From Smart Metering to Smart Grids

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Outline

- Presentation of the Enel Group
- Network Operators SG scenario
- Smart Grids technologies implemented in Enel
- Enel’s Smart Grids demonstration projects
- Enel’s Smart Grids Roadmap
An international integrated energy player
Infrastructure and Networks Division

**Electricity networks Business Area**
- 4 Macro-Regions
- 11 Local Branches
- 11 Control Centers
- 115 Offices
- 19,000 Employees
- Over 1,100,000 km lines
- About 2,000 HV/MV Substations
- Over 400,000 MV/LV Substations
- 32 million customers
- **72,000 Renewables connected for 6,6 GW**

**Public lighting Business Area**
- 5 Local Branches
- 330 Employees
- 1,925,000 Spot-lights
- 4,000 Municipalities served

**Gas network Business Area**
- 4 Local Branches
- 21 Control Centers
- 1,300 employees
- 630 Primary Plants
- About 30,600 km gas pipelines
- 2 million customers

**The 2° largest Distribution Operator in Europe**
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Network Operators Scenario

External Drivers

- Security of supply
- 20-20-20 EU Goals
- Change in electricity consumption
- Large increase of unpredictable renewable energy sources
- The EU Third Energy Package

Internal Drivers

- Reduce the total costs of the power system
- Replacement of ageing infrastructures
- Integrate low-carbon generation sources
- Support energy efficient demand side technologies
- Enable the active participation of customers to the energy market
- Enable the electrification of the transport sector
- Increase the network flexibility to face 2050 scenarios

Networks are strategic enablers of the new Scenario
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Enel network is the largest Smart Grid in the world

Solutions deployed

Automatic Meter Management
- Telegestore is fully operational on > 32 Mln Customers
  - Leading Technology
  - Excellence in operation

Network automation
- HV and MV network remotely operated
- More than 100,000 MV substations remote controlled
- Automatic fault clearing procedures

Work Force Management
- 5,200 vehicles equipped
- Logistic support to Enel crews
- ENEL cartographic available on board
- All processes through mobile applications
- Connection from field to the centre for Enel crews

Asset Management
- Cartographic census of network assets
- Database of network events (power outage notification, fault detection, etc)
- Optimization of network investments based on a risk analysis.

Investment exceeding € 2,5 bn
Dramatic reduction of cash-cost per customer
Cost leadership and operational excellence

930€mn yearly opex savings vs 2001
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Priority demonstration projects

**Smart network and Large Scale Integration of Renewables**
- New network design rules
- Development of storage capacity
- Advanced control function
- Standardized ICT solutions to integrate massively RES
- Advanced network maintenance and supervision tools
- Optimal distribution grid operation in areas with high RES generation

**e-Mobility Infrastructure**
- Extended electricity recharge infrastructure
- e-Seaport

**Active Demand**
- Load control (peak shaving and energy savings)
- Demand Response program on a large customers base
- Integration of energy management systems, home appliances and Home Automation networks and services
Active Control for Distributed Energy Resources (DER) connected to the Medium Voltage network

The project will deal with:

- Realizing an **advanced control system**
- Implementing an “always on” and **standard-based communication solution** connecting all the relevant nodes in the network, including DER locations.
- Implementing **Voltage Control (at all nodes) and Power Flow Control** in the MV network.
- Developing new procedures for managing **efficiently and reliably** the **Disconnection of DER units in the event of unwanted islanding operations**.
- Testing/implementing **network operation** in **meshed mode**.
**Electric vehicles recharging infrastructure**

*Enabling large scale electric mobility*

Smart recharging network to overcome functional and technological barriers for large scale Electric Mobility

- Enable new advanced services to manage the **billing and recharge process**
- Innovative technologies in a **standardised framework**
- Include Smart Grids functionalities such as load management and storage

**2010 - 2012**

- Pilot test: 500 recharging points in 3 cities
- **FP7 Call on Electric Vehicles**

**2012 - 2019**

Roll out
The Enel Smart Info project

The Smart Info is an innovative device needed to build customer consciousness on energy consumptions.

The Smart Info will collect data from the Enel smart meter and publish them to different customer interfaces (e.g. PC, TV, custom display, appliances).

The Smart Info will be the first step to create a new energy services marketplace:

- Automatic load management
- Networking with smart appliances
- Energy efficiency
- Active demand services

2010 - 2012
- Design, development and Pilot Test

2012 - 2019
- Roll-out
Energy@Home (E@H) Project

Energy@home is a collaborative project between

• Development of a communication platform for collaboration of devices in the Home Area Network (HAN) in order to enable provision of Value Added Services based upon information exchange related to energy usage.

• The project envisions a standard protocol based on ZigBee technology.

• Focus on technology
Road to full active demand

**Smart Meter**
- Invoices based on actual power consumption
- Remote contract management
- Tailored tariffs

**Smart Info**
- Consciousness on energy consumption
- Available data collected from the smart meter to the indoor environment

**Address project**
- Open and standard platform for the indoor communication between meters, home appliances and broadband gateways
- Active Distribution Network with full integration of Demand and Distributed Energy Resource

The Starting Point

Using Telegestore know-how

International cooperation

Full Active Demand
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Level of Smart Grids deployment

FULL SMART GRIDS ROLL-OUT

EUROPEAN ELECTRICITY GRID INITIATIVE

FP7 DEMONSTATIONS
- Active Distribution Networks
- EV/PHEV Infrastructure

ENEL DEPLOYMENT
- AMM
- Network automation
- WFM
- Asset Management

EU FP7 R&D
- address
- G4V
ENEL PROJECTS
- Smart Info, Active Demand, IP network, E Mobility

2000  2010  2020
Thanks for your kind attention!