



L'ENERGIA CHE TI ASCOLTA.

Smart Metering and Smart Grids: the Enel experience

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Agenda

Smart grids potential

Enel achievements and strategy

Smart grids regulation and financing

Network Operators Scenario

External Drivers

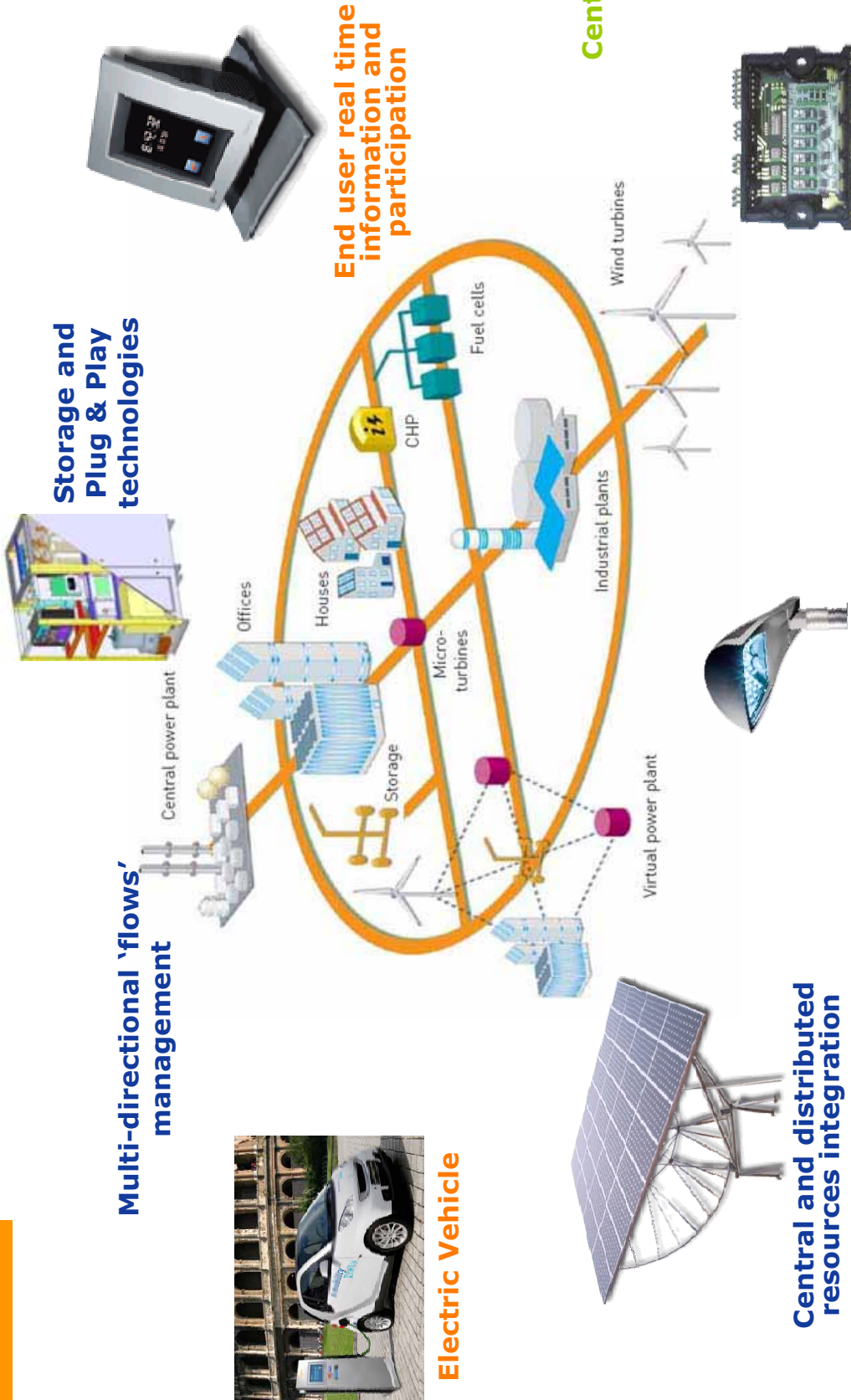
- **20-20-20** EU goals
- Change in electricity consumption patterns
- Large increase of intermittent/unpredictable renewable energy sources
- Security of supply
- Third Energy package provisions

Internal Drivers

- Reduce **total costs** of the power system and replace **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 long term uncertainties

Networks are key elements to implement any low-carbon strategy and increase the security of the system

Smart Grids: vision and benefit

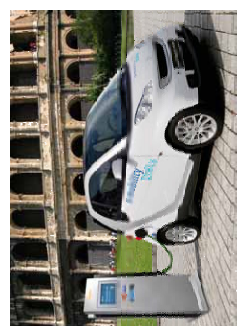


Multi-directional 'flows' management

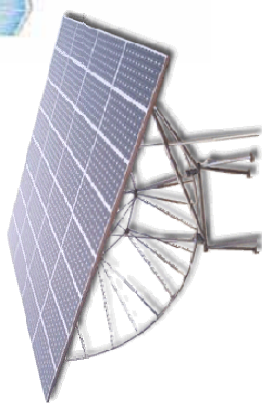
Storage and Plug & Play technologies

End user real time information and participation

Central and distributed Intelligence



Electric Vehicle



Central and distributed resources integration



LED Public Lighting



Smart equipments and power electronics



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Enel smart grid and network innovations



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

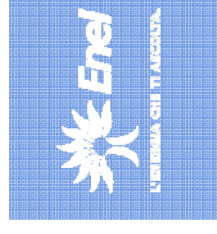
- ▶ 5.200 vehicles equipped
- ▶ Logistic support to Enel crews
- ▶ ENEL cartographic available on board
- ▶ All processes through mobile applications
- ▶ Connection from field to the centre for Enel crews



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.

Enel Network: the largest Smart Grid in the world



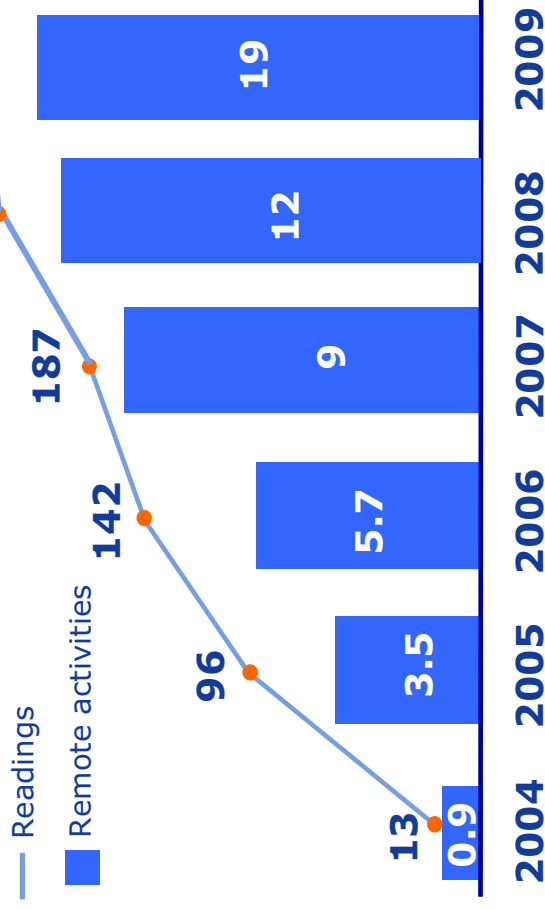
Electronic Meters and Automatic Meter Management

Italian pioneering experience and leadership

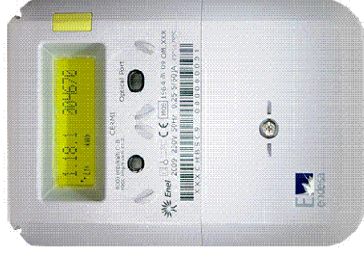


Digital meters installed, controlled and read in December 2008: 32 mln

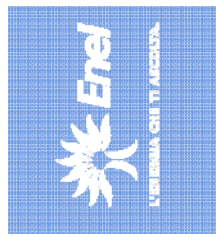
Remote activities and readings (mln)



13 mln Customers in Spain



New Generation based on Italian unique experience
with state of the art functionalities



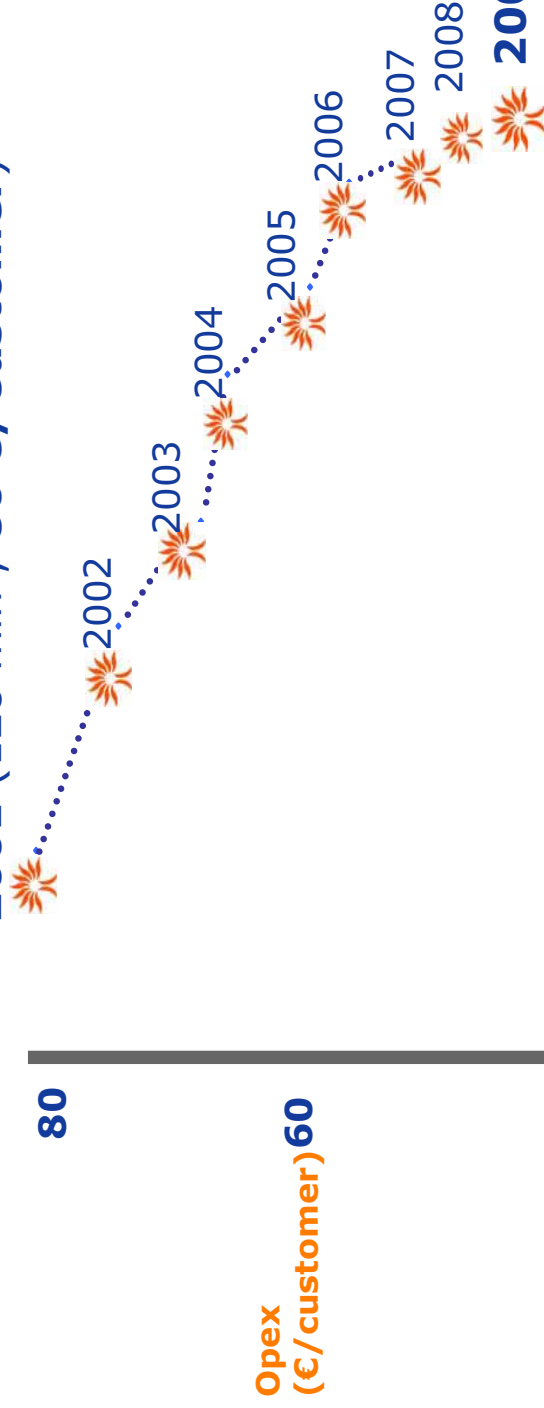
Results achieved

Enel Operational Excellence

- ✓ Network remote control and automation
- ✓ Automated work force management
- ✓ Automated metering management
- ✓ Process reengineering
- ✓ Investment optimization
- ✓ Network development optimization

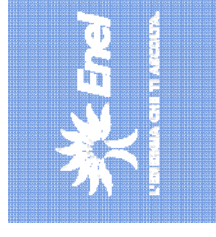


2001 (128 min ; 80 €/Customer)



European Benchmark

2009 (49 min; 48 €/Customer)



Communication protocol opening

Enel strategy

EU mandate (M/441) assigned to CEN - CENELEC – ETSI



Development of an open architecture for utility meters involving communication protocols enabling interoperability



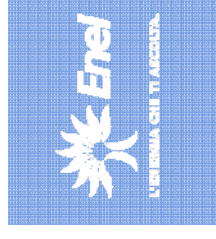
Enel communication protocol (**Meters and More**) is:

- ▶ **managed by a neutral and no-profit association** based in Brussels;
- ▶ **accessible**, assuring its availability;
- ▶ **enabling** evolution certified.

Leveraging on

- ✓ proven reliability of the Enel proprietary protocol thanks to 35 Mln meters in operation
- ✓ implementation of all the advanced AMM functionalities ready for Smart Grids infrastructure.
- ✓ upcoming deployment on over 13 Mln meters in Spain

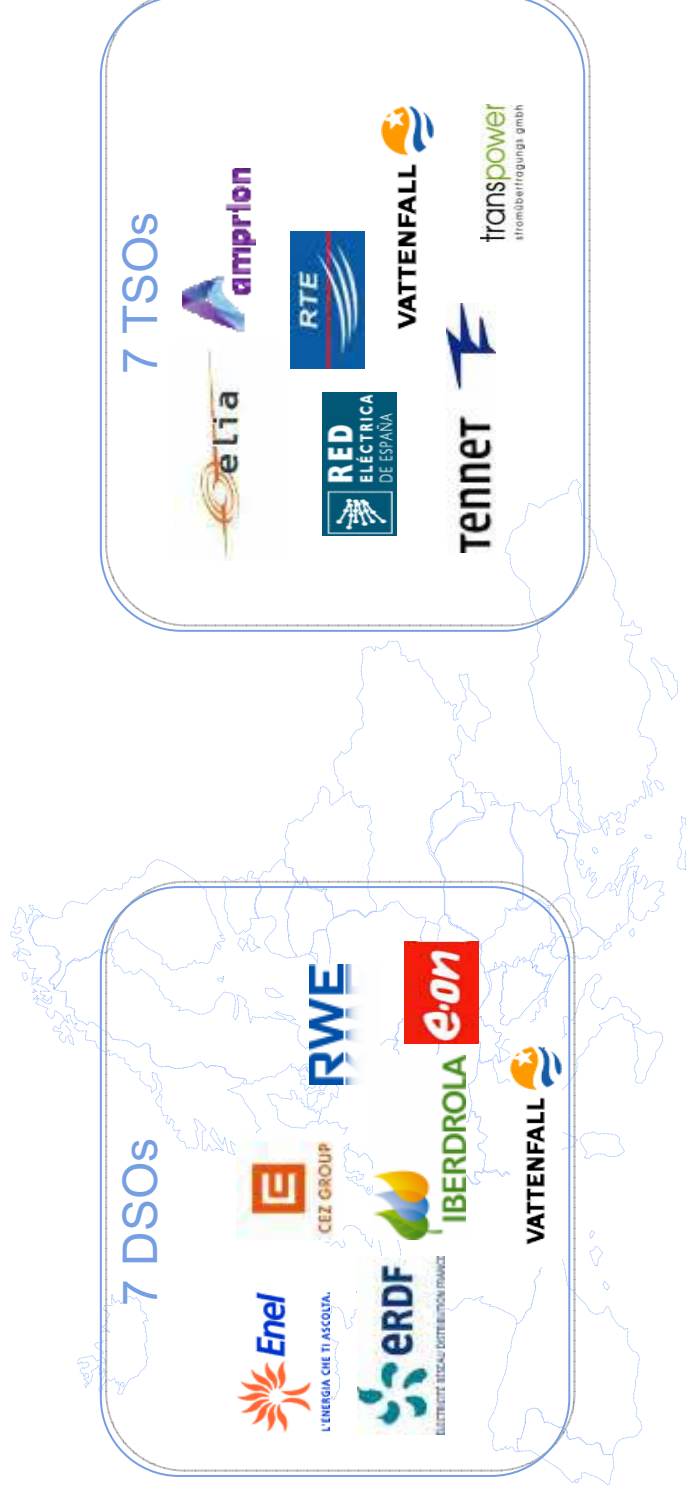
Best European experience available for the standardization process



Smart Grids Implementation of the European Electricity Grid Initiative (EEGI)

Joint TSO-DSO contribution to the European Industrial Initiative (EII) on Electricity Networks within the framework of the **Strategic Energy Technology Plan** of the European Union (**SET Plan**)

Active role of the EEGI in designing the regulatory rules within EU DG Energy



**R&D and demonstration program budget of 2€ bn
included in the Communication on Financing of the SET plan**

Enel's Smart Grids Roadmap

20-20-20

FULL SMART GRIDS ROLL-OUT

Smart Grids deployment

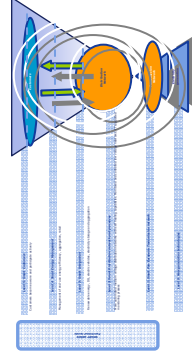
Technology Standardization

EUROPEAN ELECTRICITY GRID INITIATIVE

FP7 DEMONSTRATIONS
• Active Distribution Networks
• EV/PEV Infrastructure

EU FP7 R&D
• address
• G4V
ENEL PROJECTS
• Smart Info, Active Demand, IPnetwork, E Mobility

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



2000

2010

2020

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The EU electricity market

Directive 72/09 – III Energy Package

Recital 27:

- “Member States should encourage the modernisation of distribution networks, such as **through the introduction of smart grids**, which should be built in a way that encourages decentralised generation and energy efficiency.”

Article 3.11:

- “In order to promote energy efficiency, (...) the regulatory authority shall strongly recommend that electricity undertakings optimise the use of electricity, for example (...) **introducing intelligent metering systems or smart grids**, where appropriate.”

The EU electricity market

Directive 72/09 – III Energy Package (cont.)

Article 37.8:

- "(...) the regulatory authorities shall ensure that **transmission and distribution system operators are granted appropriate incentive** over both the short and long term, to increase efficiencies."

Annex I.2 :

- "(...) The implementation of those metering systems may be subject to an **economic assessment** of all the long-term costs and benefits."
- "(...) Where roll-out of smart meters is assessed positively, at least **80 %** of consumers shall be equipped with **intelligent metering systems by 2020**."

Financing the European Electricity Grid Initiative (EEGI)

An in-itinere process

European Commission Communication on Financing Low Carbon Technologies – COM (2009) – October 2009

“The total public and private investment needed in Europe over the next 10 years is estimated as €2 bn. The goal is that by 2020, 50% of networks in Europe would enable the seamless integration of renewables and operate along 'smart' principles (...)”.

- Unclear how to finance the EEGI as well as how to shape its governance
- Current debate on Set Plan unlikely to solve the above issues (EP Resolution – Rapporteur C. Ehler, and Conclusions of the March Energy Council)

Main issues to address:

- **Governance:** setting up an entity (e.g. Joint Technology Initiative) for the project's governance, implementation and dissemination
- **Risk management:** reducing the Prime Mover Risk through *ad-hoc* financial instruments for R&D and demonstration phases
- **Deployment:** setting up a regulatory framework (e.g. through a national tariff plan) to guarantee the investments during the roll-out phase

Financing the European Electricity Grid Initiative (EEGI)

An in-itinere process (cont.)

Draft European Commission Communication A reform Agenda for a Global Europe – October 2009

“A new consensus on EU spending should be built around the following three priority axes:

- Sustainable growth and jobs (...)
- Climate and energy (...)
- A Global Europe”.

And, most notably:

“The scale and importance of new spending priorities will require either an increase of the EU budget or a significant shift from traditional to new spending areas”.

Possible instruments / solutions to scale-up smart grids financing:

- EU Budget 2014-2020
- EU financial framework pre-2013 (e.g. FP7) and post-2013 (to be launched in 2011)
- EU funding vehicles available to electricity companies for infrastructure projects (EU ETS NER-300, EU ETS auctioning at national level, Cohesion Policy Funds, CIP, RSFF...)
- New investment vehicles by European Investment Bank (e.g. Marguerite fund)
- National funds

Co-financing EEIG through a tariff plan?

Current legislative framework in Italy

- An incentive mechanism based on weighting of remuneration rate linked to the invested capital as currently in place for investments in network automation (Smart Grids - Article 11.4 of the Framework legislative on tariff)
- A Committee of Experts appointed by the Energy Authority in charge of assessing the investment (eligibility phase)
- No R&D incentives by tariff



Issues to address

- Investments for Smart Grids to be explicitly included among the elements which constitute the Net Invested Capital
- Inclusion of the so-called *demonstrator* (relevant pilot projects) among the eligible investments by tariff
- Extension of the “WACC” based incentive (today restricted to few projects)
- Reduction of Regulatory life-cycle of Smart Grids facility to get faster depreciation in tariff