The COMMONENERGY project targets

• up to factor 4 reduction of energy demand
• power peaks shaving
• 50% increased share of renewable energy source favored by the intelligent energy management and effective storage
• Improve comfort and indoor environment, for the benefit of employees and visitors
Schneider Electric
Global specialist in energy management and automation

€25 billion
FY 2014 revenues

~5%
of revenues devoted to R&D

~170,000
people in 100+ countries

Our scope is to make energy: safe, with power and control; reliable, with critical power and cooling; efficient, with energy efficiency; productive, with industrial, building and home automation; green, with renewable energy solutions.

Balanced geographies – FY 2014 revenues

25%
North America
+33700 employees

28%
Western Europe
+47600 employees

28%
Asia Pacific
+61500 employees

19%
Rest of World
+34100 employees
Building Automation and Control System

For achieve the targets of the project the systems that mainly can contribute are the Building Management systems, in fact the EN15232 standard reports:

“Building Automation and Control Systems (BACS) provide effective control functions of heating, ventilating, cooling, hot water and lighting appliances etc., that lead to improve operational and energy efficiencies. Complex and integrated energy saving functions and routines can be configured based on the actual use of a building, depending on real user needs, to avoid unnecessary energy use and CO2 emissions. Technical Building Management (TBM) functions as part of Building Management (BM) provide information about operation, maintenance, services and management of buildings, especially for energy management –measurement, recording trending, and alarming capabilities and diagnosis of unnecessary energy use. Energy management provides requirements for documentation, controlling, monitoring, optimisation, determination and to support corrective action and preventive action to improve the energy performance of buildings.” (Ch. 5.1 En15232:2012)
BMS - Building Management System

Allows the inter-communication of different systems using open protocols for the management of a building

Thus:

• Same sensors can be used for different systems, thus reducing the capital cost.
• Systems do not overrun each other due to different set points (ex. Blinds, lights)
• Inter-communication is used for monitoring and control of all systems.
• Possibility to perform advanced programming of control logic using programming languages with higher capabilities.
An advanced BEMS provide a working environment which:

Integrate the energy consumption data in the building management system and correlate the parameters which affect the energy performance (ex. Outdoor temperature, occupancy hours, area etc)

Thus:

• Comparison of energy consumption with previous periods can be performed
• Comparison between different areas and conditions.

Moreover, an advanced BEMS should provide periodically:

A summary of the energy consumption of various systems for non-technical users which are interested in the overall performance of the whole building (ex. facility manager)
The solution for CommONEnergy: iBEMS

iBEMS - intelligent Building Energy Management System

The iBEMS incorporates:

- **Use of open communication protocols** for data exchange with all the various systems installed in shopping malls and with third parts using open protocols (e.g. Webservices)
- **Control algorithms** which have been developed and verified with simulation tools in order to maximize the Energy saving while improving the comfort.
- **Advanced graphical environment** for showing the measurements collected through sensors and meters defined in the Monitoring and Verification Plan.
- A powerful **Reporting Tool** that allows to verify if the system is obtaining the expected results and potentially continuously improve the control rules for adapting to the real system.
Integrating iBEMS in the pilot cases

For the demo cases, the iBEMS consists of different systems connected to the local controllers using the available open protocols.

The local controllers perform the logging of the required parameters and are responsible for the transfer of information and commands from the systems to the server and vice versa.

Finally the user can overview and override the operation of the system from a dedicated PC in the control rule or any browser using the correct credentials.

Also the system automatically informs dedicated users in case of alarms that are their responsibility to overview.
The iBEMS solution integrates control rules for systems’ control and optimization

As aforementioned in the iBEMS run control algorithms (verified in simulation environment) which can applied in several systems connected to it.

Example:
• Shading system
• Natural ventilation system
• HVAC system
• Lighting

Different values affect the operation of the systems in parallel. Since the control is performed in higher level using the iBEMS and the commands are sent to all the systems, energy saving is maximized.
Example of control rules

Cooling energy for the sun heat gain > light energy
Example of control rules

External T < internal T (during cooling season)
Example of control rules

Taking account of the shadows of the surroundings
The iBEMS integrates advanced graphic environment for systems monitor

The iBEMS integrates advanced graphics showing the areas of interest with the installed equipment and its working conditions.

As an example, for the artificial lights connected to the iBEMS, the user can overview their performance, the power demand as well as the energy consumption.

In case it is required, dedicated users can adjust the operation of the artificial lights.

Similarly, graphics for shading systems have been developed with the possibility to adjust their positioning if required.
The iBEMS environment

Lighting scenes
- Lights On/Off
- Automatic operation
- User scene 1

Manual scene dimming
- Dimming
- CCT
- Activate override

MONITORING
- Luminaire monitoring
- Energy monitoring

Selected zone
CMA Daylight 2

100 % Dimming
75 % Dimming
50 % Dimming
25 % Dimming
0 % Dimming
Final remarks

Concluding it can be said for the iBEMS that:

1. It incorporates advanced control rules developed by project partners to optimize the performance of the connected systems.
2. It provides the users the tools for monitoring and if required override the operation of the systems.
3. It performs logging of available values for long term monitoring and data comparison using reports in order to indicate if systems require maintenance or changes.
4. It contributes significantly on the energy saving target set by the CommONEnergy project through the optimization of the systems connected.
5. The availability of aggregate data is the factor that allows to become aware of phenomena and change behaviors.
THANK YOU!