SmartHouse/SmartGrid

Smart Houses interacting with Smart Grids to achieve next generation efficiency and sustainability

SAP und Partner auf der E-world 2009

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SmartHouse/SmartGrid

SEVENTH FRAMEWORK PROGRAMME

Agenda

1. **The SmartHouse/SmartGrid project**
   1.1. Goals
   1.2. Consortium
   1.3. Field Trials
2. SmartHouse/SmartGrid Business Cases
3. Architecture
4. Outlook

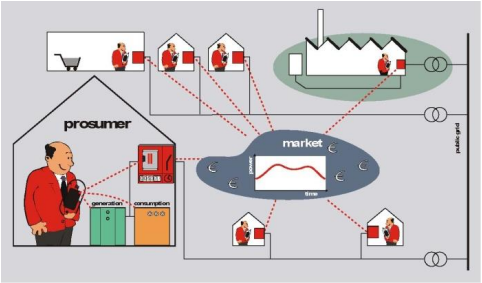
The SmartHouse/SmartGrid Project Goals

SmartHouse/SmartGrid is a EU-funded project (EU FP7)

Timeline of the project: Sep 2008 – Feb 2011

The goal is to *demonstrate how ICT-enabled collaborative aggregations of Smart Houses can achieve maximum energy efficiency*

- Customer-interactive in-house technology for energy management
  - Demand side: real-time information and dynamic tariffs
  - Customer as prosumer: generation within the house can be integrated into the system
- Interaction with the Smart Grid
- Distributed control in a decentralized energy world
  - Intelligent agent-based control
  - Web services at the device level and at higher system levels
- Electronic markets and forecasting techniques



The SmartHouse/SmartGrid Project Consortium

Six project partners in three Member States

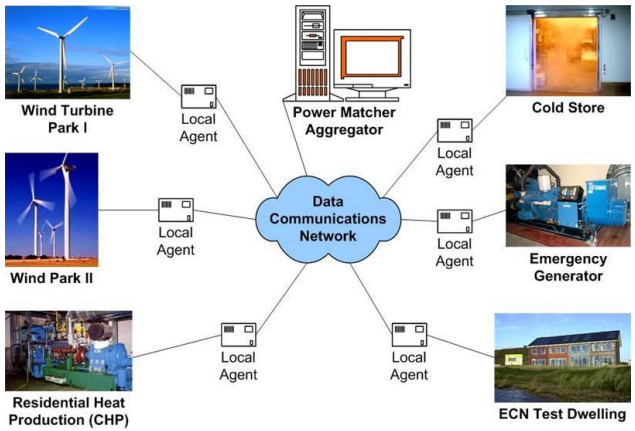
- Coordinator: SAP Research
  - Enterprise integration, business processes
  - Web services at device level integrated with higher level web services
- Institut für Solare Energieversorgungstechnik (ISET), Kassel
  - Bi-directional Energy Management Interface (BEMI)
- MVV Energie AG
  - Concept of the „Energiebutler“
- Energy Research Center (ECN), The Netherlands
  - Multi-Agent System architecture
  - Analysis of scalability to ~1 mio. customers
- Institute of Communication and Computer Systems (ICCS), Univ. of Athens
  - Agent-based control in power systems
- Public Power Corporation (PPC), Greece
  - Renewable and diesel island power grid

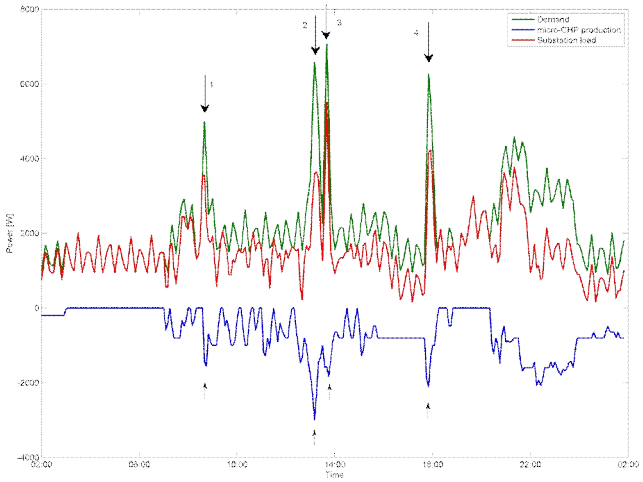
The SmartHouse/SmartGrid Project: Field Trials

Three field trials are envisioned

Trial A: Mass application scenario

- Location: The Netherlands
- Validation of multi-agent system based aggregation of Smart Houses for maximizing efficiency
- Electricity trading via PowerMatcher protocol
- Integration of domestic appliances and µCHP plants
- Testing scalability for mass application
- Simulation with real households and additional entities mimicking the households‘ behavior

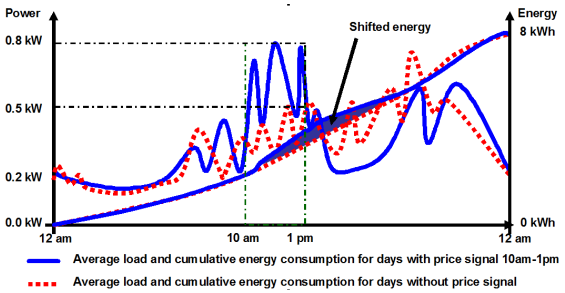




The SmartHouse/SmartGrid Project: Field Trials

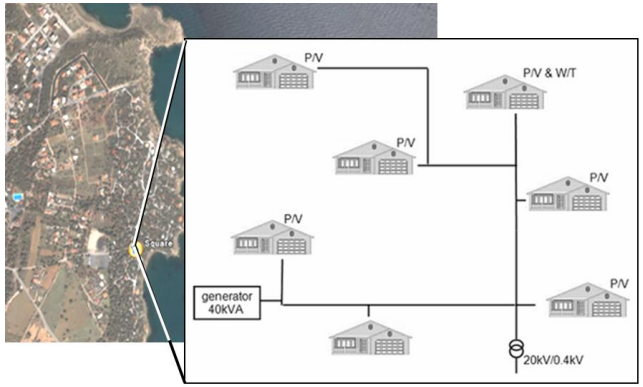
Trial B: Domestic cluster Mannheim Wallstadt

- Carried out by MVV (= supplier and DSO)
- 100 Smart Houses in an ecological settlement
- Photovoltaic and CHP in many houses
- Prior experiment „Washing with the sun“ (2006)
- Validation of the BEMI developed by ISET
- Testing the ability to control a network of energy devices in a decentralized manner for achieving higher efficiency



Trial C: Micro-grid operation Meltemi, Greece

- Seaside camping site
- Diesel generator and photovoltaic panels
- Island mode operation
- Testing the ability to provide ancillary services such as load sheddig support

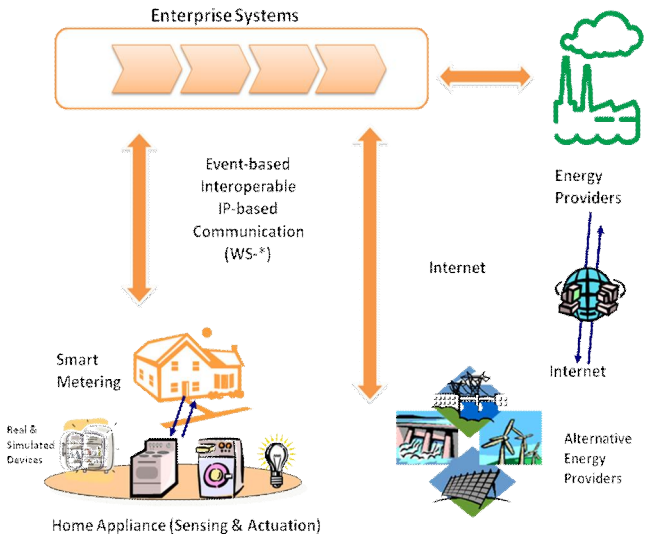


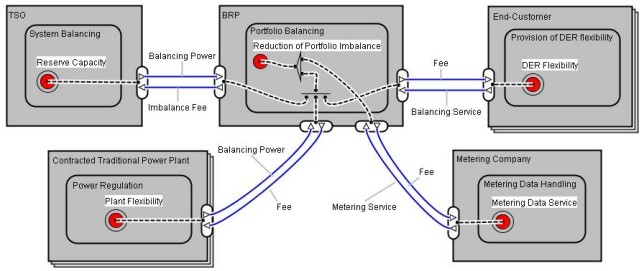
Business Cases to be Realized by a SmartHouse/SmartGrid System

First step within the project: business case definition and requirements specification

Examples of SmartHouse/SmartGrid business cases:

- Real-time balance reduction of a retail portfolio
  - Flexibility and price-responsiveness of the Smart Houses is used for balancing the grid
  - Aggregation of demand response could also be used for offering reserve capacity
  - Aggregation of Smart Houses functions as a virtual power plant
- Variable-tariff-based load and generation shifting
  - Controllable distributed generation (e.g. CHP)
  - Devices with storage characteristic (e.g. deep freezers)
  - Devices with fixed programs and shiftable start times (e.g. washing machine)
  - Devices that can reduce load (e.g. dimmable light)
- Energy usage monitoring and optimization services for end-customers
  - Enable energy savings through better awareness
  - Additional energy savings encouragement through comparison





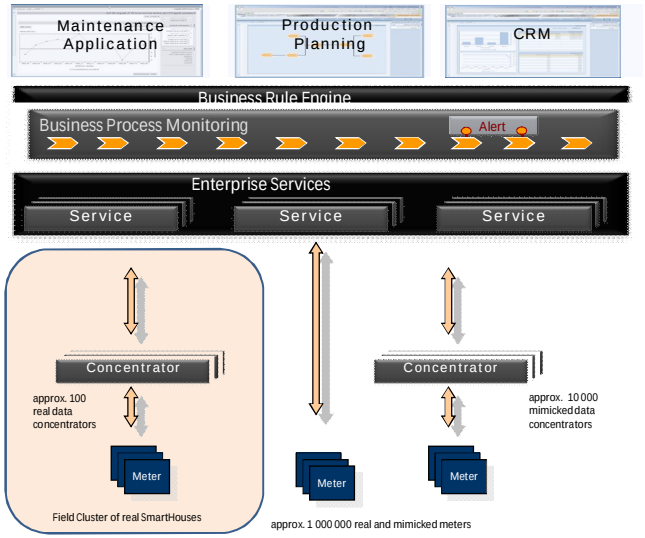
Architecture for a Scalable and Efficient SmartHouse/SmartGrid System

Service-oriented architectures (SOA) allow flexible composition of functionality

- Embedded services within smart meters and household devices
- Higher-level services for business applications
- SOA can ensure interoperability and compatibility in heterogeneous software environments

Agent-based approaches allow energy management to be automated

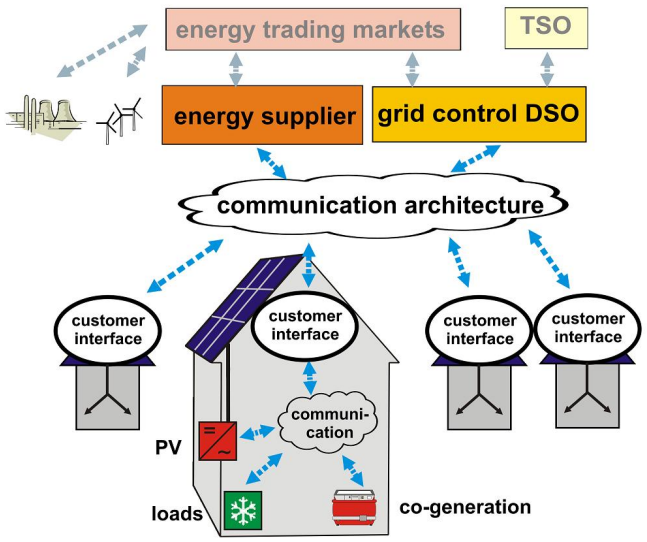
- PowerMatcher protocol: matching energy supply and demand at a marketplace
- Commercial trade optimization
- Technical grid optimization



Outlook – Next Steps

The SmartHouse/SmartGrid project enters into the architecture design phase

- Distributed markets and trading mechanisms for integrated aggregations of Smart Houses
- Development of customer interface, market interface and ancillary service interface
- Enterprise integration



Field trials will start in Q4 2009

- Common demonstrator design will be available in Q3 2009

Next event: EU High Level Event on ICT for Energy Efficiency (ICT4EE)

More information about the project at http://www.smarthouse-smartgrid.eu

Thank you for your attention!