

SmartGen	<p><b>Programme:</b> CSE "Cassa Conguaglio per il Settore Elettrico" (<i>Compensation Fund for the Electricity Sector</i>) - "Ricerca di Sistema" – (<i>System research for innovation and development of the electricity system</i>)</p>	 <b>www.smartgen.it</b> <a href="http://www.research.softeco.it/smartgen.aspx">www.research.softeco.it/smartgen.aspx</a>  <b>Contacts</b>  <b>Gianni Viano</b> Phone: +39 010 6026 338 Fax: +39 010 6026 350 Email: <a href="mailto:gianni.viano@softeco.it">gianni.viano@softeco.it</a>  <b>Stefano Bianchi</b> Phone: +39 010 6026 368 Fax: +39 010 6026 350 Email: <a href="mailto:stefano.bianchi@softeco.it">stefano.bianchi@softeco.it</a>
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## OVERVIEW

The scenario of electricity distribution networks has significantly changed in the last decade.

**Passive power networks** were designed to transmit power from generation sources (large nodes with production plants using fossil and nuclear fuels) to points of consumption, usually covering long distances.

Deregulation of electricity markets, sustainable development, use of cleaner fuels, development of **distributed generation (DG)** technology and investments in renewable energy sector have steered electrical system solutions towards the inclusion of active energy distribution.

**Active power networks** imply the presence of small and medium size generators (often with random production characteristics - solar, wind, etc.) participating in the electricity market as actors having flexible load characteristics – also in relation to the price of energy. The extensive penetration of DG within medium (MV) and low voltage (LV) distribution networks has significantly altered the principles of operation and management of the electricity system, as **the line between energy producers and consumers has become blurred**. DG, for particular renewable energy characterized by intermittent operation, may also play a role in the provision of ancillary services on the distribution networks, linked both to the provision of active and reactive power.

SmartGen will propose **electric power and control system solutions** for an intelligent management of generation and electric loads in active distribution networks equipped with small and medium size generators and storage units so as to meet technical and economic constraints.

SmartGen will define the architecture of a **Distribution Management System (DMS)** for portions of electric distribution networks capable of managing problems of optimization, power flow control, voltage control, supply of auxiliary services from distributed generators and loads:

- control logics for compensation devices will be developed in order to mitigate grid disturbances;
- possible emergency conditions and restoration procedures will be analyzed;
- innovative protections systems will be analyzed and proposed.

“Smart grids are electricity networks that can intelligently integrate the behaviour and actions of all users connected to it - generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies.”

**ETP SmartGrids**

## OBJECTIVES

- **definition** of
  - DMS architecture and specifications to manage power distribution networks including generators and controllable loads;
- **integration** of
  - existing instruments (and/or development of new ones) suited to enable the provision of the electric power service and of ancillary services (such as regulation and active and reactive flow control, enhanced quality of the service, fast and reliable restoration service after faults and blackouts);
  - distributed generators (especially renewable sources) into distribution networks;
- **improvement** of
  - network stability;
  - network congestions management;
  - recovery procedures from emergency events (blackouts);
  - controllability and management of the electric grid;
  - the Quality of Service (QoS);
  - specialized regulation;
- **increase** of
  - the participation of players in the electricity market in particular end users;
- **reduction** of
  - new transmission lines;
  - network losses.

## SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.

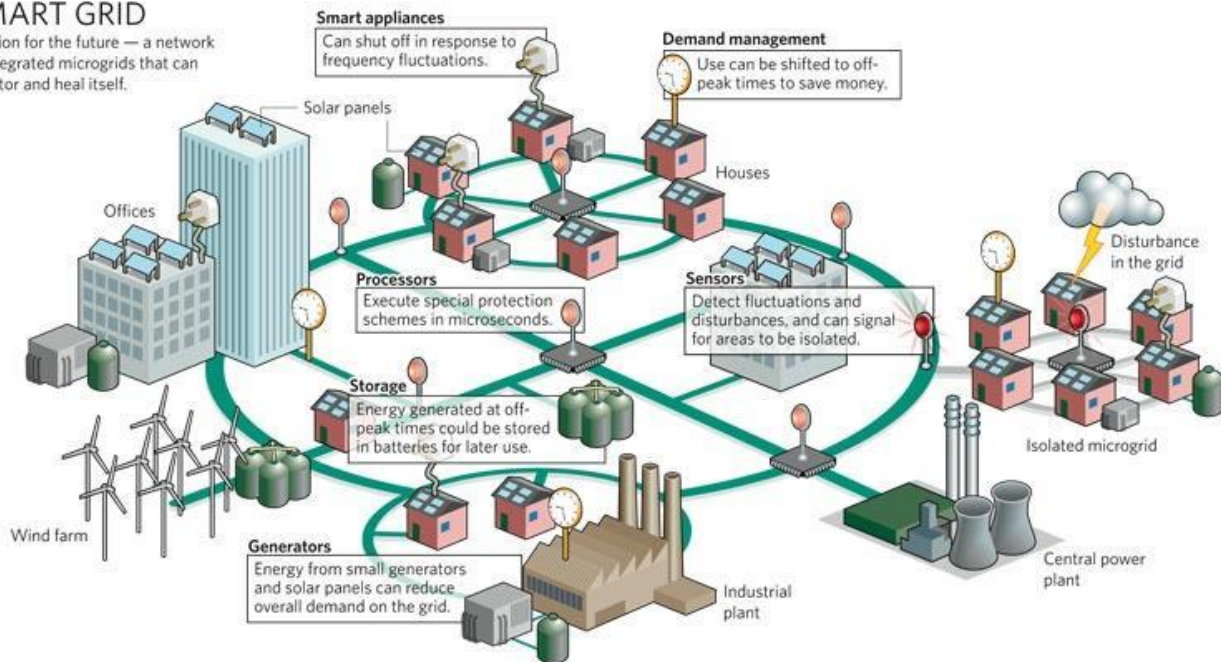


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## CONSORTIUM