

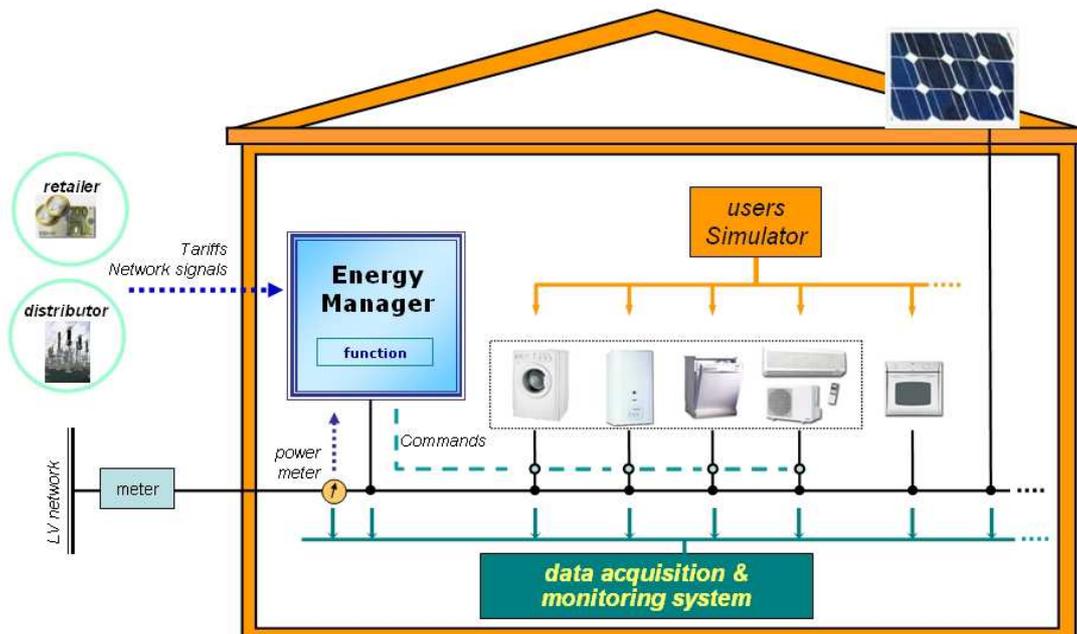
Demand side Management Experimental House (DSM-EH)

The RSE DSM-EH is a 60 m² building representing a common residential flat with living room, kitchen, bedroom and bathroom. The central element of DSM-EH is a Home Energy Manager & Gateway (GED), combining signal received from retailer (tariffs) and distributor (emergency) and user preferences regarding comfort and energy saving. In order to succeed with this management, several functionalities have been developed and tested. The main functionality implemented is the load and heating management, i.e. the possibility of switching off some appliances when particular circumstances occur or deciding whether it is better to use electric or gas devices for HVAC purposes. For example, when a power reduction is required because of high electricity price or an network emergency condition, GED switches off some appliances according to a scheduled priority and the gas heating is preferred to heat pumps.

This facility makes possible to carry out several tests on different energy management strategies but it also simulates the user presence, thanks to an appropriate sub-system which operates each single domestic appliance as it may do a real family living in a house. To carry out these functions, the House is equipped with:

- Home energy manager & gateway (GED), that manages loads and thermal system; this platform is equipped with a monitoring, acquisition and data storage system;
- a commercial home automation system managed by GED to control loads, heating system etc.;
- an automation system that switches on and off each load according to profiles representing different family habits (“user simulator”),
- a whole set of common appliances,
- heating system (boiler + fan coils and air conditioners).

The below Figure shows a scheme of the RSE facility with the GED and the user simulation sub system.



This Experimental House already comprises a storage unit, a photovoltaic conversion generator and a micro cogenerator (μ CHP).

Commercial of the shelves components and technologies are used to build the infrastructure. Java™ with OSGi™ specifications are used to maximize dynamic interaction (upgradeability) and interoperability. OSGi technology (www.osgi.org) is a Universal Middleware that provides a service-oriented, component-based environment for developers and offers standardized ways to manage the software lifecycle. OpenWebNet™ communication protocols (www.myopenbticino.it) is used to interface commercial home & building automation systems.

TCP/IP protocol and XML format are considered because are widely used and it is very likely that their diffusion will extend even further in next years, becoming a de facto standard.; they permit also to pass easily from virtual environment to real test facility, DSM-EH is fully integrated into [DER-TF](#); the central Control Unit of DER-TF is able to control also DSM-EH.

It is possible to perform research and tests involving both DER-TF and DSM-EH.