



1962 2012

Enel Infrastructures and Networks Experience on Smart Grids

Daniele Stein, Smart Grids Development and New Technologies

Enel Distribuzione SpA

Pisa, 28th January 2013

Outline

- Presentation of Enel Infrastructures and Networks
- Renewable energy scenario in Italy
- Smart Grids projects
- GRID4EU project
- Roadmap towards Smart Grids



Enel Infrastructures and Networks Division

Main Business Areas and Figures

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

Public lighting Business Area

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

The 2° largest Distribution System Operator in Europe



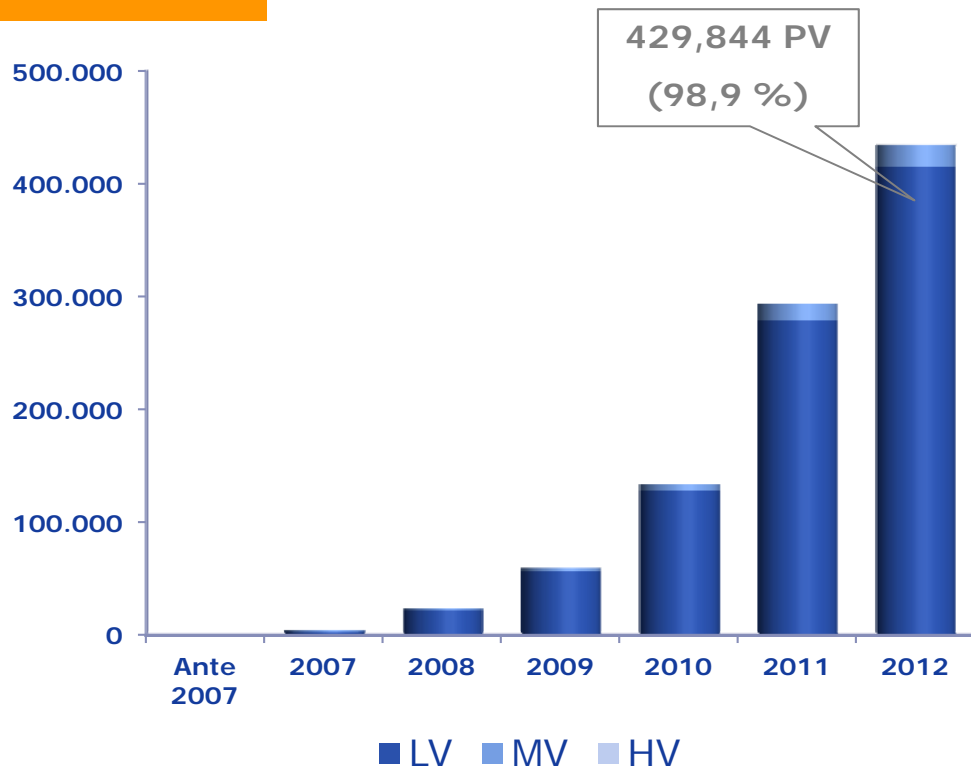
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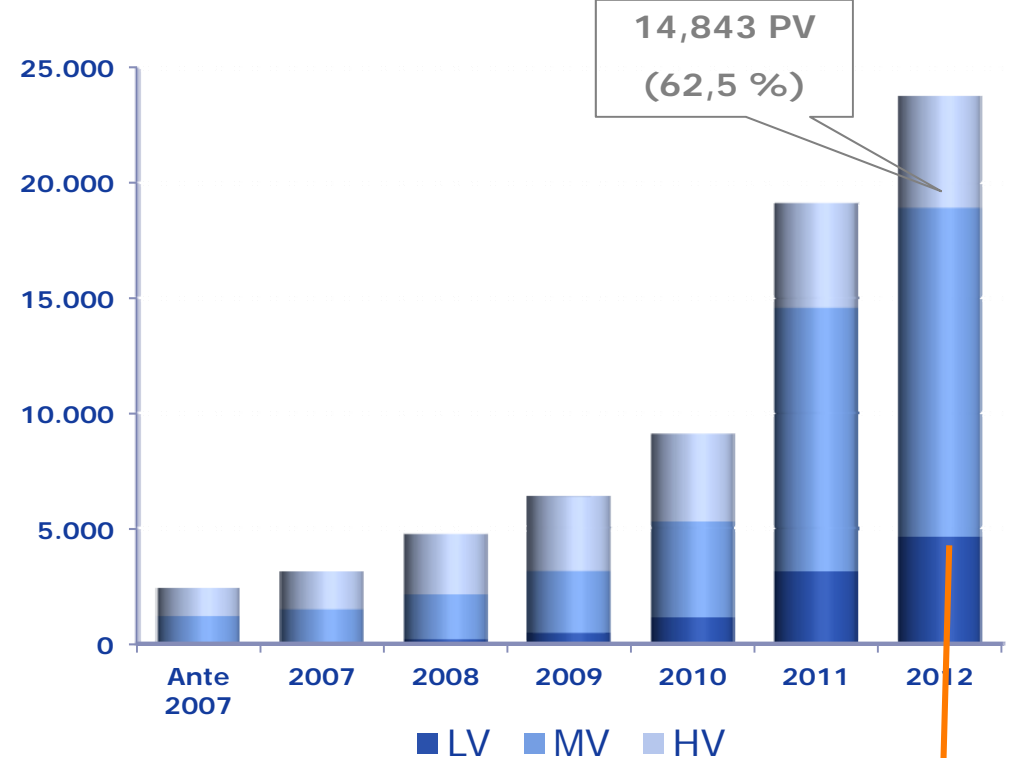
The Development of Renewables

Connections to Enel Distribuzione's Network (up to Dec. 2012)



Connections [No.]

Cumulative Data



Connected Power [MW]

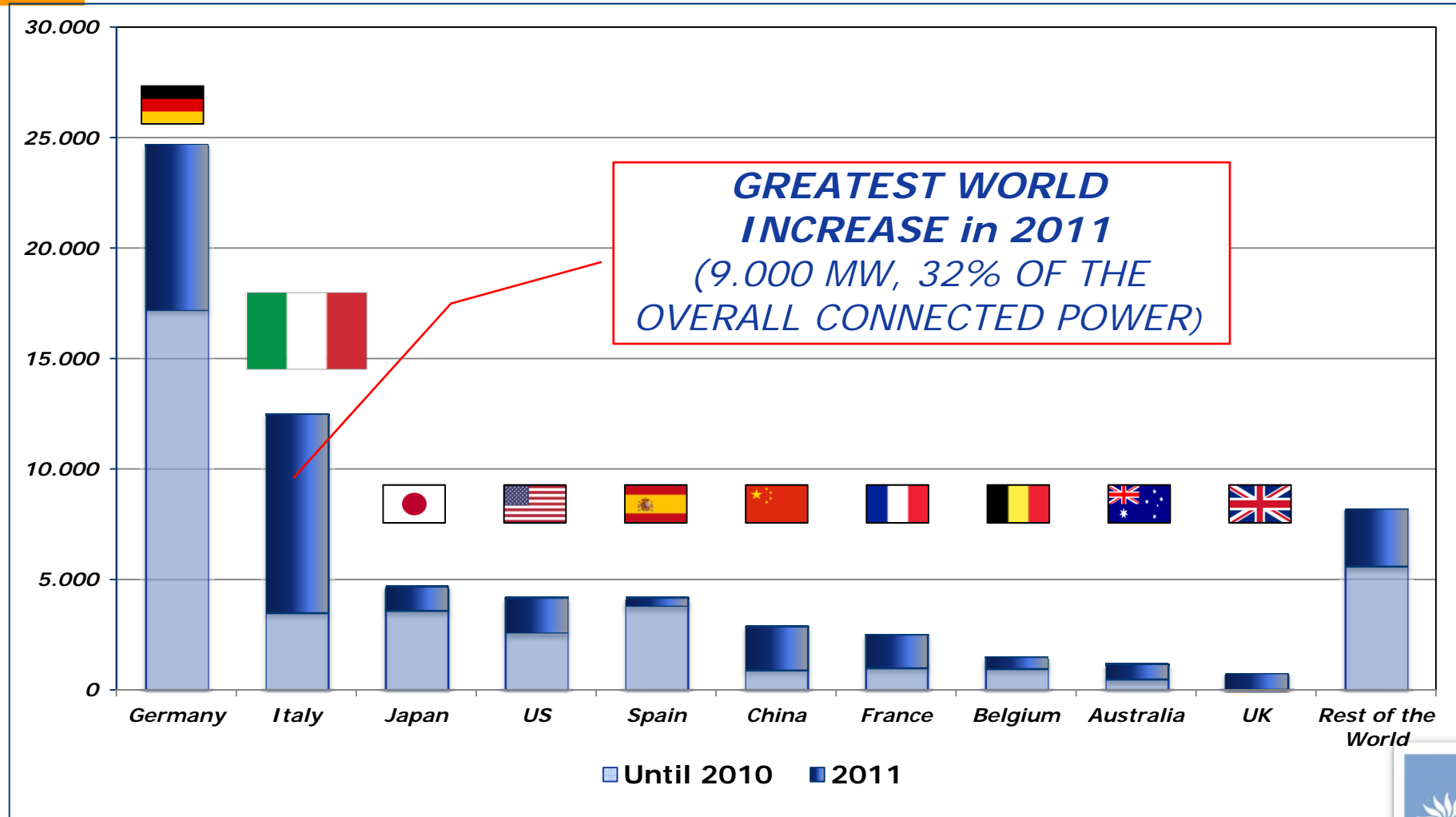
Cumulative Data

Most RES-Power is connected to MV Network



PV Growth in Italy in 2011

International Benchmark



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Enel and its "first generation" of Smart Grids



Automatic Meter Management

- ▶ Telegestore is fully operational on > **32 Mln** Customers
 - ▶ Leading Technology
 - ▶ Excellence in operation



Network remote control & 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



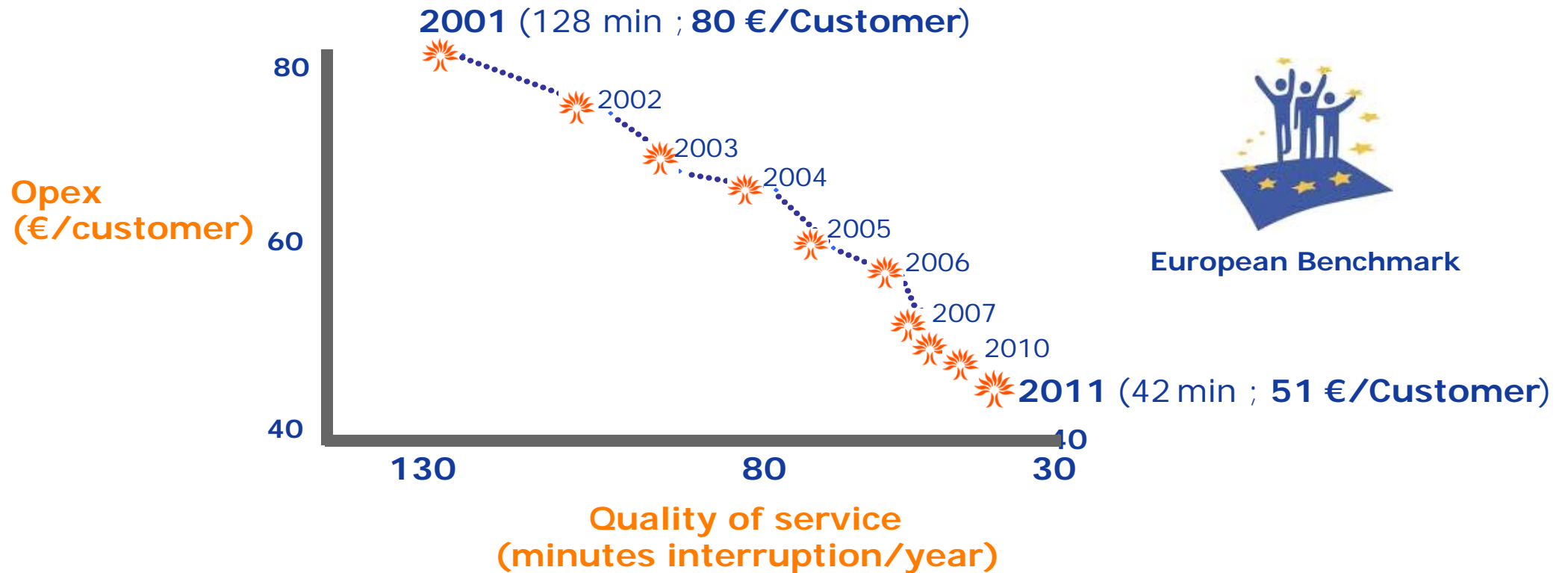
Asset Management

- ▶ 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

Results achieved

Enel Operational Excellence



Enel ongoing Smart Grids projects

Italy



Europe



Integration of DER



Progetto Isernia



Energy Consumption / efficiency



Smart Info



address
interactive energy
ADVANCED



Electric mobility



e-mobility Italy



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Isernia Project

A pioneering project integrating various Smart Grids elements

Funding: AEEG (Italian Regulator) – **Delibera 39**
+2% Additional WACC on investments
related to Smart Grids and energy efficiency

Project budget: Approx. 10M€

Objectives:

Demonstrate, under real field conditions, new telecommunication technologies aimed at testing a series of Smart Grid technologies (including storage systems)



The project addresses four smart grids related technologies



**Integration of
renewables**



Storage



**Customer Engagement
(demand response)**



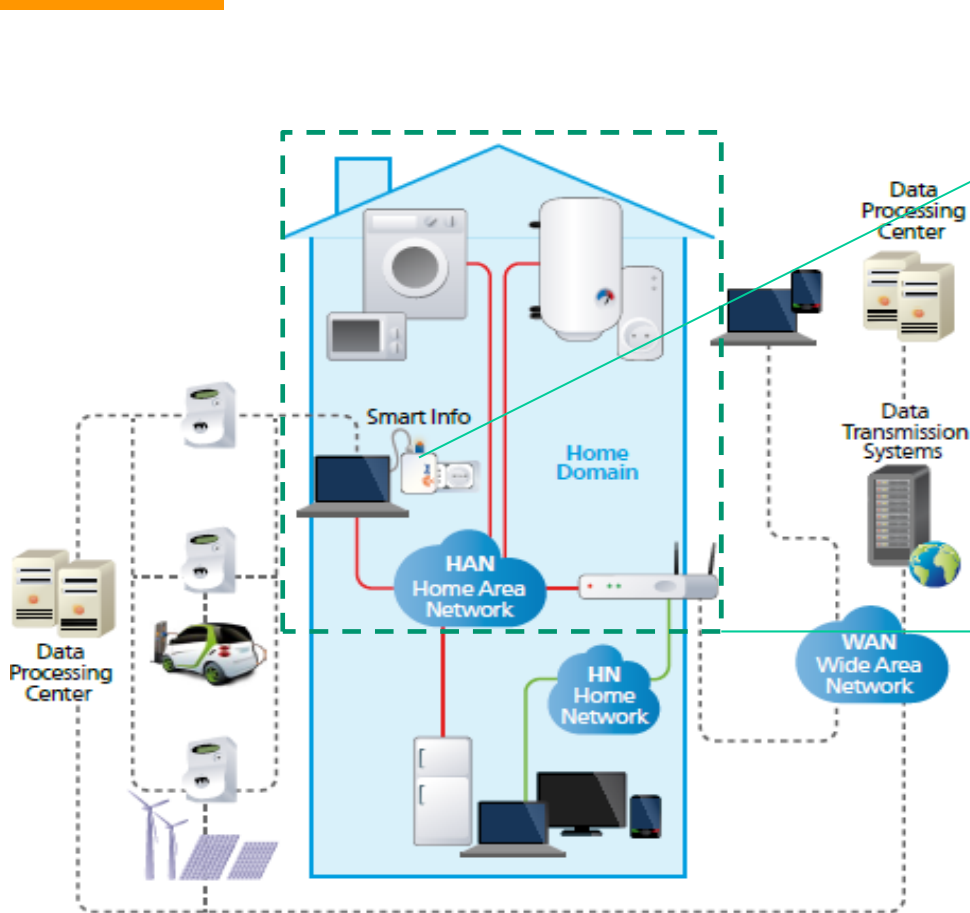
Electric Vehicles



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Smart Home

Energy Efficiency projects for the house of the future



Smart Info®



Objective: To provide customers with easier access to the information in the meter via a number of visual devices thus improving their consumption awareness



Objective: Development of a communication platform for collaboration of devices in the Home Area Network in order to enable provision of Value Added Services based upon information exchange related to energy usage

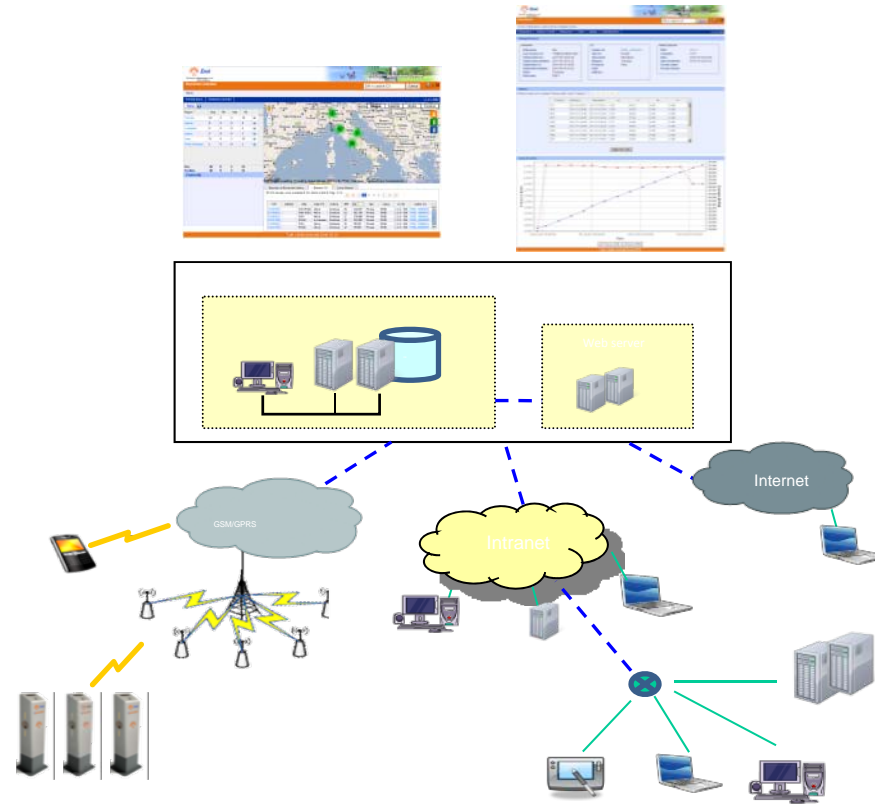
Connecting energy with customers

Electric Vehicle charging infrastructure

eMobility Italy



*Designed and
Certified*



Implemented



Delivered



FIFTY YEARS

1962 2012

Electro Mobility in Italy



Emilia Romagna Region: first agreement in Europe
on Regional field for electric mobility
150 Charging Infrastructures

Bologna
Reggio Emilia
Rimini
Piacenza

Ferrara
Ravenna
Forlì
Cesena



Collaboration with ACEA to share **Enel** charging technologies

200 charging points

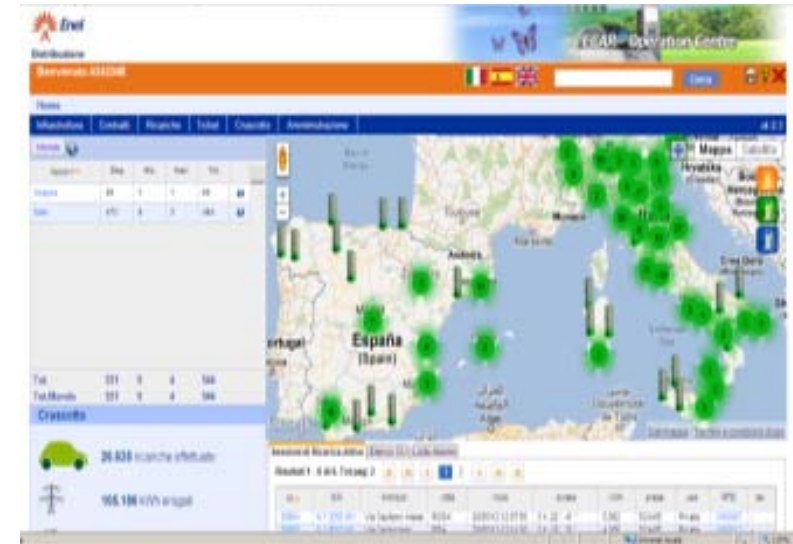


Zero emissions collaboration for the last mile with:

- Trenitalia – Maggiore
- NTV – Hertz – Smart

FP7 project - 23 M€ - 4 years

- *European Clearing-house*
- Interoperability of 10 demonstrators



FIFTY YEARS

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European FP7 Smart Grids Projects GRID4EU



Project Kick-off: November 22nd 2011

Large-Scale Demonstration of Advanced Smart GRID Solutions with wide Replication and Scalability Potential for EUROPE

- **6 Demonstration projects**
- **Lead by 6 DSOs** (covering more than 50% of the metered electricity customers in Europe)
- **27 partners** (Utilities, Energy Suppliers, Manufacturers, Research Institutes)
- **Duration: 4 years and 3 months** (November 2011 - January 2016)
- Project Coordination: **ERDF** ; Technical Director: **ENEL** ; General Assembly Chairman: **IBERDROLA**
- **Total eligible costs: 54 M€**, Requested EC grant: 25.5 M€



Enel's demonstration project in Italy

Increase the Medium Voltage (MV) network's hosting capacity for Distributed Energy Resources (DER, in particular solar), introducing Active Control and Demand Response of MV generators, controllable loads and storage

- Located in the **Emilia Romagna region, area of Forli-Cesena**
- An area with **high penetration of renewable energy generation**
- Network portion interested: **2 HV/MV substations, over 20 MV lines, about 160 MV Substations and about 35000 LV customers impacted**
- **Direct involvement of MV distributed generation**
- **Partners involved:**



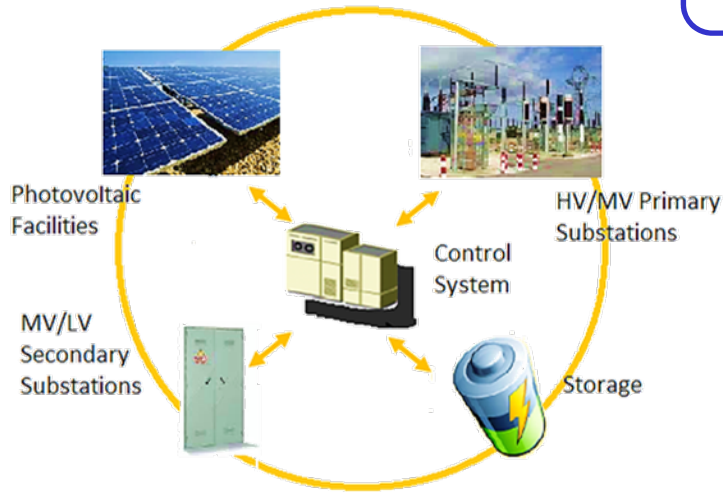
Brief Description of the DEMO



To meet the objectives, the project will address:



The realization of an **advanced control system** communicating with the renewable generators, HV/MV & MV/LV substations and storage facility.



The realization of an **“always on”, IP standard-based communication** solution connecting all the relevant nodes in the network (wireless, cabled and PLC)



The installation of a battery **storage facility** (1 MVA / 1 MWh ca) connected to a MV power line

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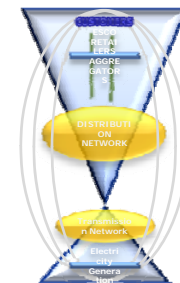
Roadmap towards 2020

Level of Smart Grids deployment

FULL SMART GRIDS ROLL-OUT

20-20-20

EUROPEAN ELECTRICITY GRID INITIATIVE (EEGI)
 GRID+: Support EEGI



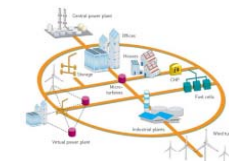
PILOTS & DEMONSTRATION

- GREEN EMOTION: EV demo
- GRID4EU: Active Network demo
- e-mobility: 100 EV
- POI, ISERNIA: DG integration
- IP NETWORK: Comm. Solution
- Storage projects



R&D (FP7)

- ADDRESS: Active demand
- G4V: EV infrastr. stand.



ENEL DEPLOYMENT

- AMM
- Network automation
- WFM
- Asset Management



2000

2010

2020





Thanks for your kind attention

