

Smart Energy Systems

Strategic vision, technology
developments, best practices

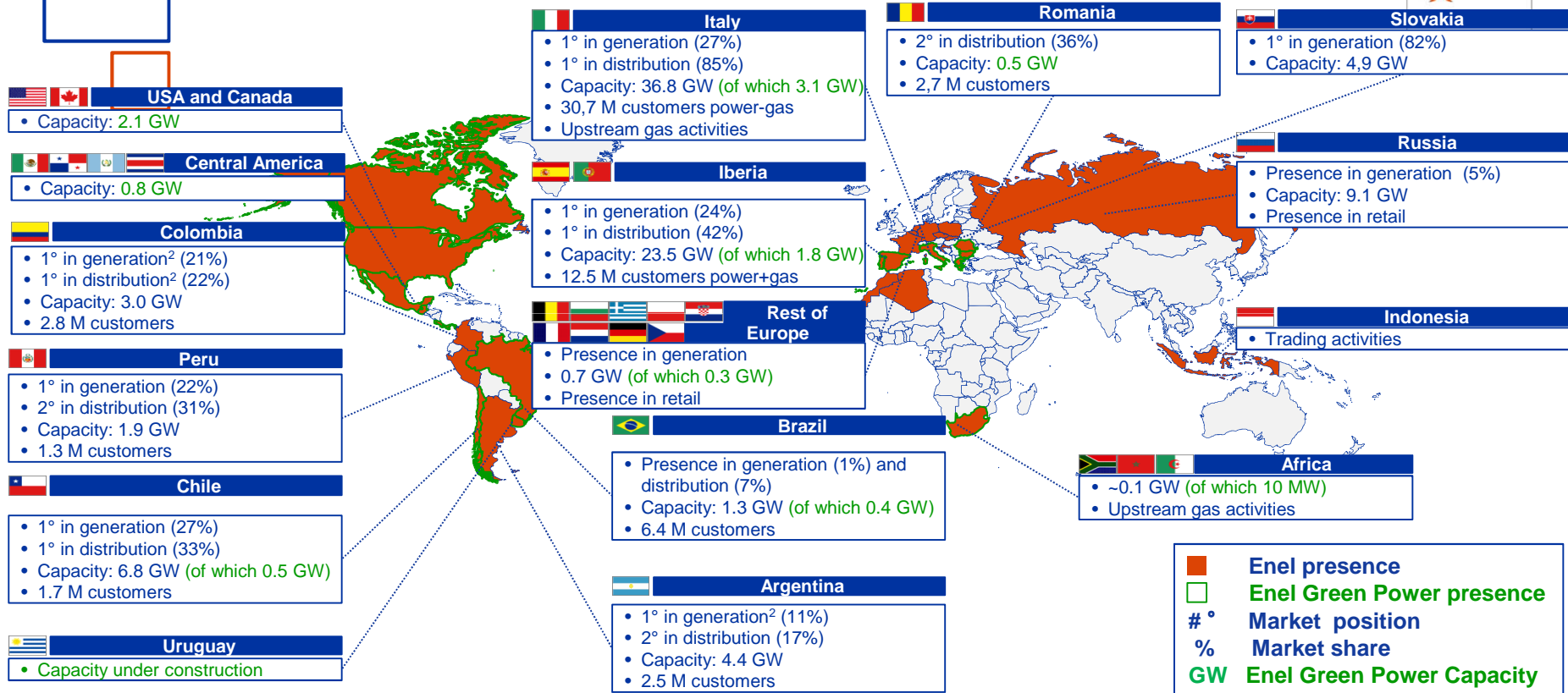
RTSI

Torino, 16/09/2015



Lilia Consiglio
Enel Distribuzione

Enel's global presence¹



1. As of 31st December 2014
 2. RTA among private operators
 Turin, 16 09.2015

Global diversified player in more than 30 countries

USE: Public
 Issuing: I&N Italy



Innovation at Enel



Conventional generation

Improvement of **operational and environmental performance, reducing emissions**



Renewable energies

Improvement of performance of **all the available technologies, integration of storage and research in new technologies**



Infrastructures and networks

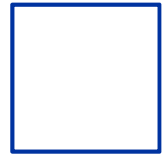
Continuous development of **smart grids** to manage distributed generation, **electric mobility** and increase the **electric system reliability**



New products and services and e-mobility

Development of new business models, to **increase people's quality of life and to propose innovative solutions for companies**, through the launch of **new products and services mainly electricity based**

Innovation as a basis for growth and consolidation of our leadership



Infrastructure and Networks Italy 2014



The Company

- Headcount 16.890
- Blue Collars 6.972

Business Size

- Customers 31,6 Million
- DG Connected 592.000
- Market share - Customers 85%

The Network

- 1.130.000 km lines: MV 350.000 km; LV 780.000 km
- 2.100 HV/MV substation, 100% all remote controlled
- 430.000 MV/LV substation, 30% remote controlled



Second largest DSO in the world

Smart Grid and Smart City Vision



New strategic role of the Infrastructure



Smart Grid: where we started...

Isernia Project (Delib. AEEG 39/10)



Integration of Smart Grid key elements



DG Management



Energy Storage System



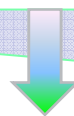
Smart Info



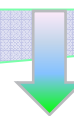
Electric Vehicles



Voltage control, anti-islanding, DG Power regulation, network monitoring, ...



First ESS on MV network installed in Italy



First large scale field test (8000 customers)



Integration of EV recharging infrastructure with a solar power plant and ESS; usage test of EV for Enel field crews

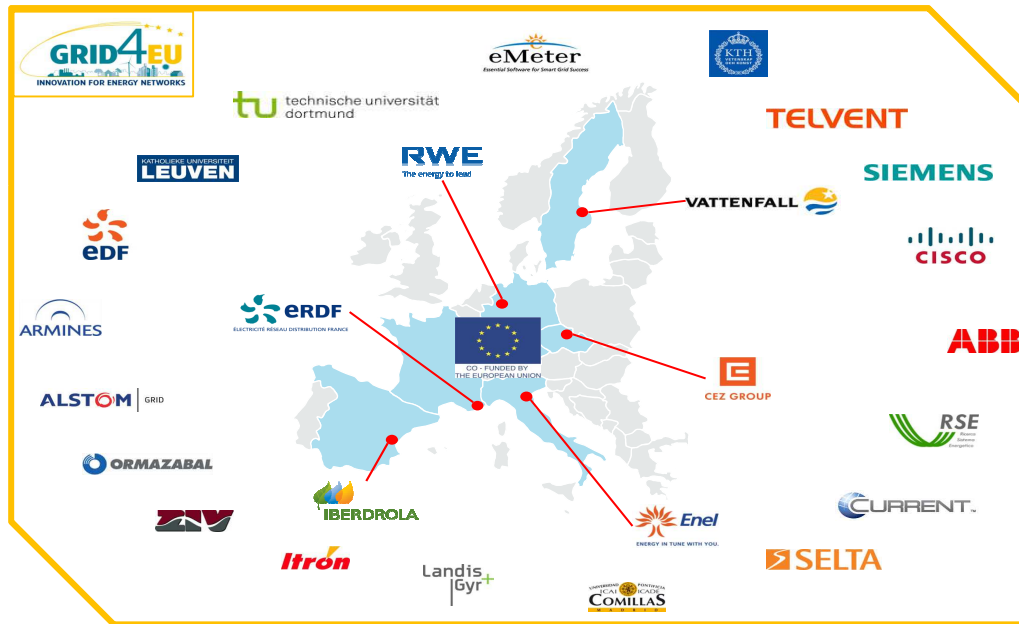


Smart Grid: where we started...

Grid4EU



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

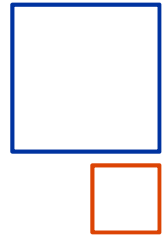


6 DSOs (covering more than 50% of EU customers)

27 partners (Utilities, Energy Suppliers, Manufacturers, Research Institutes)

54M€ /51 months (Nov. 2011 – Jan. 2016)

Project Coordination: ERDF
Technical Direction: ENEL Distribuzione



Smart Grid: where we started



Reti Edifici Strade Nuovi Obiettivi Virtuosi per l'Ambiente e l'Energia

“Reti, Edifici, Strade Nuovi Obiettivi Virtuosi per l'Ambiente e l'Energia”: Research project in Smart City area of interest, financed by the Italian Ministry of Education and Research (MIUR);

Enel Distribuzione is the Leading partner among 8 participants (e.g. IBM, Enea and CNR, POLIBA, Università della Calabria).





Expo Milano 2015



➤ **Innovative control and fault detection system** for the electricity distribution network



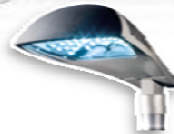
➤ **Storage System** and integration of renewable energy sources



➤ Enel **electric mobility infrastructure** (with Pole Charging Stations)

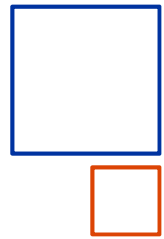
➤ **8.500 lighting points**

LED technologies with high efficiency



➤ **Operation Center** to monitor and control all the electrical parameters

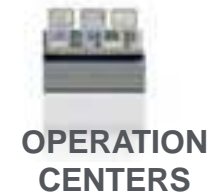




Expo Milano 2015 Technologies



GRID TECHNOLOGIES



SMART LIGHTING



ELECTRIC MOBILITY



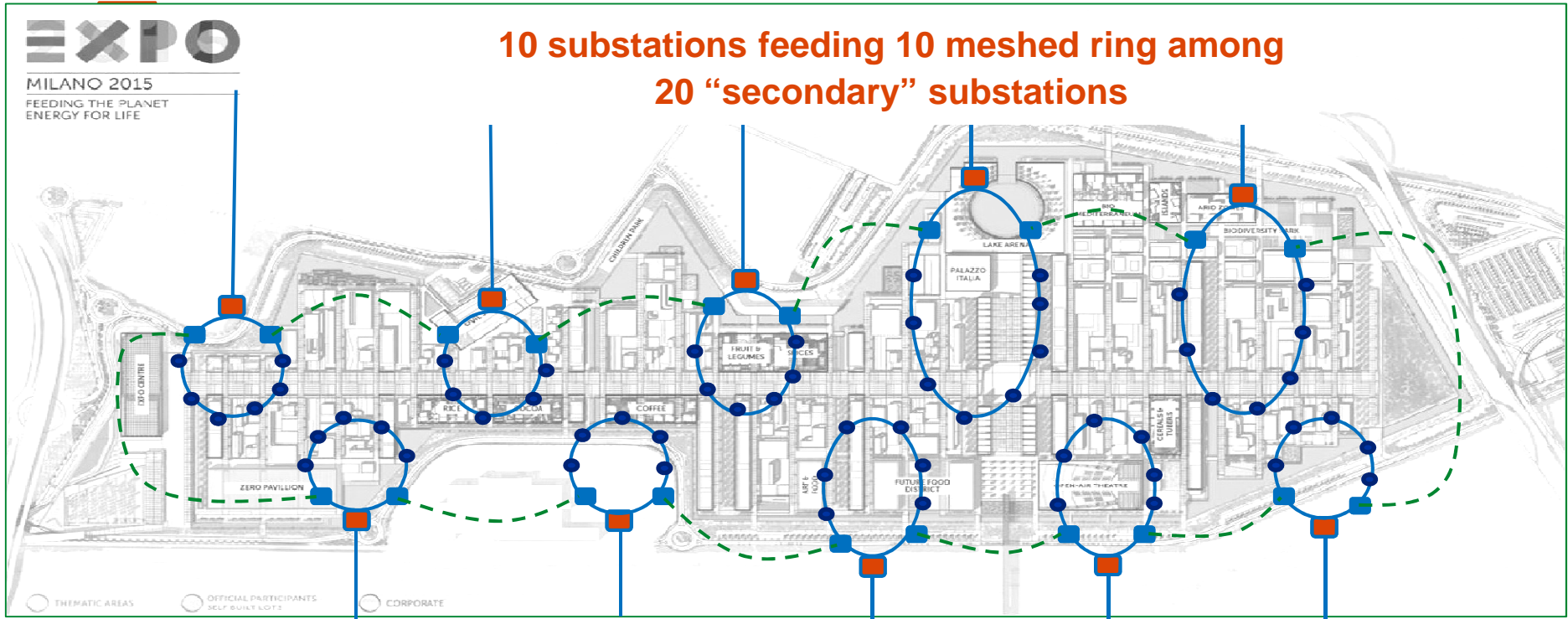
ELECTRO-MOBILITY

Issuing: I&N Italy





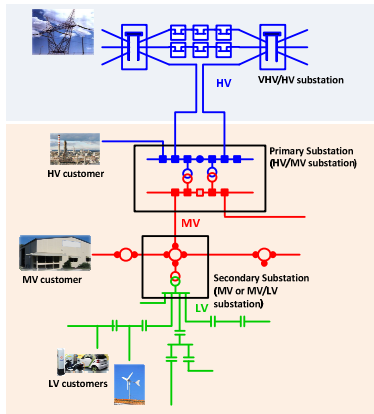
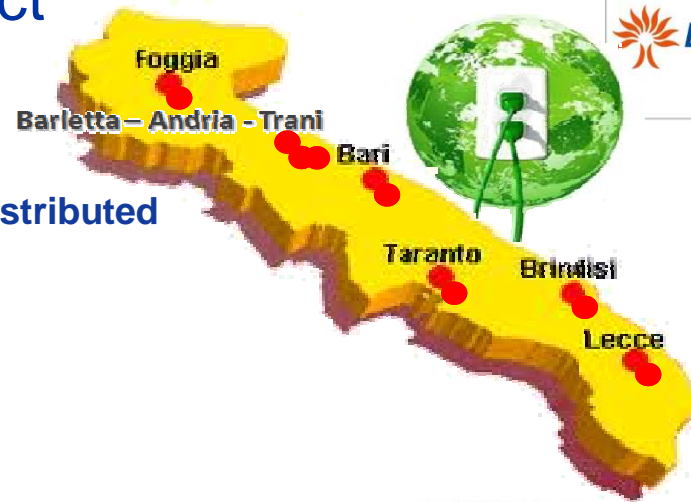
Expo Milano 2015 Configuration



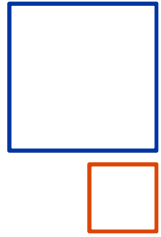


Puglia Active Network project

- management of the network with large penetration of **Distributed Generation**
- **new services** for end-users
- foster the creation of a **sustainable urban model**



Thanks to PAN - NER 300 Project, Apulia region will be the first Regional Smart Community in the world

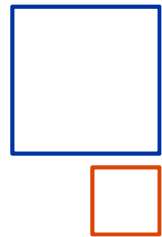


BACK UP

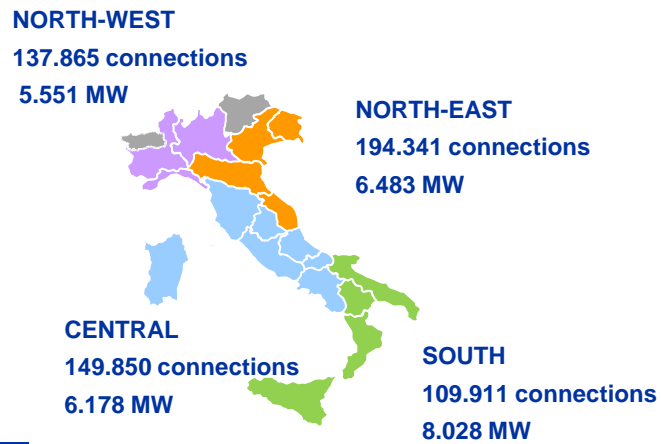
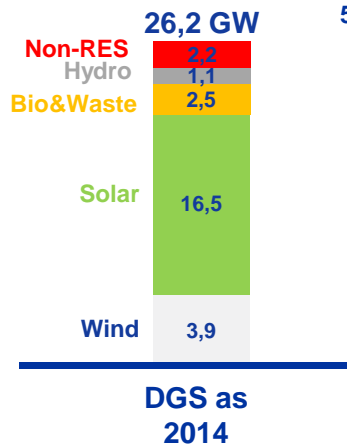
RTSI
Turin, 16 09.2015

I&N Italy]. The information contained in this document is the property of Enel SpA and must be used by the recipient only for the purposes for which it was received. It may not be copied or disclosed in any way without the explicit permission of Enel SpA.

USE: Public
Issuing: I&N Italy

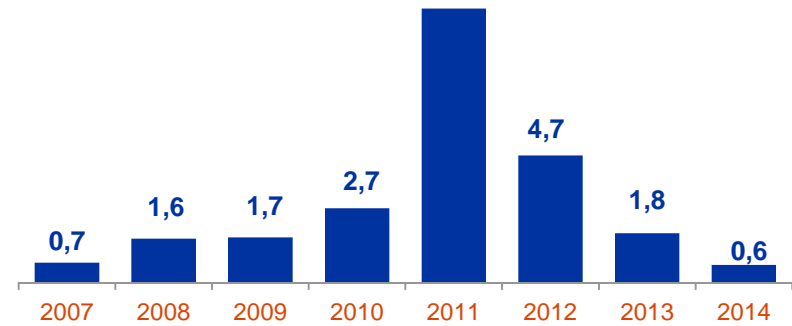


Integration of Renewables 2014 – Connections and Power

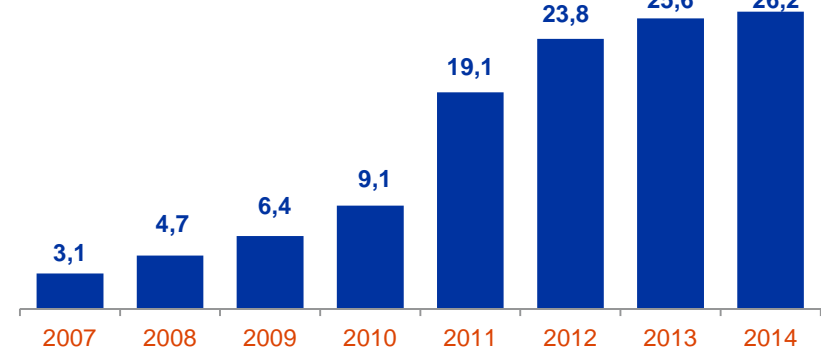


ITALY
591.967 connections
26.240 MW

Connections per year (GW)







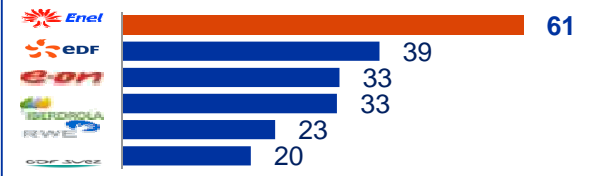
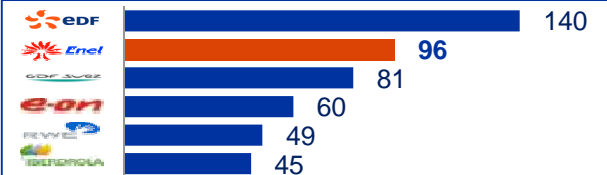
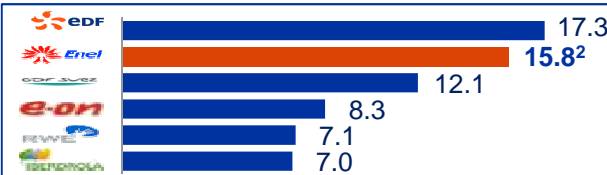
Cumulative connections (GW)



Operational data¹



Key indicators	
 Infrastructure & Networks	61 mn end users 37 mn smart meters
 Retail	56 mn power customers 5 mn gas customers
 Renewables	9.6 GW of installed capacity
 Conventional generation	86 GW of installed capacity

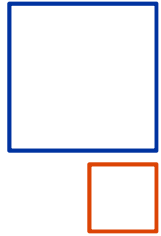
Enel and European peers													
Customers [mn]	 <table border="1"> <tr><td>Enel</td><td>61</td></tr> <tr><td>edf</td><td>39</td></tr> <tr><td>e-on</td><td>33</td></tr> <tr><td>TERENGA</td><td>33</td></tr> <tr><td>RENVE</td><td>23</td></tr> <tr><td>EDF VEZ</td><td>20</td></tr> </table>	Enel	61	edf	39	e-on	33	TERENGA	33	RENVE	23	EDF VEZ	20
Enel	61												
edf	39												
e-on	33												
TERENGA	33												
RENVE	23												
EDF VEZ	20												
Installed capacity [GW]	 <table border="1"> <tr><td>edf</td><td>140</td></tr> <tr><td>Enel</td><td>96</td></tr> <tr><td>EDF VEZ</td><td>81</td></tr> <tr><td>e-on</td><td>60</td></tr> <tr><td>RENVE</td><td>49</td></tr> <tr><td>TERENGA</td><td>45</td></tr> </table>	edf	140	Enel	96	EDF VEZ	81	e-on	60	RENVE	49	TERENGA	45
edf	140												
Enel	96												
EDF VEZ	81												
e-on	60												
RENVE	49												
TERENGA	45												
EBITDA [€bn]	 <table border="1"> <tr><td>edf</td><td>17.3</td></tr> <tr><td>Enel</td><td>15.8²</td></tr> <tr><td>EDF VEZ</td><td>12.1</td></tr> <tr><td>e-on</td><td>8.3</td></tr> <tr><td>RENVE</td><td>7.1</td></tr> <tr><td>TERENGA</td><td>7.0</td></tr> </table>	edf	17.3	Enel	15.8 ²	EDF VEZ	12.1	e-on	8.3	RENVE	7.1	TERENGA	7.0
edf	17.3												
Enel	15.8 ²												
EDF VEZ	12.1												
e-on	8.3												
RENVE	7.1												
TERENGA	7.0												

Leadership along the various segments of the value chain

¹ Data as of 31st of December 2014
² Including non recurring items

I&N Italy]. The information contained in this document is the property of Enel SpA and must be used by the recipient only for the purposes for which it was received. It may not be copied or disclosed in any way without the explicit permission of Enel SpA.

USE: Public
 Issuing: I&N Italy



Enel Distribuzione - Smart Energy Partner

- 100 secondary substations, 75 MW power demand
- Innovative automatic control system and fault detector
- 270 kW Storage integrated with RES
- EV infrastructure with 100 Pole Charging Station
- Energy Management System
- Operative Center for the control of all electrical parameters

Smart Grid at the forefront
High Quality of Service for Expo