Intelligent Energy, Smart Grids and the Efficiency Challenges for the European Utilities
A view from Enel

Livio Gallo, Managing Director of Enel Infrastructure and Networks Division,

CEO Enel Distribuzione

Strasbourg, 15° September 2009

The Enel Group

A large, geographically diversified energy operator

COMPANY DESCRIPTION

Italian core

Italy's largest utility, with a leadership position in generation, distribution and sale of electricity and gas

European base

Europe's second largest utility in terms of installed capacity and the largest for number of shareholders

Worldwide strategy

An international, well-diversified energy group producing, distributing and selling electricity and gas in **22 countries on 4 continents**

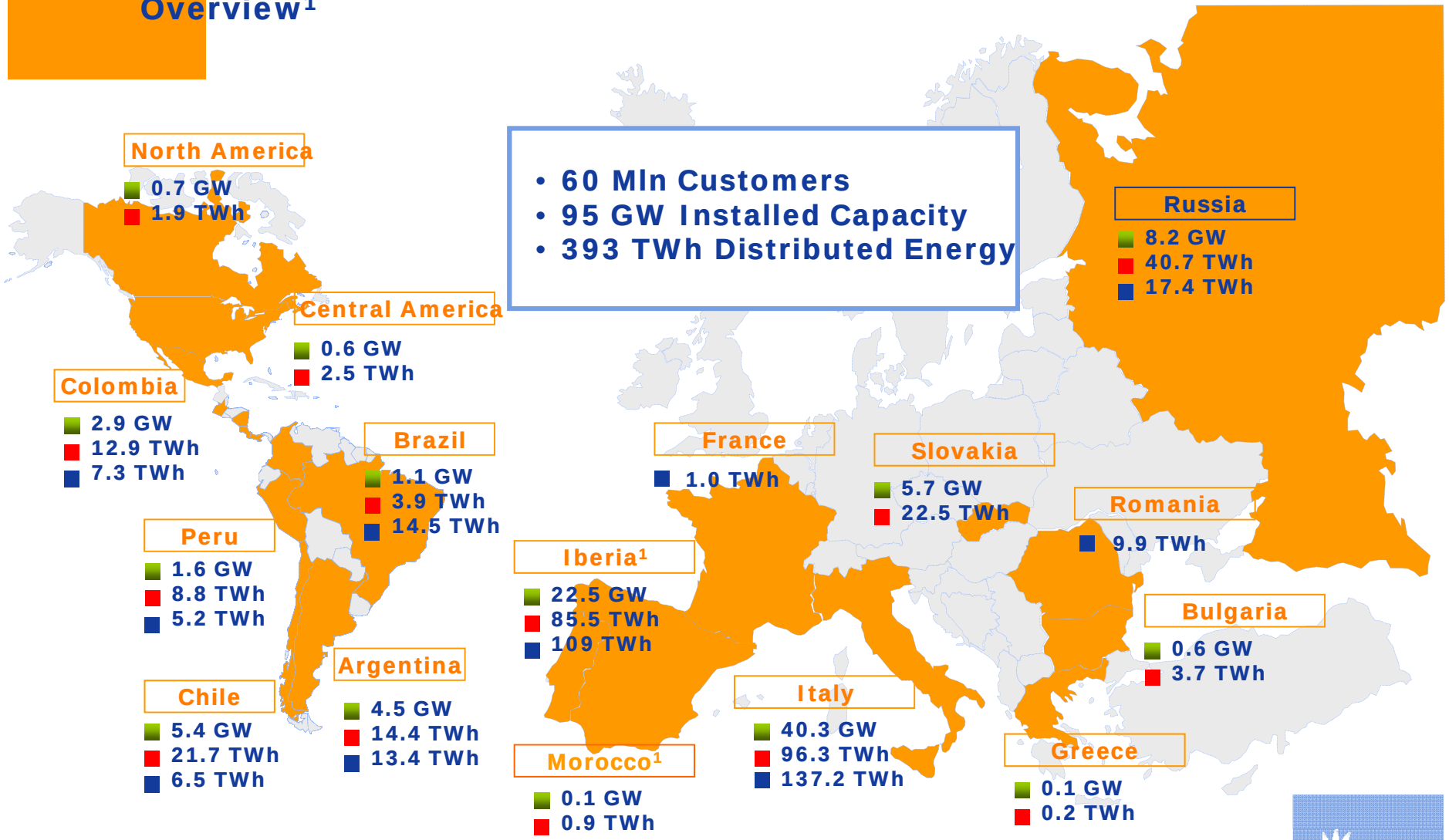
A commitment to develop efficiency and technological leadership across all of our industrial and distribution operations

Enel Group at a glance

Overview[1]

- 2008 Installed capacity (GW)
- 2008 Net production (TWh)
- 2008 Tot sales to final customers (TWh)

- 60 Mln Customers
- 95 GW Installed Capacity
- 393 TWh Distributed Energy



An international integrated energy player

1. Including: 100% Endesa net of the assets to be transferred to Acciona, full year OGK-5 and E. Muntenia Sud production and sales. Excluding January - June 08 production and sales of Viesgo.

Infrastructure and Networks Division Assets

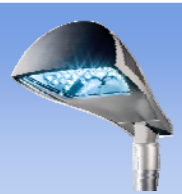
Electricity networks Business Area

- ✓ 4 Macro-Regions
- ✓ 11 Local Branches
- ✓ 11 Control Centers
- ✓ 115 Offices
- ✓ 19.700 Employees
- ✓ Over 1.100.000 km lines
- ✓ About 2.000 HV/MV Substations
- ✓ Over 400.000 MV/LV Substations
- ✓ 31 million customers

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

Public lighting Business Area



- ✓ 5 Local Branches
- ✓ 330 Employees
- ✓ 1.925.000 Spot-lights
- ✓ 4.000 Municipalities served

Power Network Scenario and New Challenges

External drivers

- **20-20-20** EU Goals
- Electricity **consumption growth**
- Replacement of **ageing infrastructures**
- Large increase of unpredictable **renewable** sources
- Extension of **market liberalization** process
- **Security** of supply
- The **Third Energy Package**

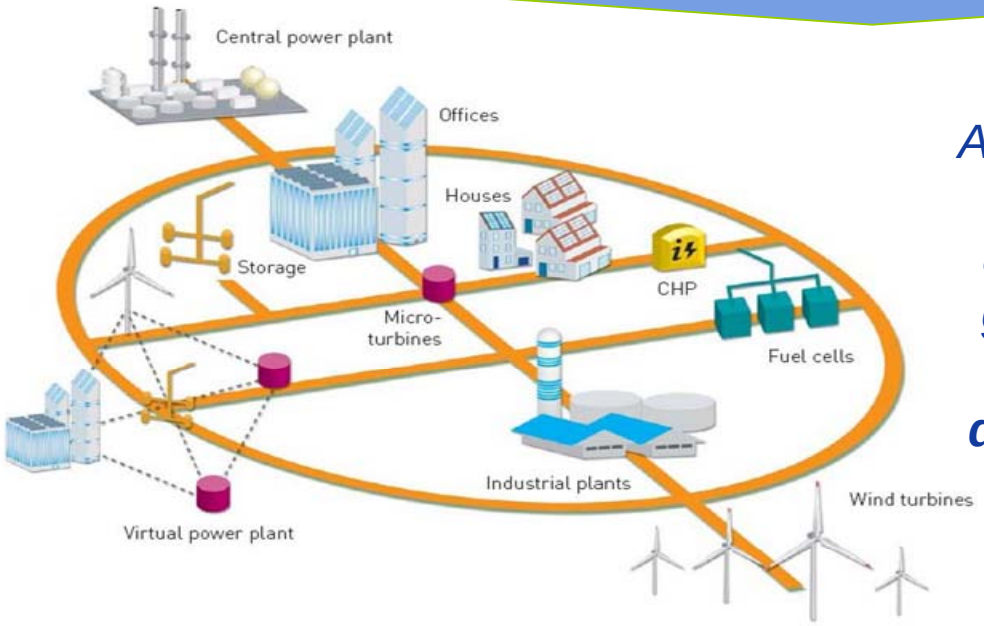
+

Distribution drivers

- Reduce the **total costs** of the power system
- Integrate **low-carbon generation** sources
- Support **energy efficient demand side technologies**
- Enable the **active participation** of customers to the energy market
- Enable new technologies e.g. **electrification** of the **transport sector**
- Develop a **flexible network** to the future scenarios

Smart Grids Implementation

From today's Network to Smart Grids



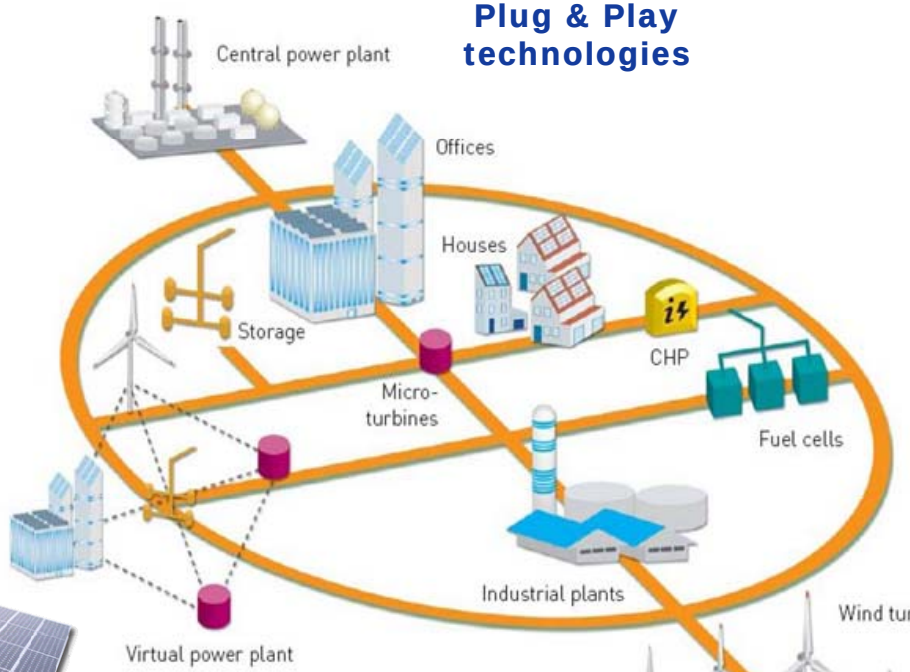
*A **Smart Grid** is an electricity network that can **intelligently integrate** the actions of all users connected to it - **generators, consumers** and those that do both - in order to efficiently **deliver sustainable, economic and secure electricity supplies***

Smart Ingedients for a Grid

Vision for the Networks of the future

Multi-directional 'flows' management

Seamless integration of new applications



Plug & Play technologies

End user real time information and participation

Central and distributed intelligence

Central and distributed resources

Public Lighting

Smart equipments and power electronics

Smart Grids Model and functionalities

SMART GRIDS
Functional levels

Level 5: Smart Customers

Customers become aware and participate actively

Level 4: Smart Energy Management

Management of end-use energy efficiency, aggregation, retail

Level 3: Smart Integration

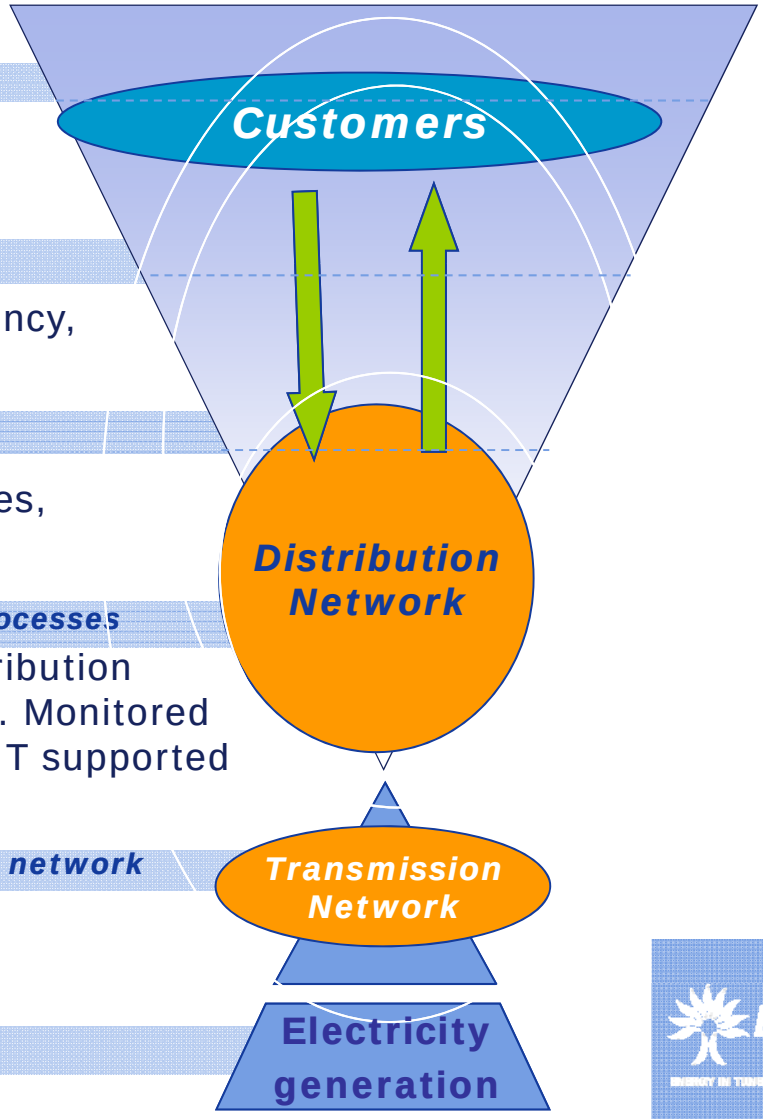
Renewable energy, DG, electric vehicles, electricity storage and aggregation

Level 2: Smart Distribution network and processes

More automated medium voltage distribution networks with self healing capabilities. Monitored and controlled low voltage networks. IT supported monitoring process

Level 1: Smart Pan-European Transmission network

Level 0: New generation technologies



Smart Grids benefits

Stakeholder	Project Key Performance Indicators	Target
System	Reduction in electricity consumption	5-10 %
	Reduction in peak to average load ratio	5-20 %
	Increased above existing design hosting capacity to integrate DER	20 %
	Reduction in CO2 emissions	5-20 %
	Reduction in distribution losses	0-2 %
	Increase in EV integration capacity	100 %
Customers	Increased quality of supply	2-10 %
	Reduction in outage time	2-10 %
	Reduction in electricity bill	0-10 %
	Increased customer satisfaction	5-10 %
	Increased customer choice	10-20 %
DSOs	Increased lifespan of electric infrastructure	10-20 %
	Reduction in operation costs	0-30 %
Retailers	Increased number of new products offered to the customers	10-50 %
Suppliers	Increased number of new products offered to the DSOs and customers	10-50 %

Enel State-of-the-Art approach and Future Strategies

- 32 million Smart Meters in operation
- Medium Voltage Network automated and self healing
- Automated Work Force management
- Public Lighting with LED technology
- Network Infrastructure for electric mobility

- Pilot test on Smart Grids:
  - Smart Cities,
  - Integration of DER,
  - “Active Demand”
- European leadership on Smart Grids DSOs Initiative for the competitiveness of Europe on Network Technologies, supporting the definition of the technical contents of the SET Plan

Leading role in defining the worldwide Roadmap:
Italy is the appointed leader of the MEF working group on SG towards COP 15 - Climate Conference in Copenhagen

A closing word

- Implementation of Smart Grids at EU level will enhance **energy efficiency** and will determine a quantum leap in the development of **energy-related technologies**.
- **DSOs, the distribution system operators**, will be demonstrating over the next years not just the feasibility of the most modern approaches in this domain, but will also contribute to refocus the European electricity market towards a more effective **balance between resources used and electricity production.**
- **Smart Grids are no "option" but a "must"** in the development of an extremely diversified sourcing of electric power and are a key factor in the **effective use of energy produced by renewable sources**.
- To be able to share with the consumers the outcomes of research and engineering, the industry needs a **precise and reliable regulatory framework** as well as the support to the already established **EU research plans**.
- **European Parliament ITRE and ENVI Committees will play a fundamental role** over the next five years in understanding and mainstreaming the potential of this technological approach and should encourage a **coherent legislative process** whose pillars are to be found in the **Energy and Climate package** approved in the last legislature.