



ENCOURAGE Project



▶ Embedded iNtelligent COntrols for bUildings with Renewable generAtion and storaGE

- ▶ Artemis call 2010
- ▶ Start date: June 1st, 2011, 36 months project
- ▶ Partners:



Research Centre in Real-Time Computing Systems



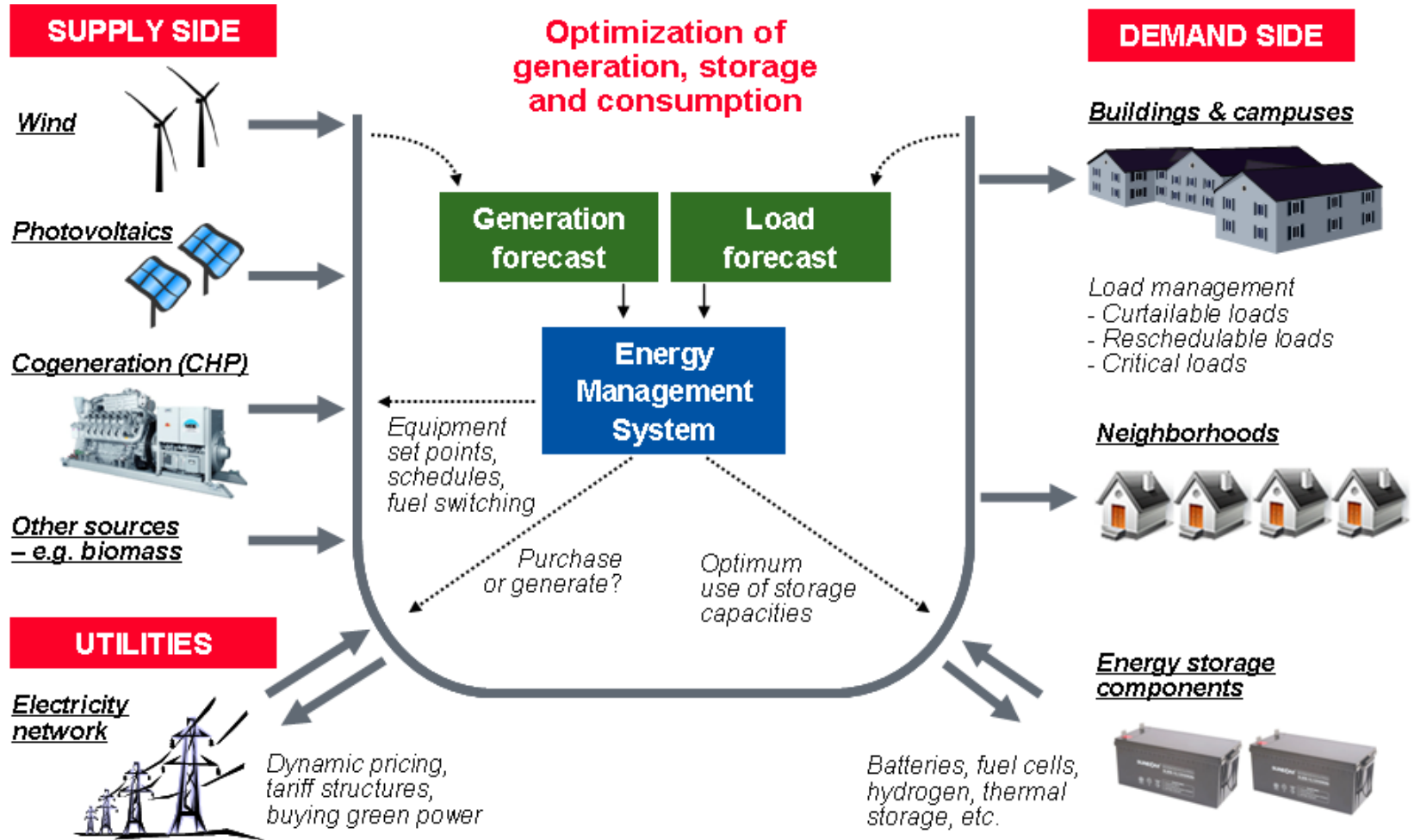


Concept



- ▶ Embedded iNtelligent COntrols for bUildings with Renewable generAtion and storaGE
 - ▷ directly optimize energy use in buildings
 - ▶ optimal control of internal sub-systems
 - ▷ enable active participation in the future smart grid environment.
 - ▶ effective interaction with external world, including other buildings, local producers, or electricity distributors.

Vision



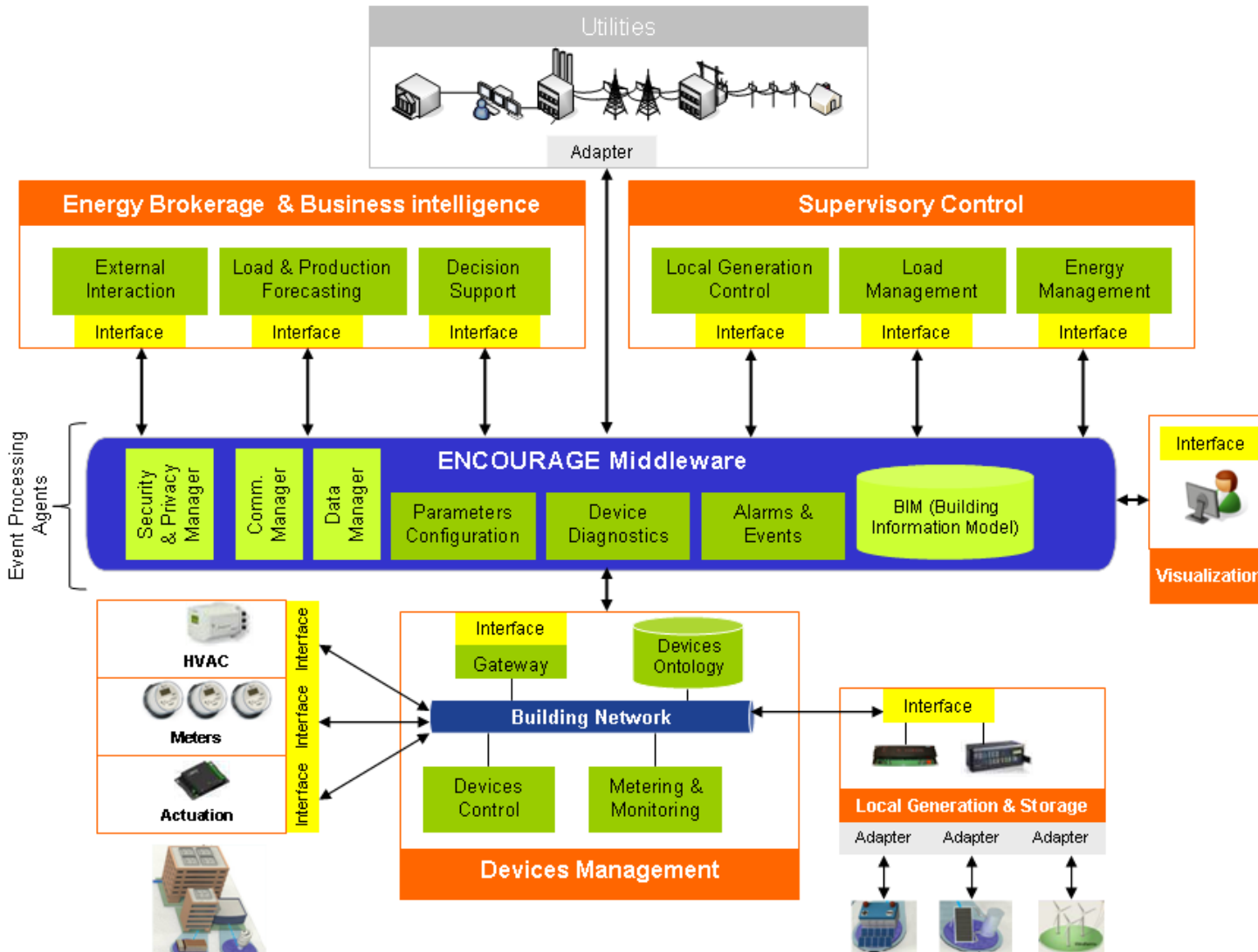


Approach



- ▶ Developing supervisory control strategies that will be able to coordinate larger subsystems
- ▶ Development of an intelligent gateway with embedded logic supporting inter-building energy exchange
- ▶ Developing novel virtual sub-metering technologies and event-based middleware applications that will support advanced monitoring and diagnostics concepts

Architecture





Technological Innovation



- ▶ Technological innovations at device level
 - ▷ Non-intrusive monitoring and control
- ▶ Scalable processing and inference of complex events
 - ▷ Use of cloud computing capabilities
- ▶ Optimal energy management and control
 - ▷ Energy efficiency at system level and not individual appliance / sub-system
- ▶ Reduction of costs of system development
 - ▷ Open architectures
 - ▷ Complexity increase with effort reduction



Market Innovation



- ▶ Enable innovative products and services in the whole chain
 - ▷ Non-intrusive management of energy in Buildings
 - ▷ Standards for communication Utilities / Buildings
- ▶ Tackle distributed energy generation
 - ▷ Control and forecast algorithms
 - ▷ Energy brokerage mechanisms



Demonstrators



- ▶ **Private homes and office buildings in the city of Aalborg, Denmark**
 - ▷ A housing co-operative with 8 homes, which recently installed 8 solar panel units. The buildings have electric heating.
 - ▷ A building with heat pump and solar panel
- ▶ **Energy-Efficient Campus in Terrassa, Barcelona, Spain**
 - ▷ This real life campus district will allow validation of the ENCOURAGE architecture as well as the social network.
- ▶ **Laboratory building of Scuola Normale Superiore di Pisa, Italy**
 - ▷ 4000 m² in a recently refurbished ancient building: energy efficiency and cost optimization, reliability and quality of energy supply



Next steps



- ▶ Specification of architecture and ENCOURAGE components
- ▶ Milestones
 - ▷ Overall system specification: May 2012
 - ▷ System integration readiness: Feb 2013
 - ▷ Release of all components: July 2013
 - ▷ Validation: December 2013