



## The German program to manage future power supply

Ludwig Karg, Head of Ancillary Research

[www.e-energy.de](http://www.e-energy.de)

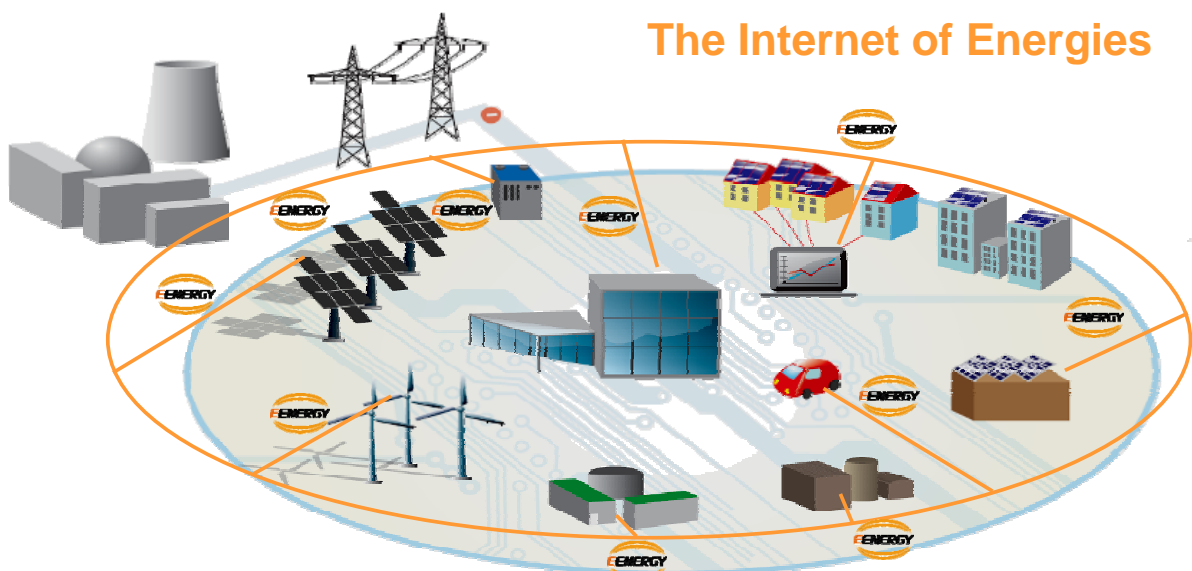
### A new Power World for Consumers

- ▶ **Hints to save power - derived from continual measurement of power consumption?**
  - ▶ **Load management to reduce costs of municipal facilities and road lighting?**
  - ▶ **A heat-pump that switches off when the refrigerator starts - to reduce peak consumption and costs?**
- ▶ **Heating a passive house with excess power and forget about the gas grid?**
  - ▶ **Checking from holiday place if oven is switched off?**
- ▶ **Fuel from the power outlet – but only when it is green and cheap?**

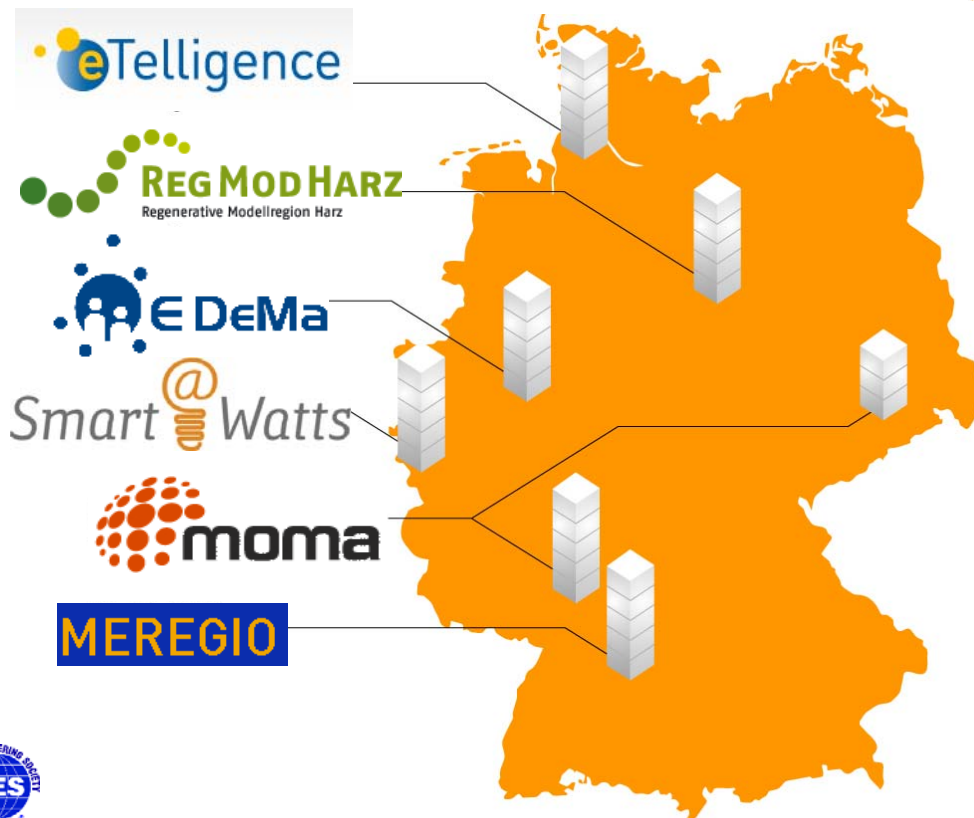
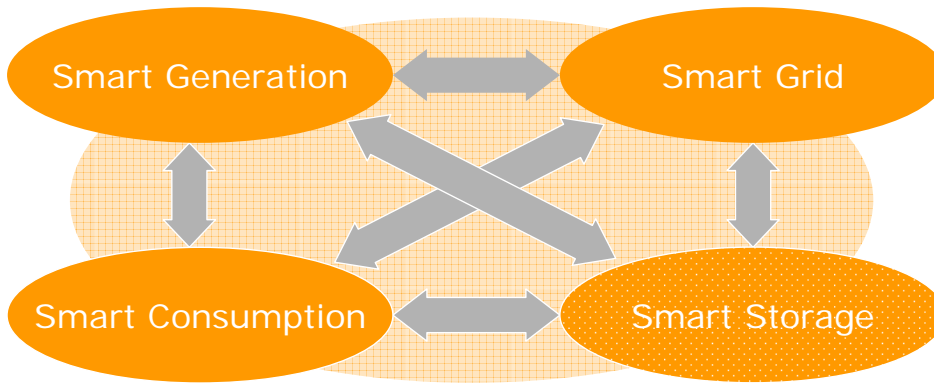
## A new Power World for Providers

- ▶ Storing wind energy at night, feed in when peak load?
  - ▶ Balancing energy from biogas plants?
  - ▶ Remote start of micro CHPs to cover load peaks?
- ▶ Consortium of PV-owners jointly selling power at the energy exchange?
  - ▶ Direct marketing of power from renewable distributed generation?
- ▶ CHPs and a microgrid for a village in the Alpes?

## Integration of two Worlds: ICT and Energy



# Linking all Components of a Smart Power System



## E-Energy on a Glance

- ▶ Dr. Angela Merkel at IT-Summit: „beacon project“
- ▶ 6 pilot regions
  - ▶ 140 Mio. EUR public and private funds
  - ▶ result of technology competition
- ▶ Scientific studies:
  - ▶ „Potentials of information and communication technologies for the optimization of energy provision and consumption“
  - ▶ “Standards for the Electric Smart Grid: Findings for the German E-Energy program”
- ▶ Ancillary research
  - ▶ national and international cooperation
  - ▶ task forces

## The Formula for the Future Energy Supply System

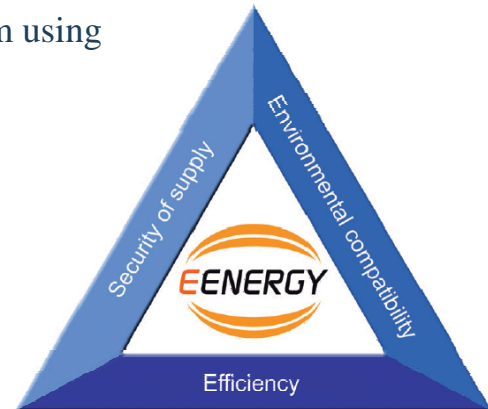
**ICT driven network operation**  
**+ electronic market place**  
**+ online linkage of market place and net operation**

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**= Internet of Energy**

## E-Energy goals

- ▶ Security of supply, efficiency and climate protection with digital networking of power provision system
- ▶ Optimisation of the energy supply system using modern information and communication technologies (ICT)
- ▶ Sustainable, cross sectoral new fields of employment and stimulus for growth
- ▶ New market for hightech solutions
- ▶ Progress in liberalisation and decentralization



## E-Energy Projekt „MEREGIO - Aufbruch zu Minimum Emission Regions“

## Model Region Baden

specifics:

**energy efficiency in the  
integrated house**

instruments:

- ▶ smart meters
- ▶ price incentives at the outlet
- ▶ minimum emission certificates
- ▶ central platform to control and run the system

lead partner: EnBW Energie Baden-Württemberg AG

other partners: IBM, ABB, SAP, Systemplan, University Karlsruhe



## Model Region Rhein-Neckar

specifics:

**new business models and tariffs incentives**

instruments:

- ▶ „energy butler“
- ▶ control devices connected via powerline carrier
- ▶ CORE platform as a base for the electronic marketplace



lead partner: MVV Energie AG

other partners: IBM, Power PLUS Communications, Papendorf Software Engineering  
DREWAG, University Duisburg-Essen

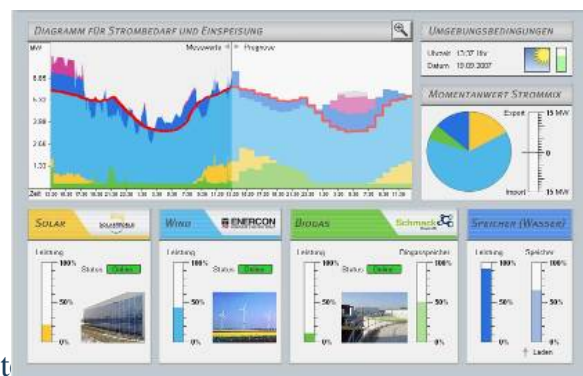
## Model Region Harz

specifics:

**multitude of renewable energy plants and a storage power station**

instruments:

- ▶ control system guarantee grid stability
- ▶ Bidirectional Energy Management Interface“ (BEMI)
- ▶ prediction system for wind energy
- ▶ new business model: bundling distributed power generators



lead partner: RegenerativKraftwerk Harz GmbH & Co

other partners: Siemens, E.ON, in.power, ISET, Vattenfall

## Model Region Cuxhaven

specifics:

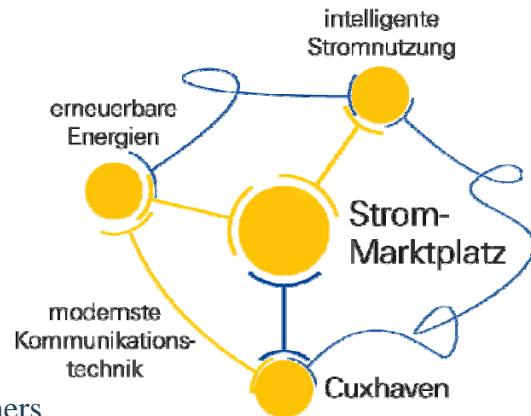
high percentage of renewable energies, cold stores and indoor swimming pools as energy storage

instruments:

- ▶ regional power portal
- ▶ plug&play networking of appliances
- ▶ online visualisation
- ▶ using regulation capacities of big consumers

lead partner: EWE AG

other partners: OFFIS, energy & meteosystems, BTC, Fraunhofer-erbund Energie



## Model Region Rhein-Ruhr

specifics:

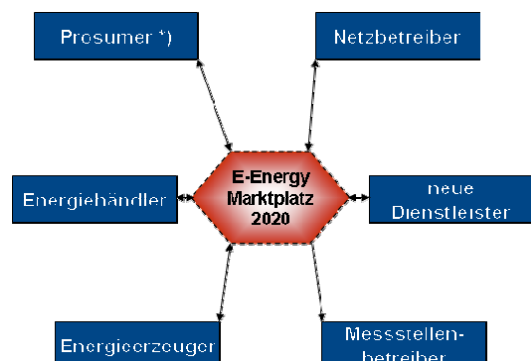
cooperation of big supplier and municipal utility; intelligent household appliances

instruments:

- ▶ smart ICT gateways
- ▶ incentive systems
- ▶ ICT for grid management decentralized distribution networks

lead partner: RWE Energy AG

other partners: Siemens, Prosyst Software, Miele, ef.ruhr, Stadtwerke Krefeld



## Model Region Aachen

specifics:

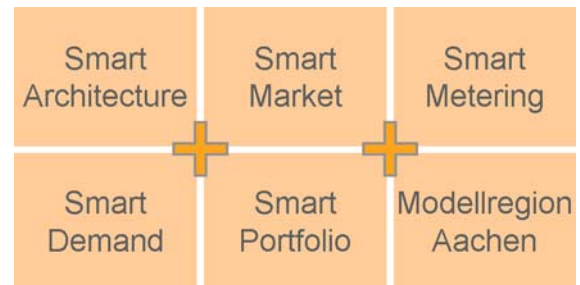
**pricing signals at outlet,  
self regulation of grid**

instruments:

- ▶ central data base, smartmeters and communication network
- ▶ prognosis system and optimization algorithms
- ▶ electronic device to upgrade household appliances and power supplies

lead partner: Utilicount

other partners: Stadtwerke Aachen, FIR at RWTH Aachen, PSI Büsing & Buchwald,  
Kellendonk Elektronik



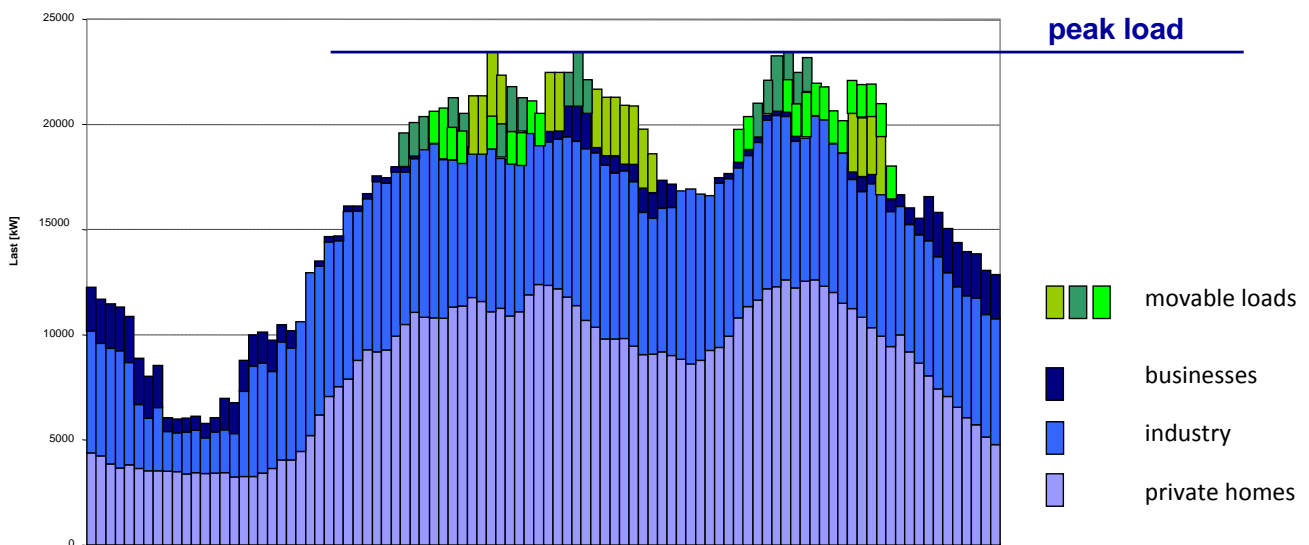
## Activities in Pilot Regions

- ▶ Developing and testing hardware and software for an **Internet of Energies**
- ▶ Gaining knowhow on interoperability, safety and security
- ▶ Testing new models of added value generation and business processes
- ▶ Analyzing market potentials and improving consumers acceptance
- ▶ Highlighting needs for changes in the legal framework

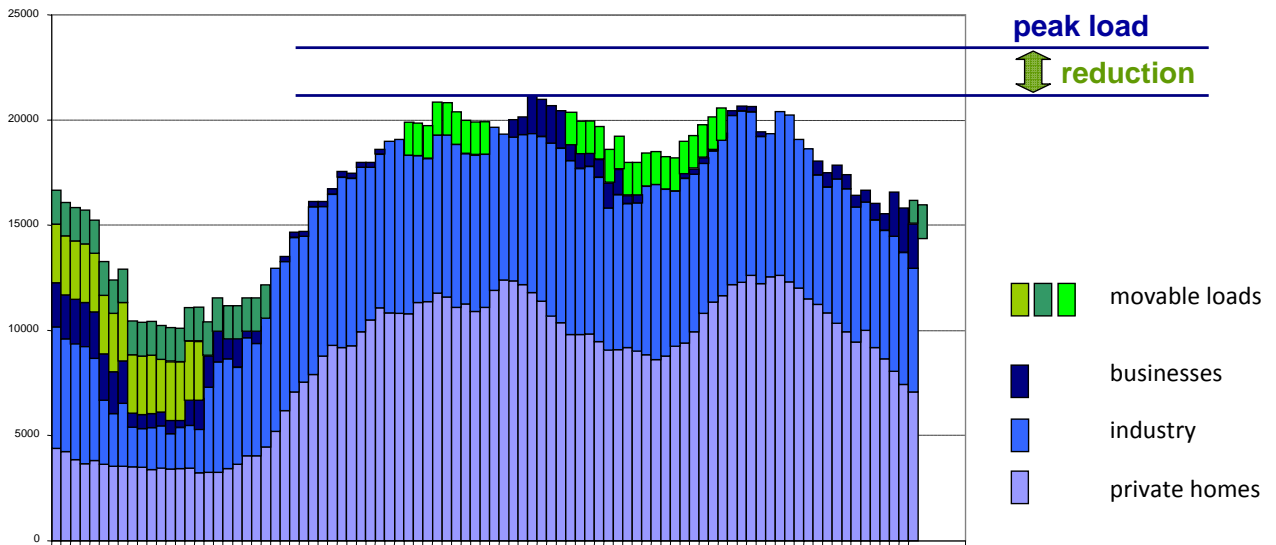
## Cross Cutting Work in E-Energy Taskforces

- ▶ System Architecture
- ▶ Interoperability
- ▶ Legal Framework
- ▶ Market Development
- ▶ Electromobility

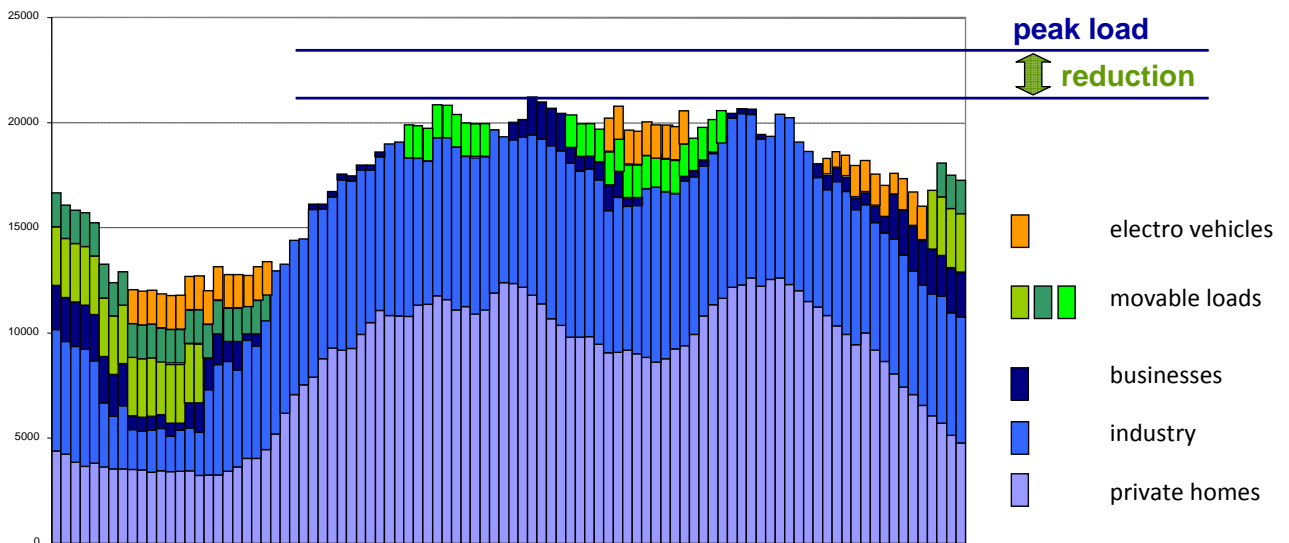
## Shifts in the Load-Curve

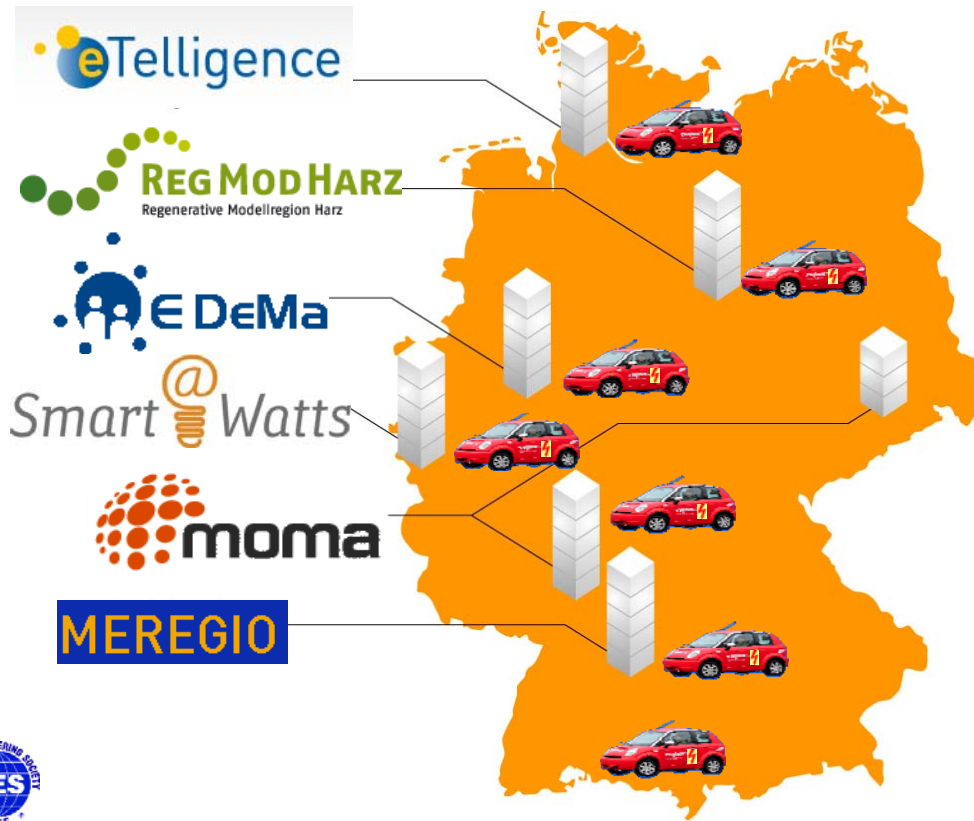


## Shifts in the Load-Curve

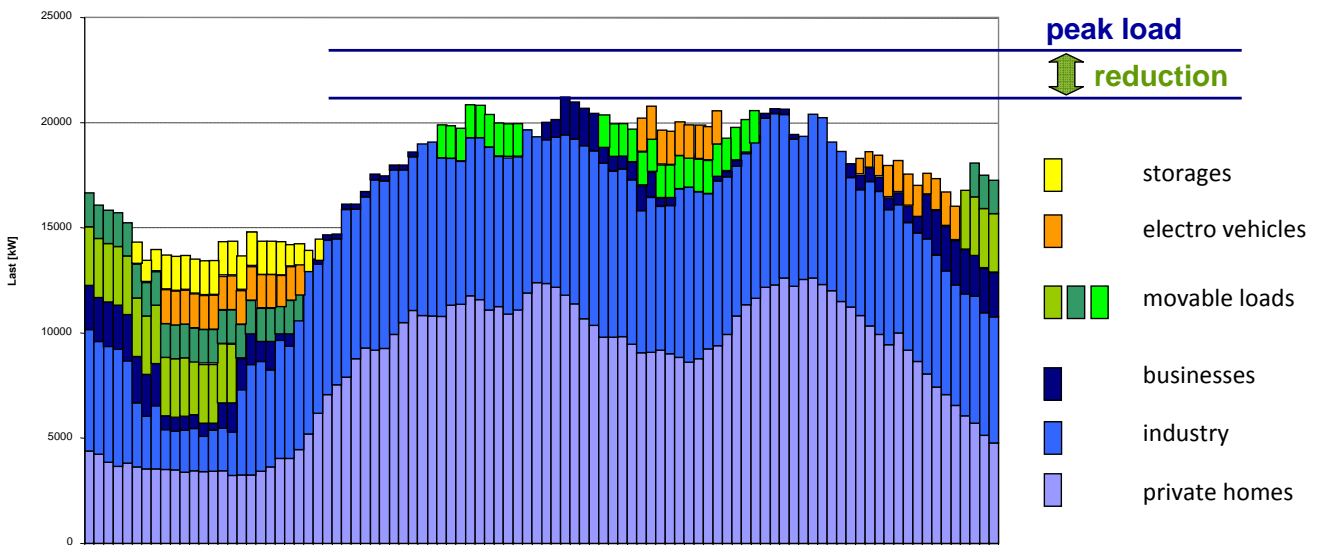


## New Consumers at the right Time: Car Batteries

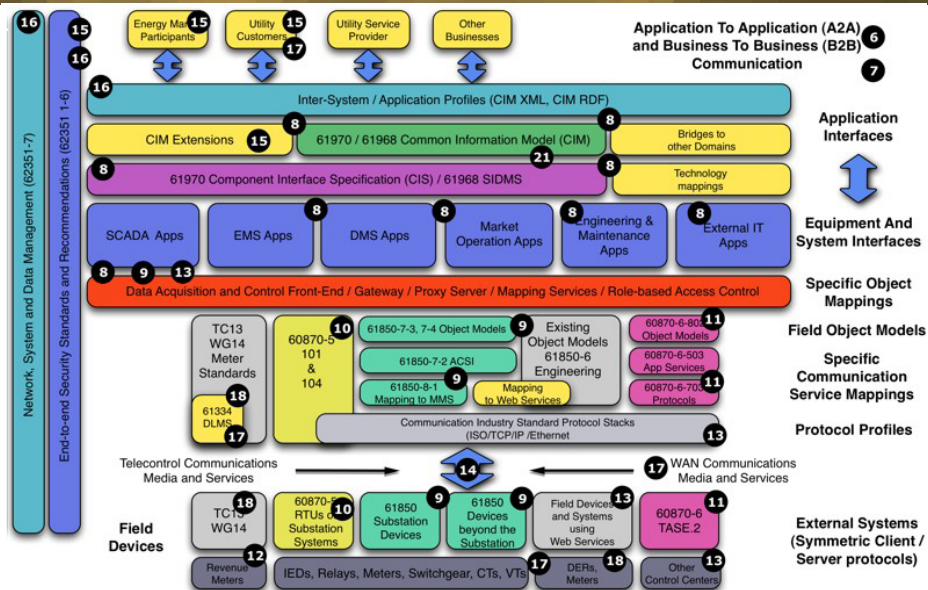




The Future: bew Storages?



## The E-Energy Standards Stack



Ludwig Karg, B.A.U.M Consult GmbH  
2009 IEEE PES General Meeting, July 26-30 2009, Calgary

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