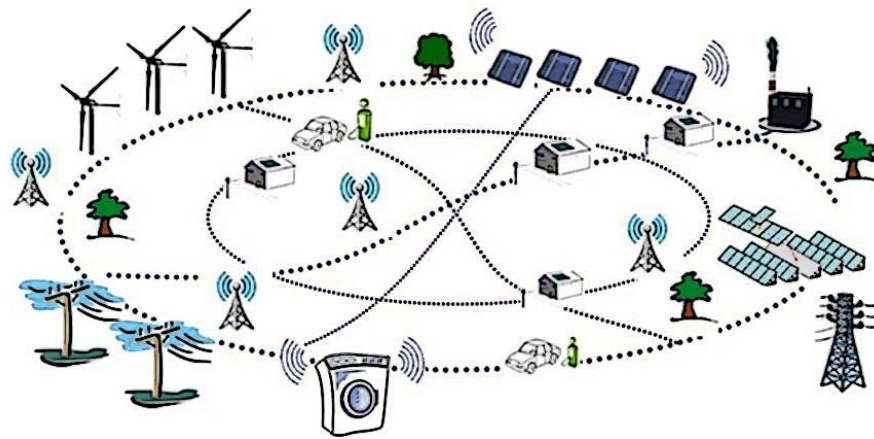


## SDG+ SERVICES FOR THE SMART DISTRIBUTION GRID OF THE FUTURE



### WHY "SMART GRID"?

'Smartness' has been built into electricity grids since their inception: supervision, control and protection are already key activities for a distribution system operator. Why, then, "Smart Grid"?

The difference between traditional grids and smart grids is mainly the capability to handle increasing complexity efficiently and effectively. This increasing complexity is due to various factors such as the widespread introduction of distributed generation, changes in customer behavior, and boosting efficiency of each link in the energy chain in a bid to reduce consumption.

In order to face these new challenges, different technologies such as communication, information management

and automated controls have to be applied within the traditional network structure.

Even when based upon tried and tested technologies, switching to smart grids generally requires the development of innovative applications and brand new solutions.

Today, distribution system operators are in various stages of evaluating, specifying and deploying technologies associated with the smart grid of the future: based on experience gained in various power distribution systems worldwide, CESI is able to provide a wide range of consulting and testing services to support smart grid projects, enhancing their reliability and profitability, and reducing technical hazards and risks.

## WHY CHOOSE CESI?

CESI has more than ten years' experience and developed know-how enabling it to play a significant role in major smart grid projects involving Italian and European distribution system operators.

- **Italian and Spanish Metering project**

*CESI has actively participated alongside Enel in the world's most significant metering project featuring 30 million connected costumers and is currently involved in the new Endesa Smart Meter roll-out.*

- **Italian Distribution Network Automation**

*CESI has contributed to the improvement of the Italian Distribution Network, which is today the most highly automated in Europe, allowing a significant increase in service continuity and quality.*

- **Italian Distribution Network Automation**

*CESI has been recently awarded as Technical Consultant to assist the deployment of the Smart Metering Projects in Republic of Serbia and in Montenegro.*

- **European R&D projects**

*CESI has participated in European R&D projects, such as DISPOWER, aimed in investigating the Smart Management of Distributed Generation into the Grid and in which CESI has managed the set-up of a real facility to test system integrations.*

- **Smart Grid pilot projects**

*CESI is engaged in pilot projects on local dispatching for renewables integration, smart home appliances and electric vehicles, focusing both on innovative local dispatching methods and through the enhancement of the network telecommunication infrastructure.*

- **EneMalta Smart Island**

*CESI is providing support for the implementation of a Smart Grid project in Malta, particularly in connection with Power Line Carrier communication technologies*

- **International Working Group for Standards Definition.**

*CESI is actively involved in the International Working Group for the Standards Definition.*

CESI has acquired experience acting both as lead consultant and testing provider for private distribution network operators and as scientific developer within international R&D projects.

Beside its consulting capabilities, CESI is able to perform a full range of testing activities on components and systems in its testing facilities in Milan, Italy, and Berlin and Mannheim, Germany.

These tests, generally aimed at evaluating systems interoperability, compliance and performance, are conducted in full synergy with consulting activities in order to offer clients a complete and reliable assessment of technologies and their capacity for integration into existing systems and networks.

Today CESI is able to offer a host of services ranging from consulting to testing and certification on:

- advanced metering infrastructure
- meter data management systems
- powerline communications
- distribution automation
- distribution protection systems
- network assessments
- voltage regulation
- distributed resource management
- storage and electric vehicles
- power quality
- network studies
- communication architectures
- standards and models

## CESI FIELDS OF ACTIVITY

CESI covers the entire chain of a Smart Distribution Network. In particular, CESI activities can be divided into the following three key segments:

### Metering Infrastructure

*Advanced metering, which allows the characterization of customer information - such as consumption data and their communication back to the local utility, thus allowing immediate operating savings - is a key enabling infrastructure for the development of advanced customer-oriented applications, including in-home devices and demand-response programs.*

In this field CESI provide a full range of services to assist operators during the implementation of Smart Metering projects:

- regulatory assessments
- technical and economic analysis and roadmap definition, losses reduction plan
- advanced metering infrastructure: architecture and technologies
- communication protocols and standards
- Smart Metering Pilot projects: strategy definition, KPIs, pilot set-up and evaluation
- Smart Metering deployment: technical specifications, procurement strategy, quality assurance and project management, supervision during installation and commissioning
- Testing and verification of interoperability of meters and concentrators

CESI has specific experience in Metering projects implemented via PLC communication.

### Distribution Network Automation

*Distribution Automation refers to all applications aimed at enhancing the capability of the network to react autonomously to unexpected external events, allowing immediate operating savings for the distribution system operator.*



In this field our services are geared to supporting operators in implementing innovative solutions designed to:

- automatically identify and recover from network faults
- regulate voltage, particularly in distributed resource networks
- implement neutral earthing through the installation of mobile Petersen coils
- optimize the distribution protection system
- perform environmental assessments

### Integration of Distributed Resources

*A high penetration of distributed Resources, such as Renewable Generators, storage systems and, in the near future, Electric Vehicles, requires a radical change in distribution network planning and operation.*

In this field we provide both specific investor- and network operator-oriented services. The former are designed to study the most appropriate form of distributed generation network connection to the grid, whereas the latter focus on providing support in evaluating the impact of such integrations as well as solutions for their efficient control.



Our field of expertise covers the following areas:

- regulatory framework
- components assessment and components verification
- distributed generators and grid connections
- Storage systems
- Electric Vehicles (EVH)
- communication infrastructure between the grid supervision and control system and distributed resources
- power system planning and modeling
- power system security and stability
- Distribution Management System (DMS)
- Environmental assessment

### Home Area Network and Energy Management System

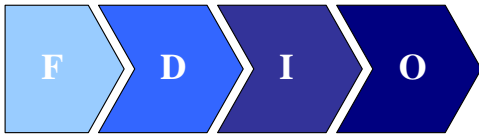
*Home Energy Management Systems (HEMS) allows a deeper interaction with the customers, boosting their consumption awareness and increase the capability to drive load profiles and raise the demand forecast reliability, thus simplifying the service management and supporting the purchase strategy, while offering the user an additional element of customer satisfaction.*

In that field, our services are aimed to support Distribution Companies and Retailers in:

- Assess the characteristics of the load profiles
- Assess the HEMS state of arts and technologies
- Perform case studies and cost/benefit analysis

## CESI SERVICES

CESI services in the field of Smart Grids ranges from consulting to Testing of components and systems and provision of special equipment. CESI is able to provide support in all stages of implementation of a Smart Grid project.



### Feasibility stage

#### Consulting Services:

- investment analysis, regulatory assistance, strategy development, road map definition
- feasibility studies, technology assessment
- assistance in grant and public funding application and management

#### Testing Services:

- Technologies
- Performance
- Benchmarking
- Compliance
- Quality



### Design stage

#### Consulting Services:

- System architecture definition
- Pilot project set-up
- Functional and detail specifications of systems and components

#### Testing & Certification Services:

- Interoperability
- Integration



### Implementation stage

#### Consulting Services:

- Pilot implementation assistance
- Roll-out implementation assistance
- Procurement support
- Vendor selection and management
- quality assurance
- commissioning assistance

#### Testing Services:

- homologation



### Operation stage

#### Consulting Services:

- Diagnostics
- Life assessment
- Technical assistance in system operation
- System optimization and improvement
- Testing & Certification Services:
- Diagnostic and post mortem analysis
- Incident reconstruction

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