

# Making the Power System More Resilient to Climate Change-Induced Water Stresses

## The Enel experience

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# ENEL Group overview



2013<sup>1</sup>

Presence  
**40 countries**

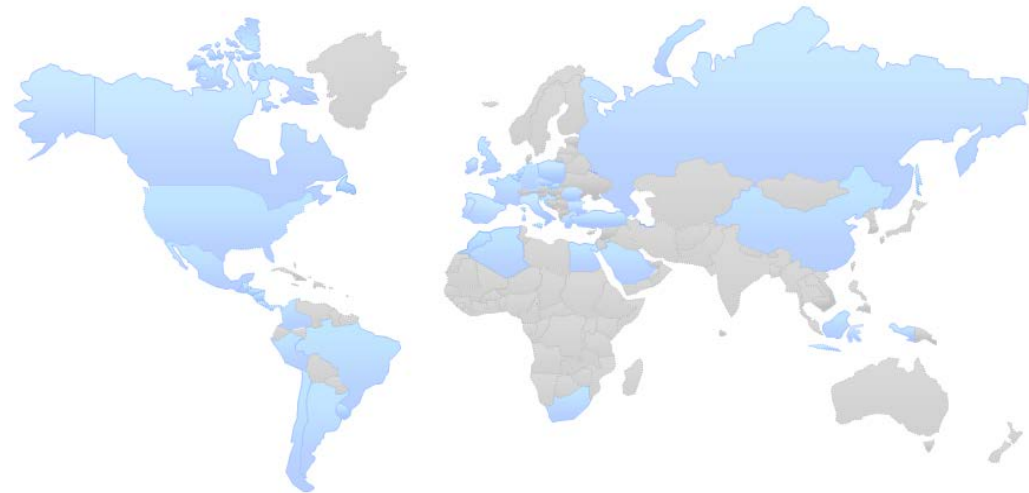
Net installed capacity  
**99 GW**

Production **286 TWh**  
(26% Hydro, 7% other RES, 14% Nuclear,  
29% Coal, 14% CCGT, 10% Oil&Gas)

Customers  
**~61 million**

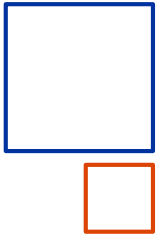
Networks  
**1.9 million km**

EBITDA  
**~16 €bn<sup>2</sup>**



**A multinational player with a wide geographical and technological exposure**

1. Data as of December 31st  
2. Recurring EBITDA



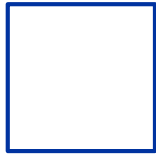
## Political dimensions of adaptation



- Increasing attention to adaptation is taking place especially within the **UNFCCC** (three milestones: Marrakech 2001, Nairobi 2006, Cancun 2010)
- Adaptation has become also a **European** priority driving Member States to implement national adaptation strategies (e.g. April 2013, European Commission's package to advance action on adaptation)
- Adaptation programs are following **at national level** (e.g. Italy concluded in December 2013 a public consultation regarding the "Italian national strategy on adaptation").
- **At City level**, the number of pilot projects is increasing exponentially (e.g. BlueAp – Bologna; Rockefeller Foundation's «100 Resilient Cities» - Rome)

**Policymakers should ensure consistency, coherence and balance of energy, environment, water and adaptation policy frameworks**





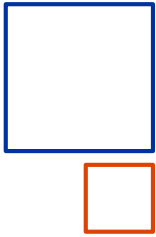
## Raising awareness

Bringing adaptation into the business



- There is no doubt that climate change is impacting the electricity sector, but **timeframe and magnitude** for both extreme weather events and temperature change is nowadays quite uncertain
- Although on the short term Enel Group seems not to be heavily exposed to climate change, **we have already started adapting to some new climate parameters** through “spontaneous” bottom up initiatives taken by different business lines
- To **increase awareness** across the group and **disseminate best practices we can leverage on these spontaneous actions**
- To ensure timeliness, a specific “Adaptation Project” has been developed and is being implemented across the Group





# Enel Group's Adaptation Framework



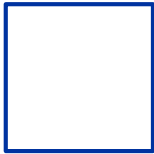
## The “Adaptation Project”

**A. “Clarify”** – Clarify the timeframe of impact of climate change and climate change extreme events and ensure state of the art knowledge of the external context

**B. “Assess”** – Expand a first assessment performed within the Iberian and Latin America Division to other parts of the Enel Group

**C. “Plan”** – Based on the first two phases develop an Adaptation Strategy and a structured medium to long term plan

**D. “Engage”**- Engage with stakeholder at institutional level, within civil society and the energy sector



# Enel's experience on adapting to climate change

Deep dive on thermo power plants (1/2)



## Impacts

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- Extreme weather events, including hurricanes, heat waves, large hail, floods and droughts, etc.
- Higher atmospheric and water temperatures
- Water scarcity

## Actions

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Examples of adaptation actions include:

- ✓ **Drought at the plant of La Casella (Italy)** – In 2003 low flow rate of the River Po, resulting in the inability of pumps to draw water at that level:
  - **A back-up system of pumps** in order to allow the water pumping from low levels
- ✓ **Drought at the plant of S. Isidro (Chile)** - the level of groundwater taken from wells decreased and the chemical quality of the water deteriorated. Adaptation study made in 2012 has revealed a progressive rain reduction that affects Chilean Central Area. Different alternatives are under evaluation:
  - **Operational & engineering measures** to increase water quantity (New groundwater sources; bringing water through channel from different area)
  - **Engineering** measures to treat waste water in order to improve quality (chemical removal)

# Enel's experience on adapting to climate change

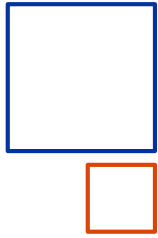
## Deep dive on thermo power plants (2/2)



### Rain water drainage

- To mitigate the risk of flooding caused by heavier rains, Enel has planned different actions to be developed:
  - **e.g. Torre Nord - Long term measure:** planting 11.000 trees in the area of the dismissed oil tanks (40 hectares) to improve drainage and prevent floods
  - **Short term measure:** improve the existing drainage channels, to pump and store water in dismissed oil tanks





## Reducing water consumption “Zero Liquid Discharge”



Flue Gas Desulfurization wastewater discharge:

- zero discharge
- 100% wastewater recovered
- almost 40% of water consumption for industrial use covered by wastewater re-use



Brindisi Coal Power Plant,  
4 Units, 2.640 MW

**BEST  
PRACTICE**

Torre Nord Coal Power  
Plant, 3 Units, 1.980 MW



**Crystallization is the final part of Water Management System and it transforms the last flow of wastewater in solid salt and water to be re-used**

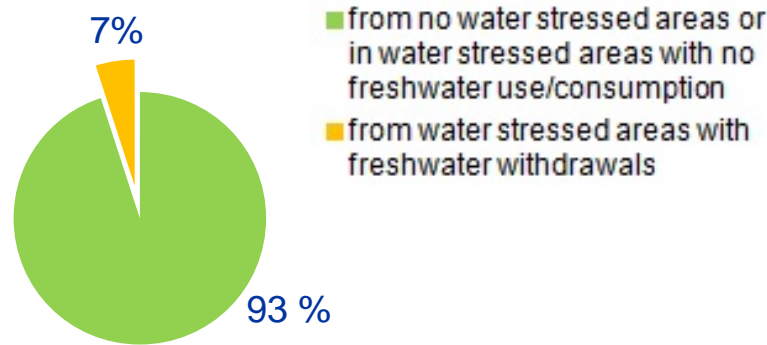


# Enel and water management



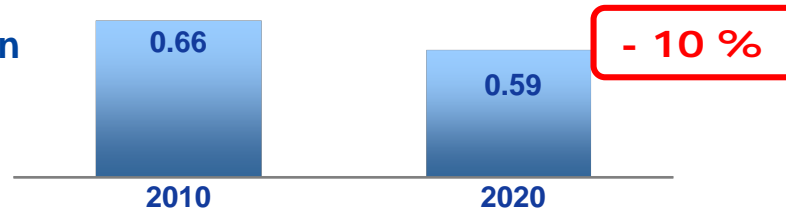
## Enel's water use in water stressed areas

% of 2013 Group production (GWh)

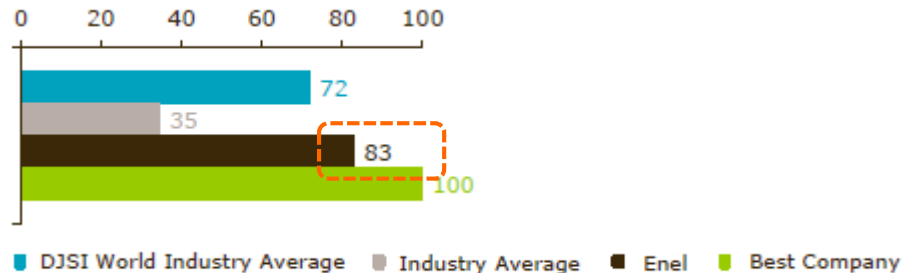


## Enel's water consumption and target (l/kWh)

0,64 l/kWh in 2013 (-4%)



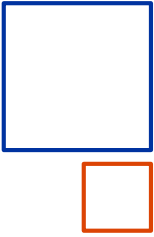
## Enel's performance in the DJSI Sustainability Index



The CEO Water Mandate



CERES AQUA GAUGE



**Thank you for your attention**