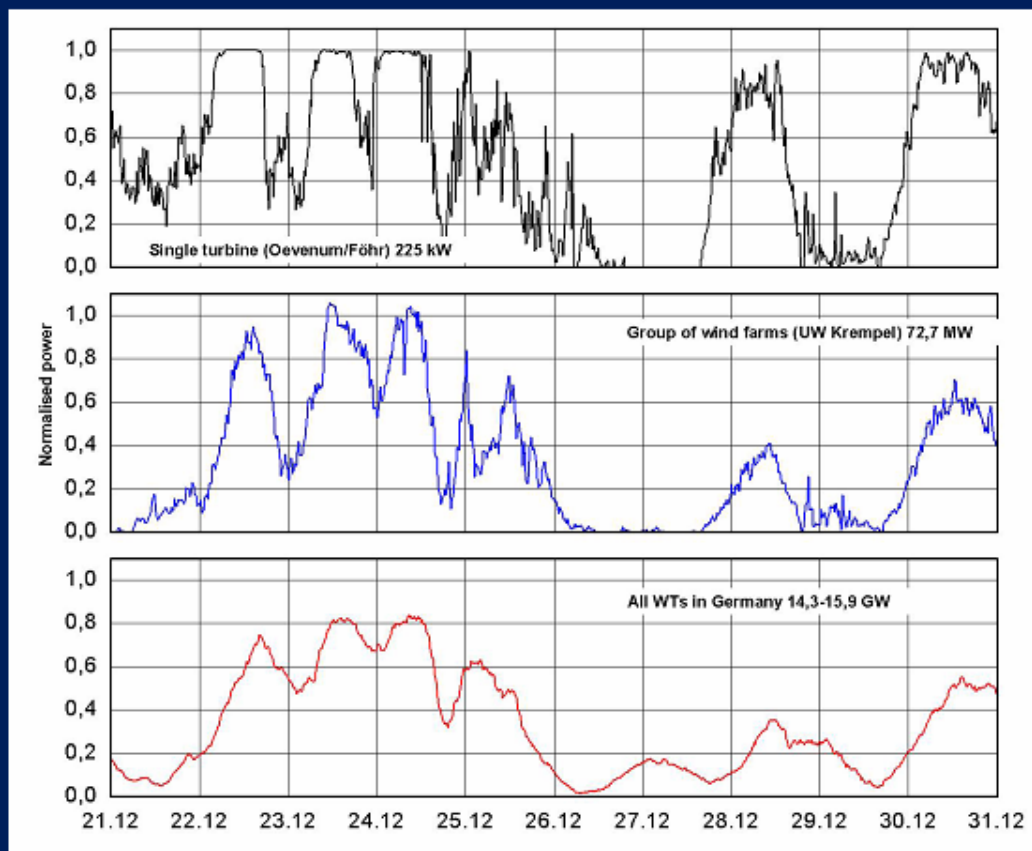
19,024 WTs

Installed capacity:

21,280 MW

● Wind Farm Sites

Wind power time series



Example of time series of normalised power output (Germany, 21 – 31/12/2004)

Single wind turbine

Group of windfarms

Total of German windfarms

Source:
IEA Wind Agreement
Task 25 / ISET

EU Action Programme “Reliance”

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- Final Reliance conference on 21 Sept. 2007 in Ljubljana
- Proposal for the foundation of “ECEN”:
European Center for Electrical Networks
- Pan-European transmission grid
operated as a single system
- But: Do not forget the interaction
with Distribution Grids!



Main R&D Topics (Europe, Distribution System)

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- Smart-*
 - Smart-Grids
 - Smart-Generation, Smart-Transportation, Smart-Distribution, Smart-Customer
 - Smart-Metering, Smart-Tariffs
- High penetration of RES
 - Variability of wind and PV
 - Reliability vs. Costs vs. Environment
- Standardized Communication (61850 + CIM)
 - Cheap, Plug-and-Play

Thank you!

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