
OGEMA – an open source concept for energy management in small and large scale

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Workshop Energy for Sustainable Science

Sina Pezeshki

Fraunhofer IWES, Kassel, Germany

Group: Decentralized Energy Management

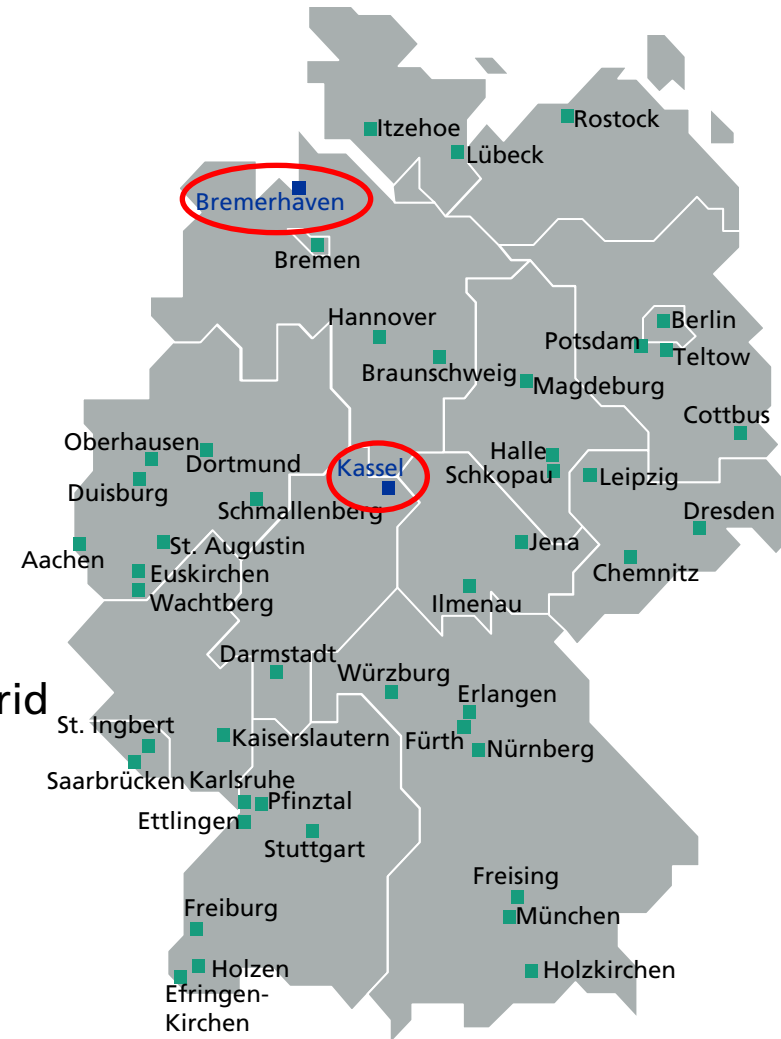


The Fraunhofer-Gesellschaft in Germany

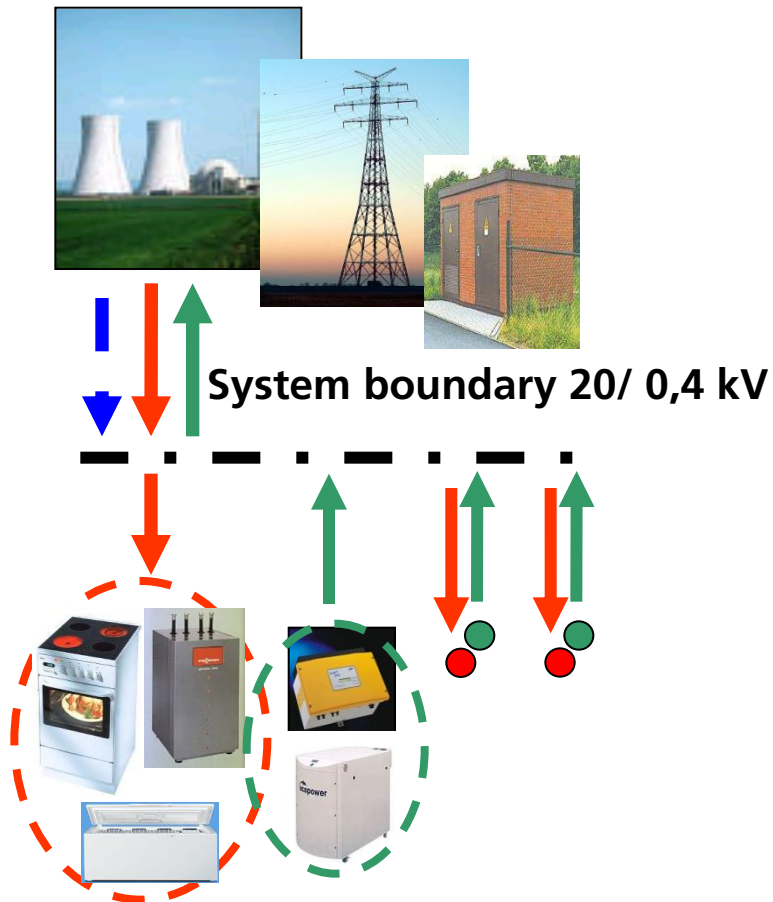
- 60 Institutes in over 40 locations
- 18.000 Staff
- 1.660 Million € per year R&D-budget

IWES: Institute for Wind Energy and Energy System Technology

- Foundation: 2009
- Annual budget: approx. € 15 million
- Research spectrum:
 - Energy system technology for all renewables
 - Wind energy from material development to grid optimization
- Personal: approx. 220
- Directors:
 - Prof. Dr. Jürgen Schmid (Kassel) &
 - Prof. Dr.-Ing. Andreas Reuter (Bremerhaven)



Situation today: decentralized generation and consumption

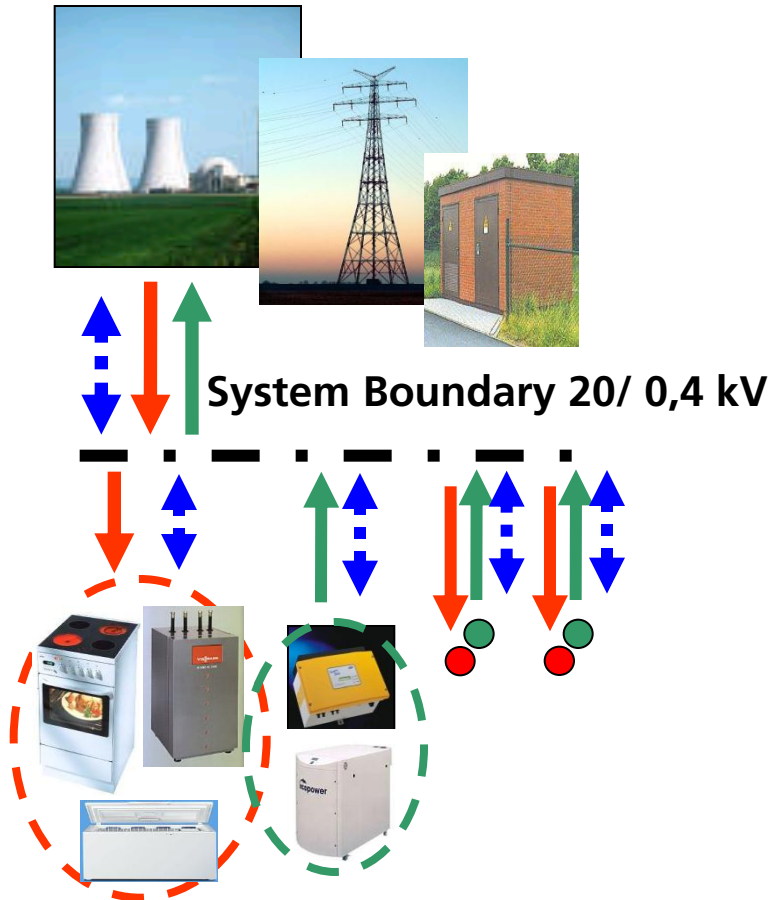


- Share of decentralized generators in low- / middle voltage (LV/MV) grid increasing
- 50 % of German electrical energy consumption in the LV grid
- Consumption and Generation non-optimized
- No Communication and Control in LV grid - no supervision or control of generators and loads possible!

→ Arising grid problems due to high share of distributed generation

Introduction: the visionary „smart grid“

Situation tomorrow: Optimized consumption and generation



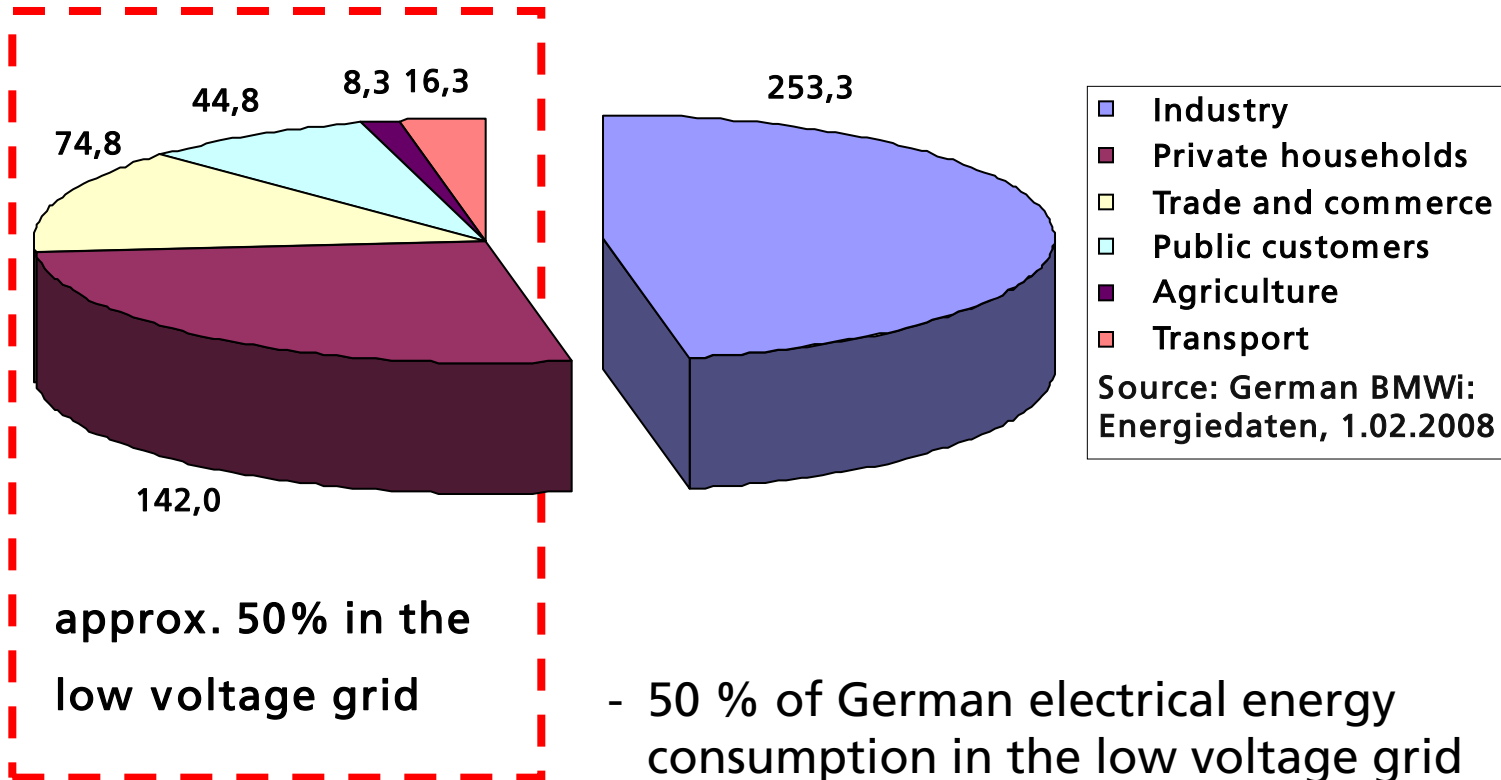
→ Goal:

- Efficient use of renewable energy sources, avoid derating DG
- Consumption AND Generation optimized
- Communication down to LV grid („Smart Grid“)

Management of DG is key element in future smart low-voltage grids!

Introduction: the visionary „smart grid“

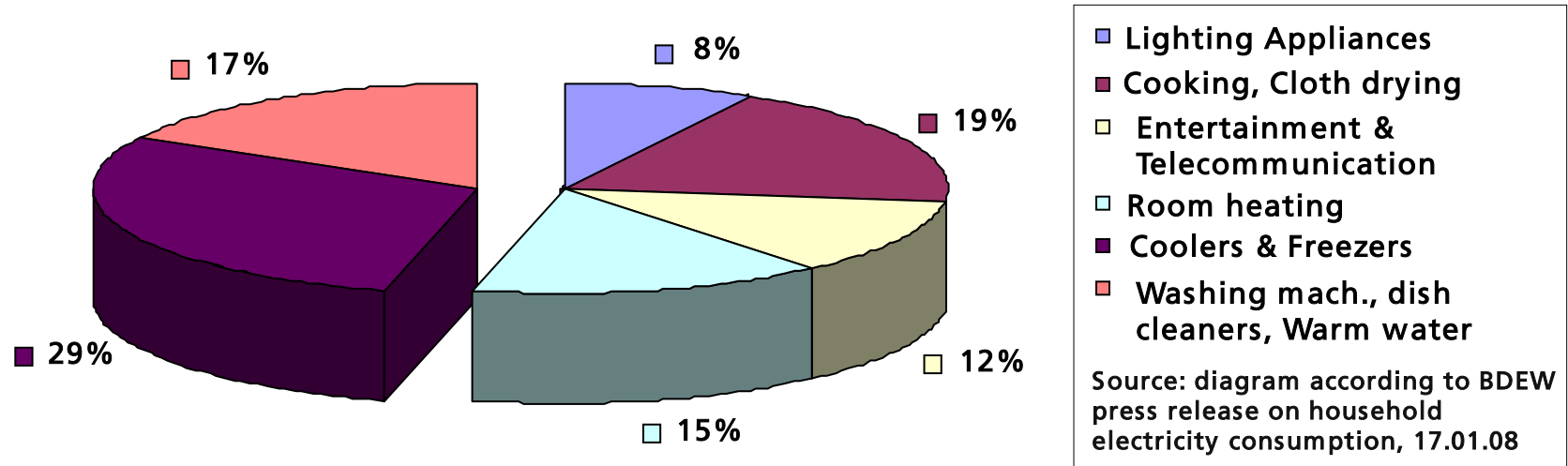
Domestic Energy Consumption in Germany 2006 in TWh (Total: 539,5 TWh)



approx. 50% in the low voltage grid

- 50 % of German electrical energy consumption in the low voltage grid
- Management only by fixed load profiles and ripple control

Potential for load management in German households

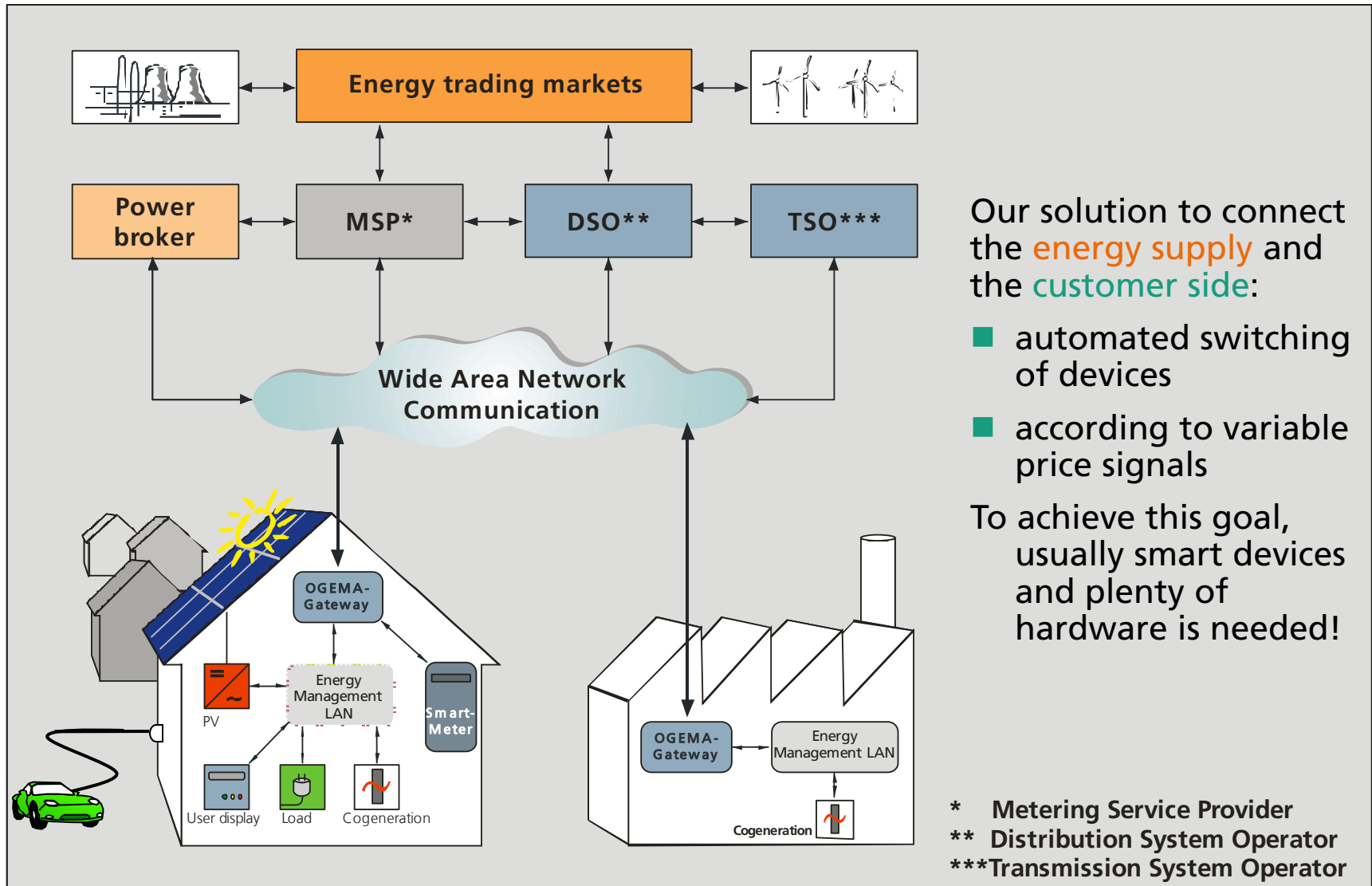


40-50% of electricity consumption caused by shiftable loads

Future: heat pumps, plug in hybrids, electric vehicles, ...

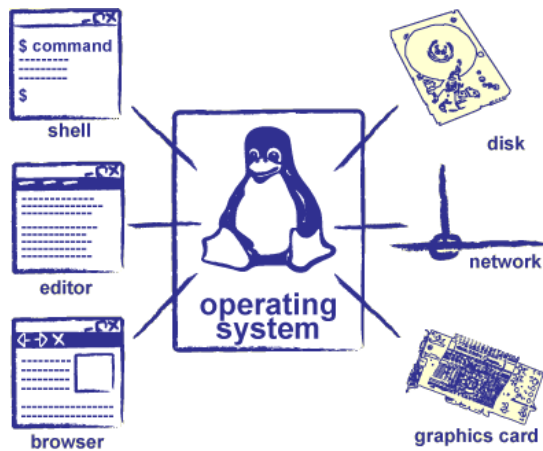
Management of micro-generators and demand side is key element in future smart low-voltage grids !

OGEMA - Open Gateway Energy Management Alliance



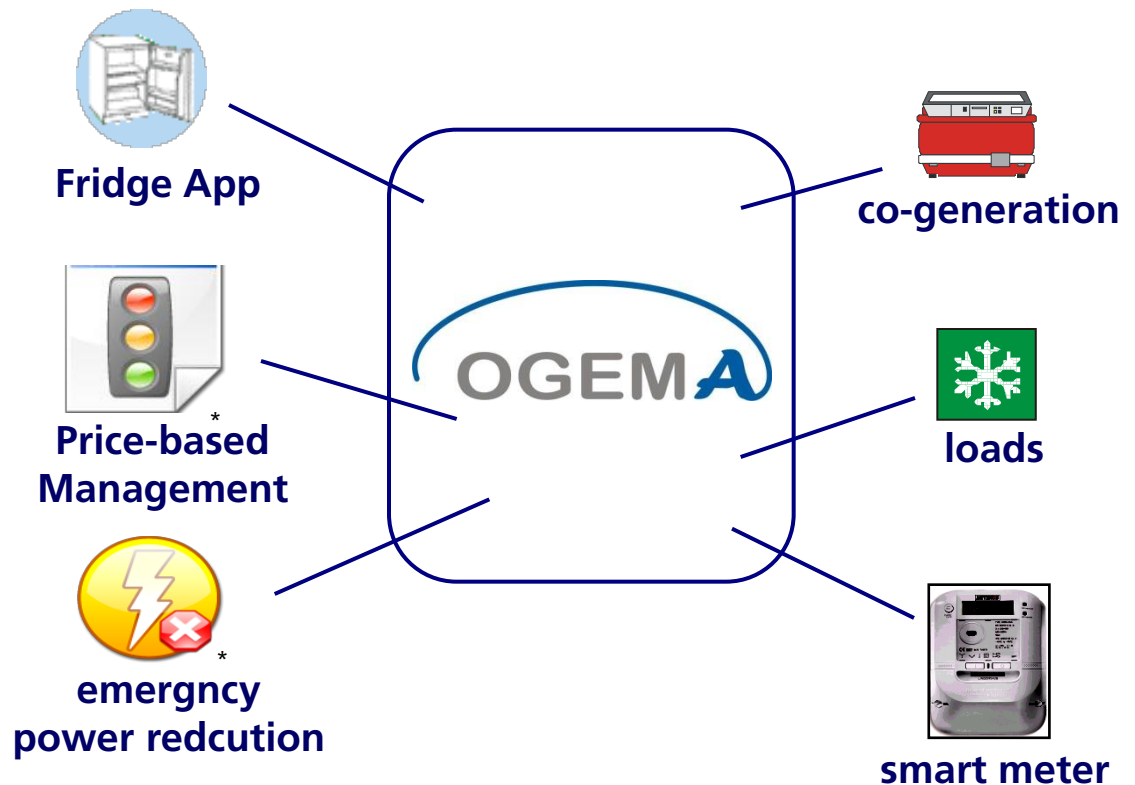
"Operating System for energy management"

Open source operating system (e.g. Linux)



Source: <http://software-carpentry.org/shell01.html>

OGEMA for energy management

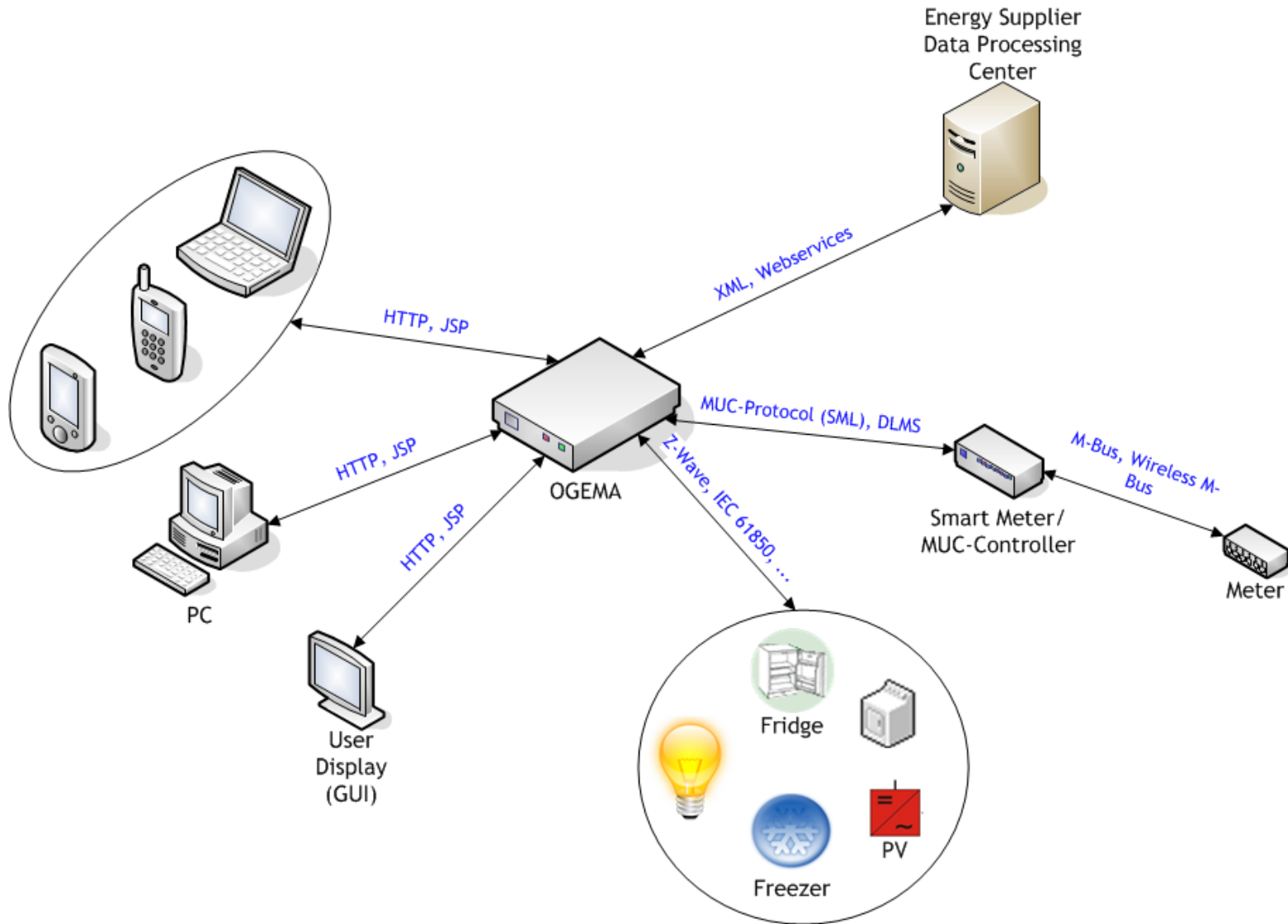


Source: http://commons.wikimedia.org/wiki/Crystal_Clear

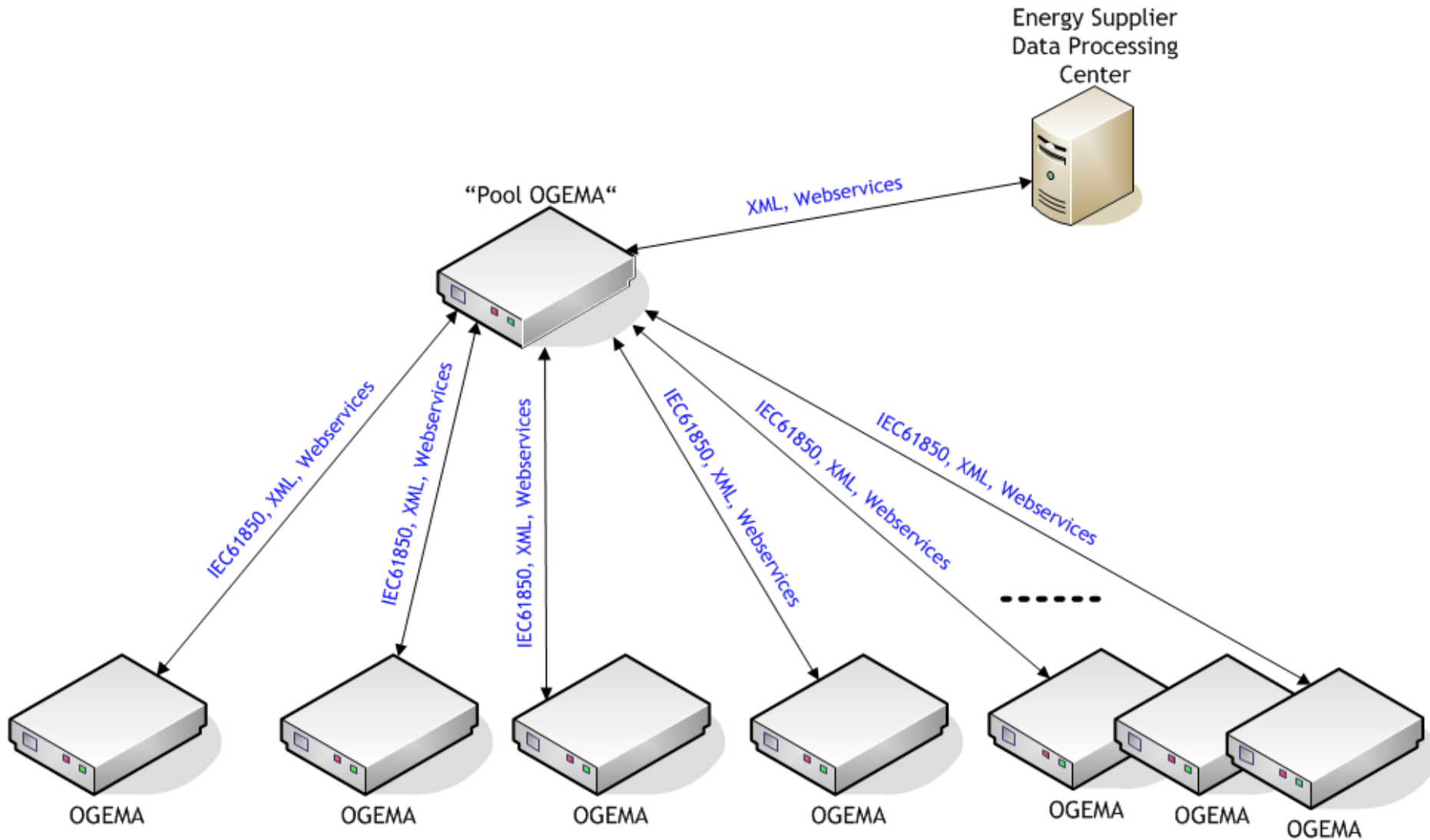
Why Open Gateway?

- Cost and energy efficiency: One single hardware platform for multi-manufacturer applications at customer's site
- Gateway serves as "Firewall" between private and public grid
- Enormous potential for applications
 - Home automation services
 - Smart metering services
 - Energy Management
 - Agent-based energy trading

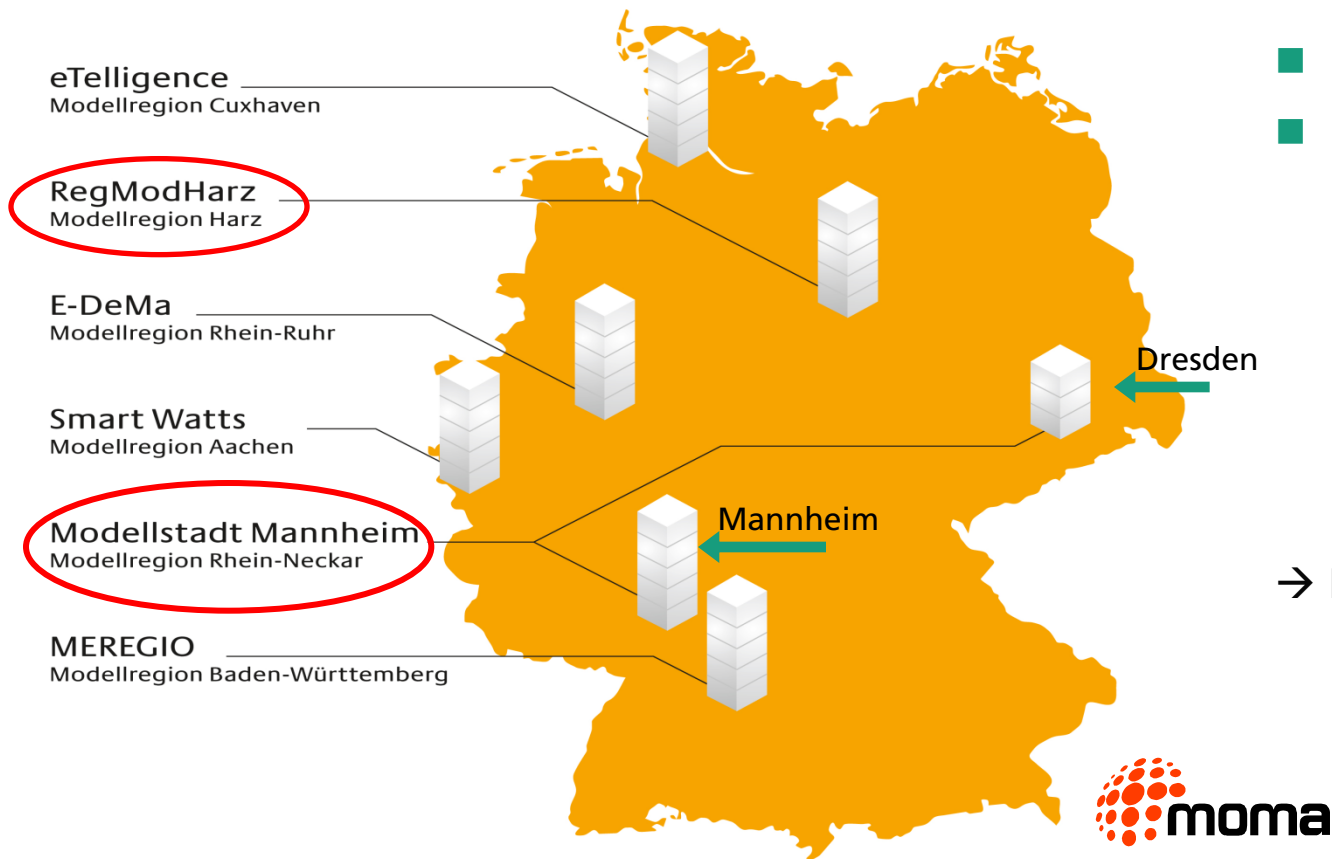
OGEMA Connections - Logical View



OGEMA for large scale environments

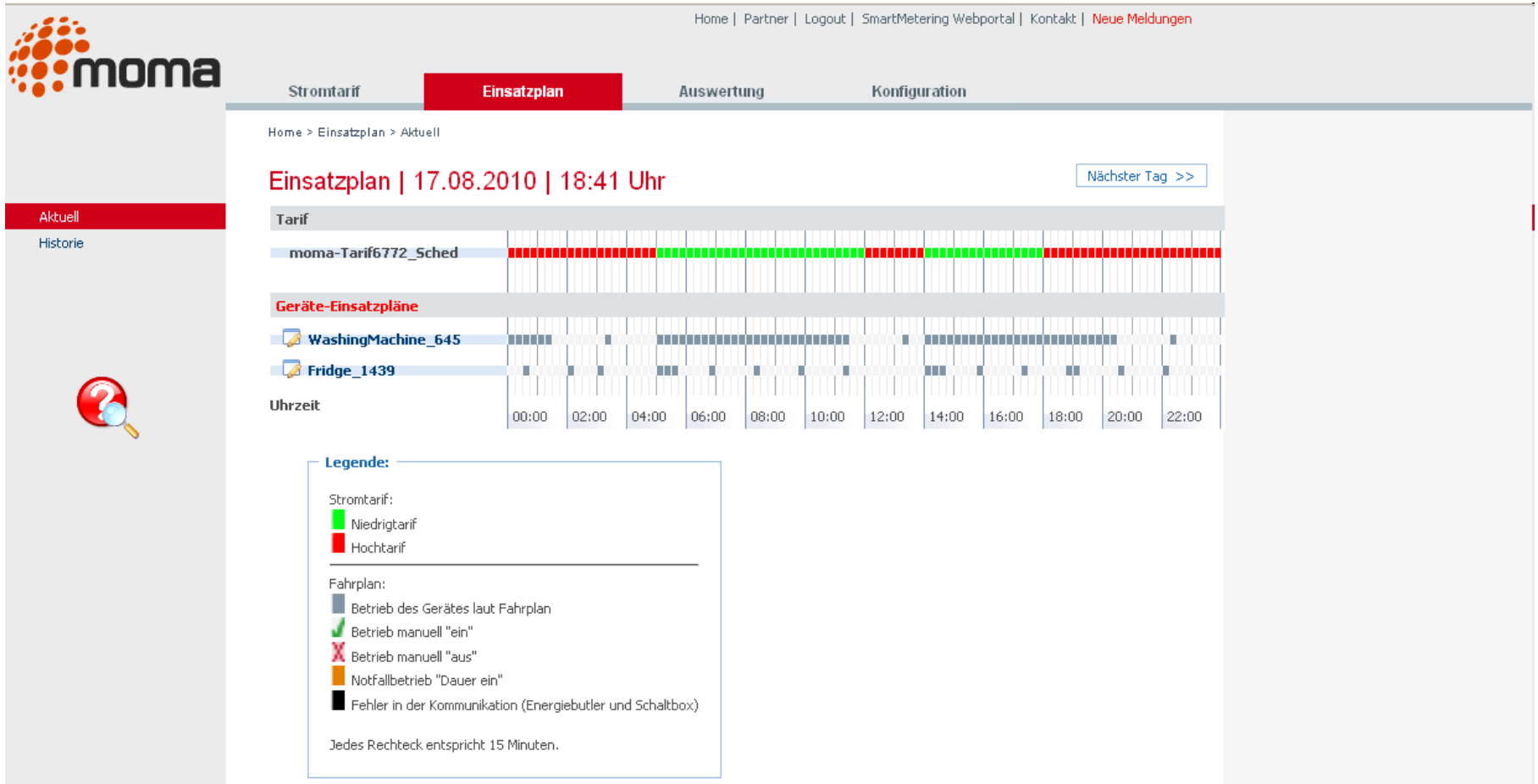


OGEMA in E-Energy model regions

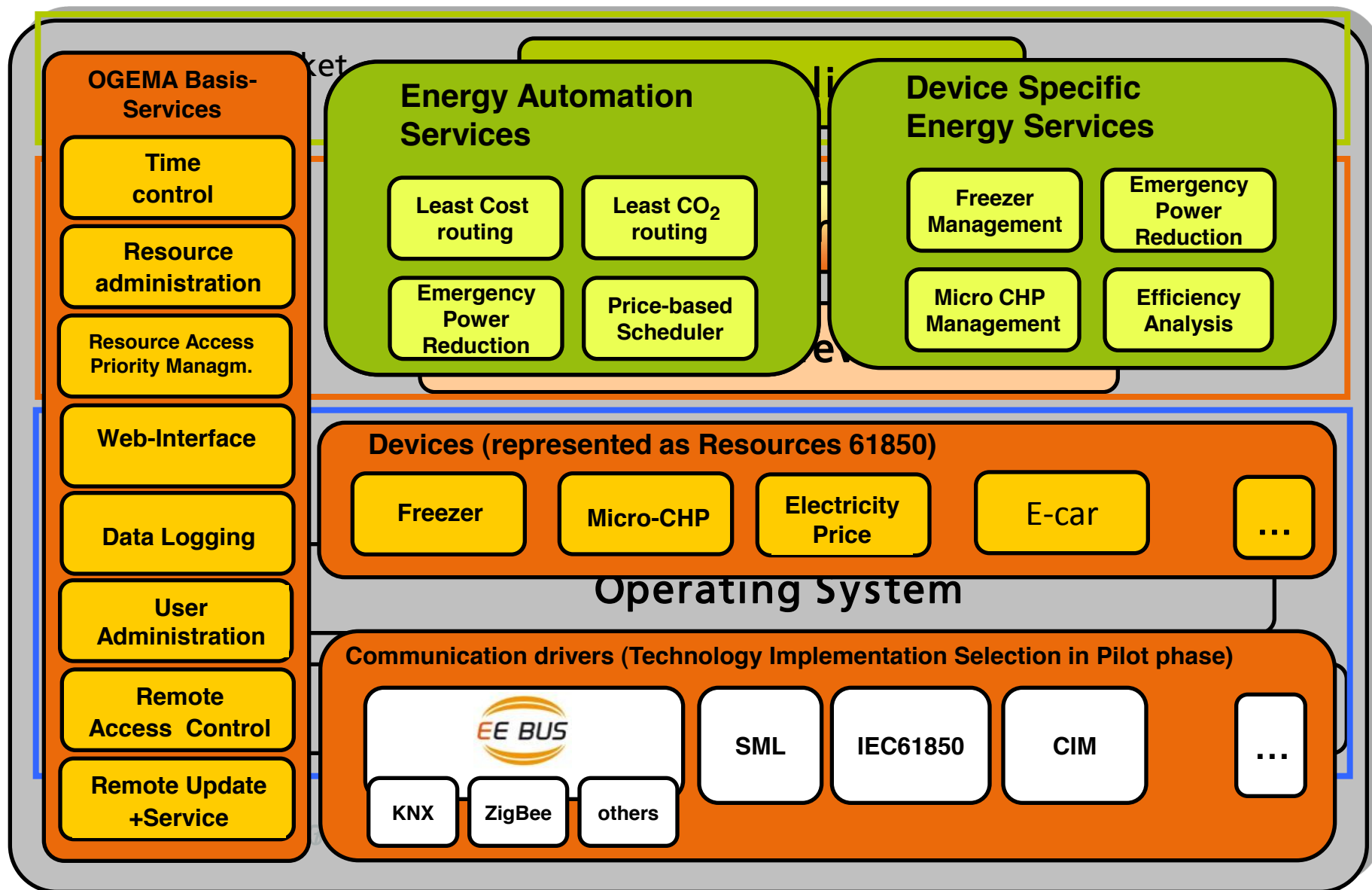


- E-Energy started 2008
 - Develop an "Internet of Energy"
 - Enhance the efficiency of the power supply via information and communication technologies (ICT)
- Focus of moma:
- Large field test with 1000 customers

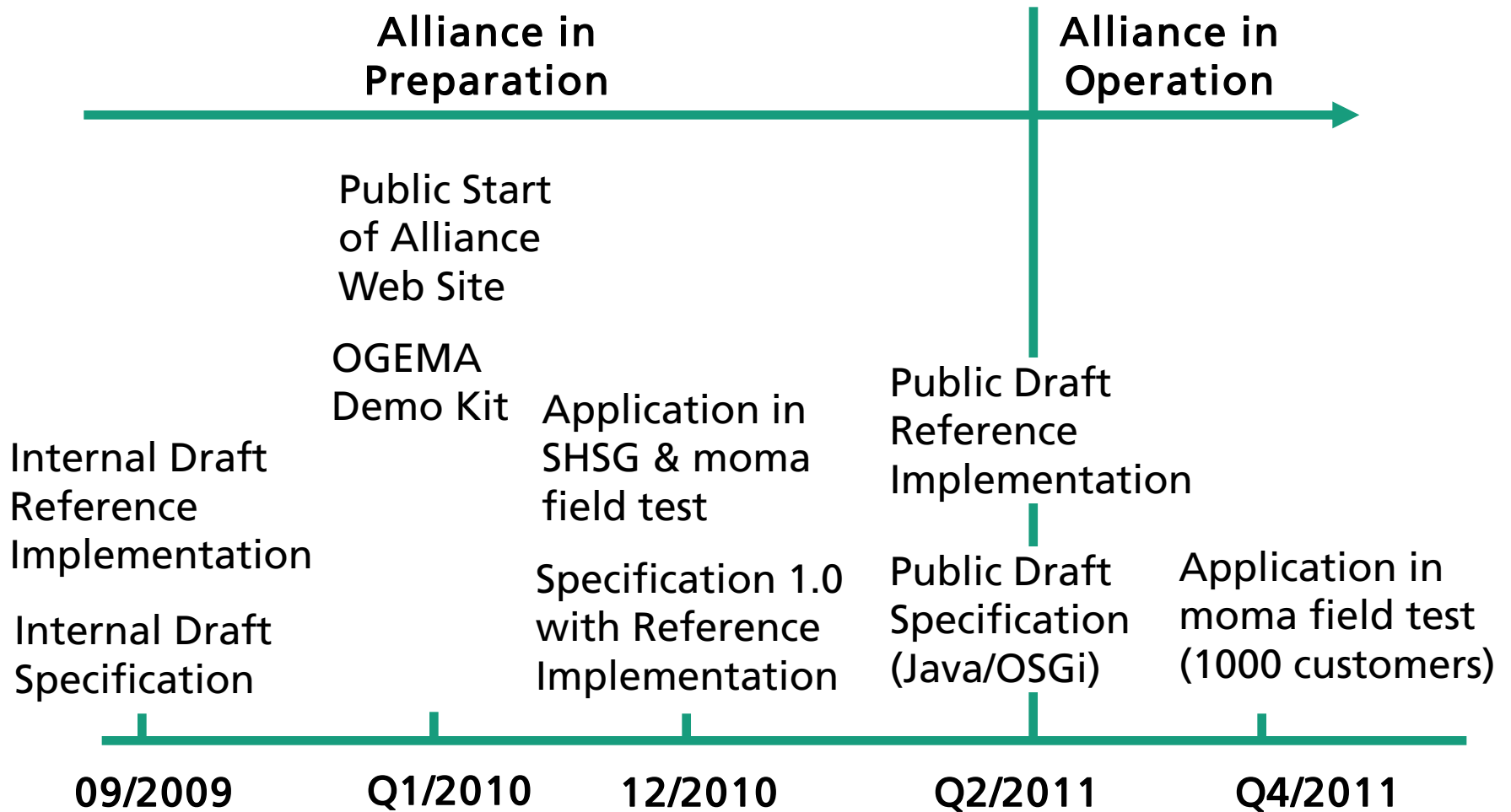
OGEMA – moma web interface



OpenMarket Energy Architecture



OGEMA Timeline



Thank you for your attention!

www.ogemalliance.org

Sina Pezeshki

Fraunhofer IWES, Königstor 59, D-34119 Kassel

sina.pezeshki@iwes.fraunhofer.de

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