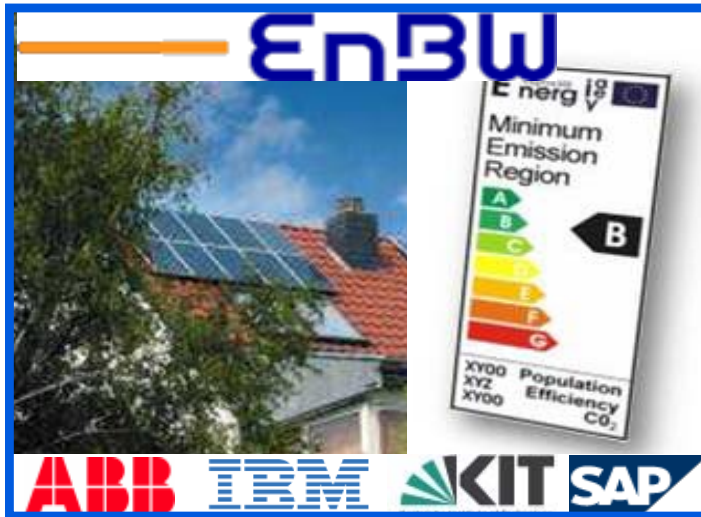


Binh Lam, ABB Network Management / SMART GRID - TAIWAN, 2009-04-08

Smart Grids Pilot Projects MEREGIO - Germany

Smart Grids pilot projects

MEREGIO – Minimum Emission REGION



Smart Grids contribution

- Minimize CO₂ emission in a specific distribution network area by simplifying integration of dispersed generation (DG), minimizing losses and optimizing electricity consumption

- Addresses distribution customer segments
- Network Manager
- Develop and install a complete IT-system covering automated meter reading (AMR), remote control for decentralized generation (DG), communication infrastructure, network control system and accounting system in a distribution network area of EnBW in Karlsruhe (Germany)
- Optimize spinning reserves with increased amount of renewables
- Reduce transmission losses
- Demand response (regulatory demand) - real time price information
- Optimize electricity consumption – home automation

E-Energy: ICT based energy system of the future

A technology challenge stimulating regional pilots



- Dagmar Wöhrl, parliamentary state secretary in the Federal Ministry of Economics and Technology (BMWi), announced at CEBIT 2008 the six winners of the technology competition “E-Energy: ICT-based Energy System of the Future”.
- 6 out of 28 project proposals selected for government funding to create 6 model regions in Germany
- Purpose to show how Information and Communication Technology (ICT) can be tapped to
 - Higher level of economic viability
 - Security of supply
 - Climate and environmental compatibility in power supply

MEREGIO – Minimum Emission REGIOn

One out of six E-Energy projects

— EnBW

ABB

IBM

SAP

systemplan

KIT
Karlsruhe Institute of Technology

- Aim: using ICT to minimize carbon emissions and to contribute to climate protection
- MEREGIO elements
 - Development of a “Minimum Emission” certification procedure to be applied in the model region of Karlsruhe/Stuttgart intended as a tool to communicate - with a high level of visibility to the outside world - the effectiveness of regional concepts for better energy efficiency and reduction of greenhouse gas emissions
 - Meeting requirements placed on an efficient energy system by integrating on a single platform state-of-the-art online technologies from power generation to consumption
 - Supporting further development of standards
- Stakeholders: EnBW Energie Baden-Württemberg AG, ABB AG, IBM Deutschland GmbH, SAP AG, Systemplan GmbH, Karlsruhe Institute of Technology (KIT, University of Karlsruhe)

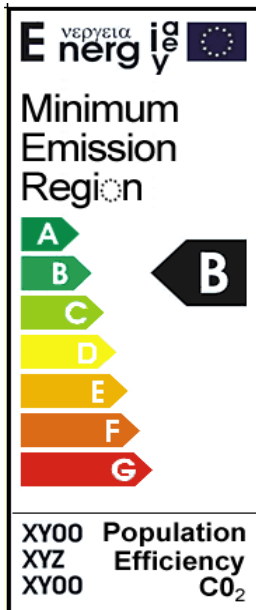
Measures to reduce CO₂ emissions

- Introduction of a certificate showing regional energy efficiency: Industry and households know their emissions caused by use of electricity as well as heating as benchmarks
- Industry and households in model region have technical equipment installed that offers time-variable tariffs and online price signals

⇒ verification of a concept that comprehensively fulfills legal guidelines in Germany to offer tariffs with incentives to save energy after 2010
- More efficient use of the electrical grid
 - Increased capacity of the network for integration of distributed generation and lower losses by
 - Use of ICT and data from smart meters in network control
 - Interfaces between energy trading and network control systems
 - Market place for ancillary services

MEREGIO certification

The passport to strengthen regional energy efficiency



- Introducing a certification for Minimum Emission Regions
- Incentive for regions for active emission reduction
- Certification as simple indicator for a region's CO₂ efficiency
- Support of measures to reduce CO₂
- Regional competition based on benchmark and control
- Strengthening leading technological position of German industry

MEREGIO

Scope of project



- MEREGIO is focused on developing a minimum emission certificate for the Karlsruhe/Stuttgart region in Germany.
 - Certification is aiming for complete acquisition of CO₂ emissions caused by heating and electrical power consumption
 - Information is intended to motivate regions to actively reduce their greenhouse gas emissions and promote specific measures to cut CO₂ production
 - Furthermore the certificate can be seen as a differentiating advertising tool for certified regions.
- For each household a smart meter with bi-directional broadband communication interfaces delivers a high level of transparency. Within the pilot project these meters will be installed at 800 consumers, 150 generation units and 50 storages for electrical energy.

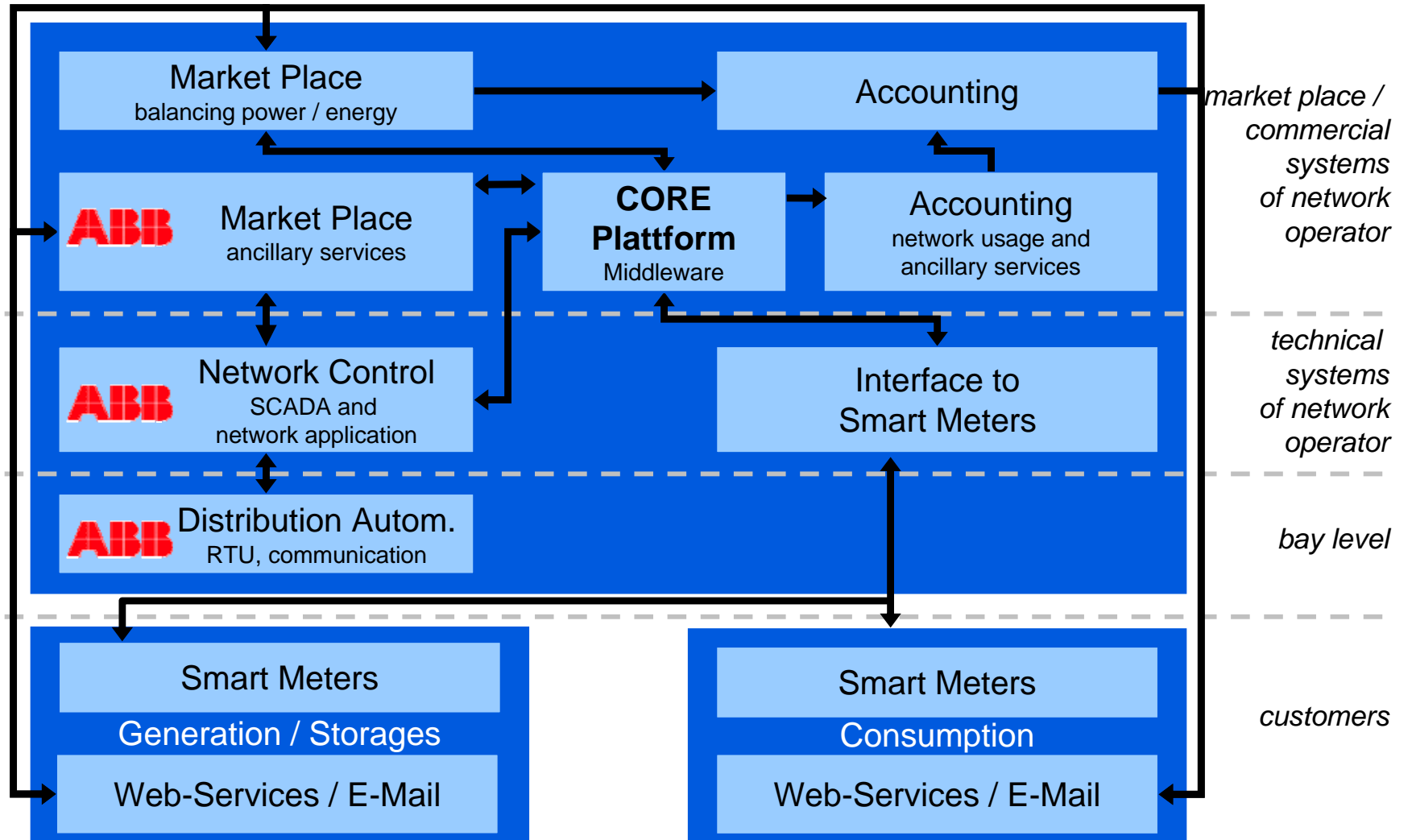
MEREGIO

Scope of project

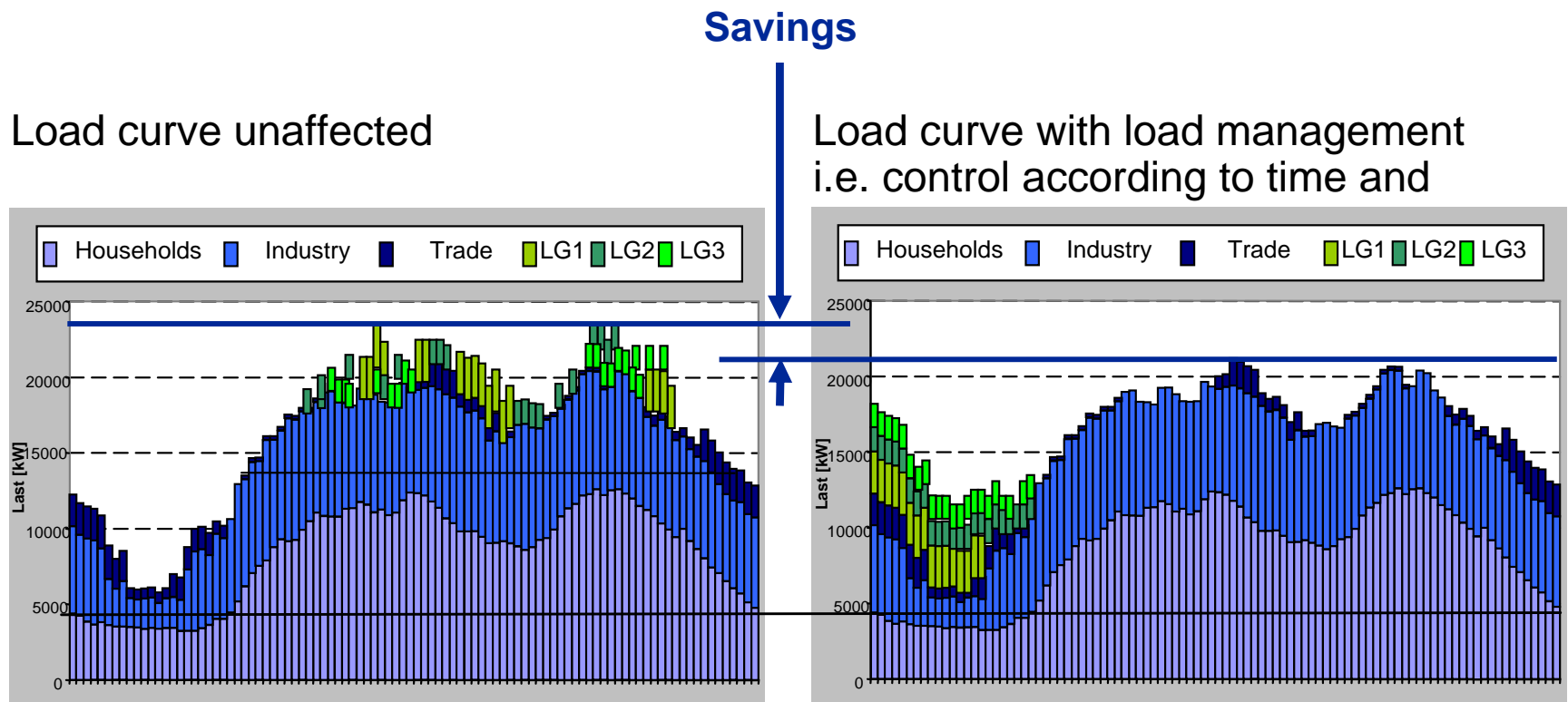
- A more efficient integration of renewable energy resources in the power grid represents another main toehold for the cut of CO₂ emissions:
 - Customers will receive price signals as motivation for renewable energy consumption.
 - Price signals are particularly suitable if regional bottlenecks force network operators to switch off renewable generation units to ensure network security.
- Another focus area in MEREGIO is
 - The increase of network capacity
 - The reduction of network losses by introducing a marketplace for ancillary services. This marketplace will offer the possibility to trade products like reactive power. Such a marketplace based on a network model allows the efficient usages of the existing envelopes of generation units to avoid voltage overshoots and to minimise network losses.

MEREGIO

System structure



Intelligent load management via variable tariff formation can balance production and increase its profitability



ABB's contribution to MEREGIO



- Market Place for Ancillary Services: Algorithms for evaluation of ancillary services and calculation of prices
- Network Control
 - On-line state estimation of medium and low voltage network of model region by using besides conventional measurements also data from smart meters
 - Algorithms to detect bottlenecks in distribution network
 - Algorithms for optimizing network operation (e.g. minimize switching during maintenance)
 - Algorithms to make a prognosis of nodal generation and demand
- Distribution Automation
 - Verification of accuracy of estimated system state
 - Additional information on load flow in low and medium voltage network
- Interfaces between network control system and commercial systems
 - Market based identification of measures to avoid bottlenecks by interaction with commercial systems
 - Analysis of data of the commercial systems on future energy trades to predict load flow in distribution networks and adequate back coupling if bottlenecks are detected

Time Schedule and Milestones

- 10/2008 begin of project
- 04/2009 concept-phase finished
- 10/2009 smart meters are installed and customers can see their consumption of electrical energy online in model region
- 10/2010 complete system (network control, market places, middleware) is realized, installed and in operation
- 04/2011 complete system is tested / start of field test of complete system with customers
- 04/2012 end of field test / beginning of evaluation
- 10/2012 end of project

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for a better world™**

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