From Smart Metering to Smart Grids

The Enel vision

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Internal & External Drivers create the need for the development of Smart Grids

Strategic Drivers

- **20-20-20 EU Goals and Third Energy package**
- Large **increase** of unpredictable **renewable** energy sources
- Change in **electricity consumption**
- **Market liberalization**
- Replacement of **ageing infrastructures**

Distribution System Operators Goals

- **Quality and security of supply**
- **Energy flow management and renewables integration**
- **Energy Efficiency**
- Enable the **active participation** of customers to the energy market
- Support **energy efficient demand side technologies**
- Increase the network **flexibility** to face future scenarios

Networks are strategic enablers of the new Scenario

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Enel 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

Four main challenges exist to realize the future Smart Grid

New Technologies

Unclear Business Case

Energy Regulation

International Dimension

New Technologies

- The **viability of new technologies** (both economic and technical) on large scale pilot projects must be demonstrated.
- **Standardization** has to be addressed and run in parallel with demonstrations in order to facilitate future replication and deployment.
- In this belief of standardization and knowledge sharing, **Enel Distribuzione SpA** and **Endesa Distribucion SA** created the international **non-profit association Meters and More**.

- Meters and More **objective** is to provide the industry with an open protocol for smart metering, thus being a tangible answer to the European Commission's mandate.

- **New technologies** are not an end, but an **enabler** of smart grids. Harder part is the underling **process reengineering**, **change management**, **data mining**, **storage**, etc, that smart grids entails and requires.

Unclear Business Case

- Business Case that provides **benefits to all stakeholders** still needs to be found.
- Benefits and **appropriate KPIs** must be created to evaluate performance of different technologies andbe able to properly evaluate business case.
- Enel **Telegestore project** has shown that smart investments provide savings, with approximate total **cost savings** of about **€500Ml**. Savings include:
  - Revenue Protection
  - Purchasing & Logistics
  - Customer Service
  - Field Operations
- **SMART METERING ≠SMART GRID**.

Unbundling of energy market makes it **harder** to define a clear **business case** for Smart Grids!

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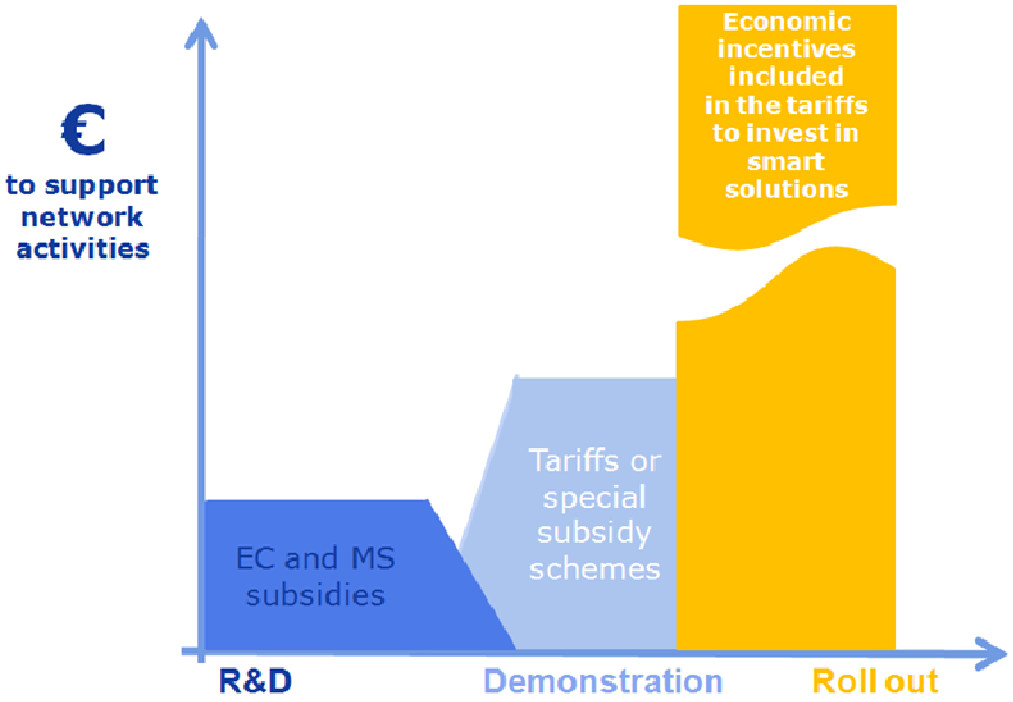
Energy Regulation

- Current tariff schemes do not provide sufficient incentives to support large scale RD&D projects.
- Regulators must define a financing structure that ensures a long-term **stable support framework** for Smart Grids and for multi-annual projects.
- **Tariffs** must **provide incentives** for future investments in smart solutions
  - **Example:** Italian regulator approved an **additional 2% WACC** on **investments** related to Smart Grids and Energy Efficiency
- Need to distinguish in tariffs between:
  - **Grid Internal Benefits**
  - **Grid External Benefits**
- Clear regulatory and legislative rules should be set for full roll-out and replication of demonstration projects.

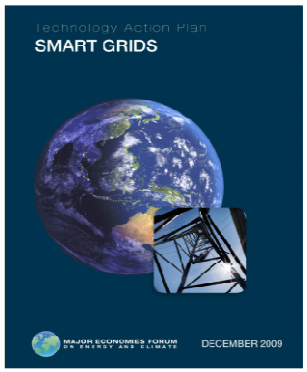


International Dimension

- The transformation of the electricity network requires **European-wide collaboration** among many different stakeholders.

- Enel is **founding member** and **chair** of **EDSO for Smart Grids**, international non-profit organization launched in February 2010. It aims to structure, lead and enhance, not for profit cooperation between European Distribution System operators for electricity. Currently 19 Distribution Network Operators are part of Association.

- **Global Cooperation: Italy** and **S. Korea** have led the definition of a development plan on Smart Grids on behalf of the **Major Economies Forum (MEF)**. The Roadmap document was presented in Copenhagen last December. Main points addressed:
  - Remove barriers
  - Establish incentives
  - Enhance capacity-building
  - Implement measures to accelerate deployment and transfer



Enel works on two-fold strategy for the development of Smart Grids

European Projects (Top-Down Approach)

- **EEGI:** European Electricity Grid Initiative
  - Founding Member of **EDSO4SG**
- **European FP7 Projects**
  - GRID4EU
  - ADDRESS
  - Grid For Vehicles

Company Projects (Bottom-Up Approach)

- **Smart Info®** for the improvement of customer consumption awareness
- **Recharging infrastructure** for supporting the electrification of transport sector
- **STAmi** for LV network consumers and producers monitoring
- **New DMS functionalities** for CO2 emissions reduction and energy losses reductions