InnoGrid2020+
The European Research & Development Dissemination Seminar
23-24 February 2012

ADDRESS
Active Distribution networks with full integration of Demand and distributed energy RESourceS

Experience, competence, knowledge

- **25** partners, **11** European countries. Coordinated by Enel Distribuzione
- **40%** research centers (including universities); **30%** manufacturers; **30%** utilities

Address target and objectives

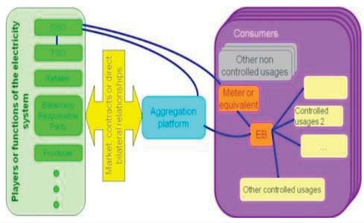
The aim of the project is to develop a comprehensive commercial and technical framework for the development of "Active Demand" in the smart grids of the future.

Active Demand (AD): active participation of domestic and small commercial consumers in the power system markets and in the provision of services to the different power system participants.

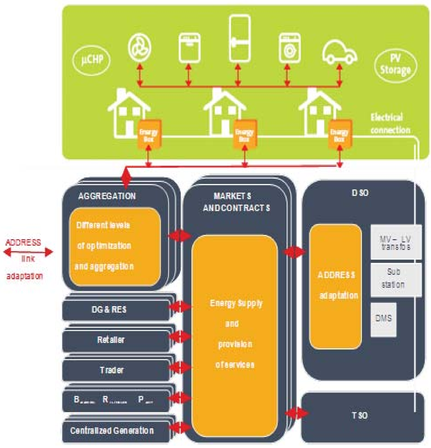
AD involves all types of equipment installed at the consumers premises: electrical appliances ("pure" loads), distributed generation (such as photo-voltaic arrays or micro-turbines) and thermal or electrical energy storage systems.

The main **objectives** are**:**

- Enable active demand:
  - Develop technical solutions at the consumers premises and at the power system level
  - Propose recommendations
- Exploit the benefits :
  - Identify the potential benefits for stakeholders
  - Develop markets and contractual mechanisms
- Accompanying measures to deal societal, cultural, behavioural aspects.
- Validation in 3 complementary test sites
- Dedicated dissemination activities for stakeholders



Address architecture

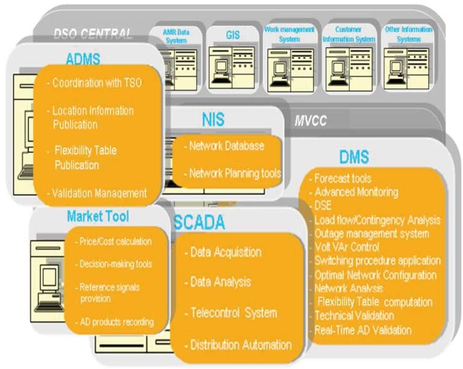


DEREGULATED PARTICIPANTS

Consumers providing AD: domestic and small commercial consumers with single phase or three-phase connection to LV networks and with 100 kW maximum power consumption and/or generation.
Aggregator: mediator between consumers and markets.
Producers: central producers, decentralized electricity producers, producers with regulated tariff and obligations (reserve, volume, curtailment, etc.).
Intermediaries: production aggregators, electricity traders, electricity brokers, balancing responsible parties, retailers.
Large consumers

REGULATED PARTICIPANTS

DSO (Distribution System Operator): regulated entity responsible for the transport of the electrical power on the distribution networks. DSO provides access to the distribution network users according to non-discriminatory and transparent rules. DSO also guarantees the safe and economic operation and the maintenance of the distribution system.
TSO (Transmission System Operator): entity responsible for the bulk transmission of electric power on the main high voltage electric networks. TSO provides access to the electricity market players according to non-discriminatory and transparent rules. TSO also guarantees the safe and economic operation and the maintenance of the transmission system.

DSO & TSO

ADDRESS focus on active network management, providing the signals sent by the DSOs to the aggregators and the markets, in order to guarantee a safe, reliable and flexible operation of the distribution systems.
Three main types of services that AD may provide to network operators have been identified:
-**Voltage regulation and power flow control**: system operators (DSO and TSO) can resort to AD services to carry out voltage regulation and power flow control.
-**Tertiary Active Power Control**: tertiary reserves (for frequency control) are used as non-automatic action to restore adequate control margins. Frequency control is under the responsibility of TSOs.
-Smart load reduction: both TSO and DSO might need some form of load reduction in a certain area of their networks when, due to maintenance issues or following network failure, a load reduction is needed. Nowadays if such a problem occurs, entire feeders are disconnected.
DSO architecture has been designed to implement new functionalities developed to fulfill project's requirements related to management of the network in presence of **AD:**
- Location information manager: is a tool used by DSO and provided to the Aggregators in order to localize the area network in which Active Demand has been required.
- Flexibility table manager: is a facility to Aggregators operation when addressing AD programs over different network areas, since it provides an indication of both the upper and lower limits of the power variation (flexibility) allowed in different network (load) area.
- AD products validation: is the validation process of the market clearing results. It verify that there are no network constraint.