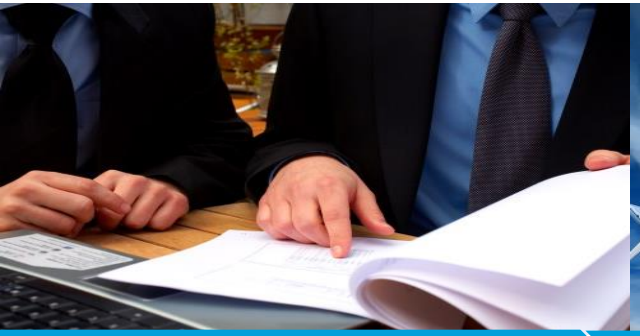
ENERGY

Wind & Solar – coming of age

Christof Stork, Country Manager Italy

08 April 2016

Global Service Portfolio for the Energy Sector




Policy | Production | Transmission & distribution | Use

Service areas:

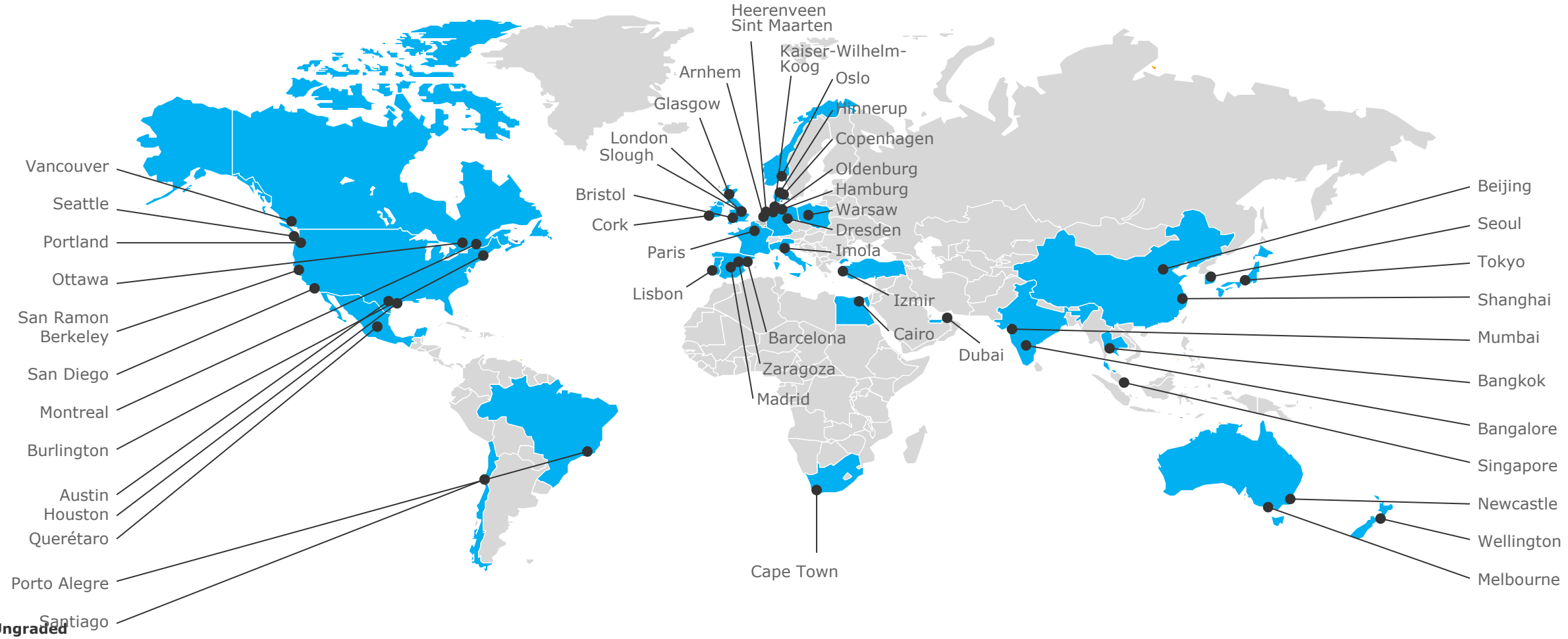
- Power testing, inspections and certification
- Renewables advisory services
- Renewables certification
- Electricity transmission and distribution
- Energy efficiency services

Strategic topics:

- Smart energy cities and smart grids
- Energy storage
- Future transmission grids
- Solar

Global Geographical Reach

More than 1,000 renewable energy staff in 50 locations across 27 countries



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In the News

Oldest Operating Wind Turbine In World Turning 40

21/05/2015 by **Jake Richardson**

On May 30, the world's oldest operating wind turbine will turn 40 years old. Tvindkraft was built in Denmark at the Tvind school in Jutland. Danish wind enthusiasts will join there again soon to celebrate the turbine's 40th birthday.

Innovation Wind turbines for 30 years?

11.12.2014

Wind Power Monthly reports that German wind turbine manufacturer Enercon is working on a 4 MW turbine designed to remain in operation for three decades. Ironically, this turbine would slow down the German market if it proves to be a success.

In the News

SUN& WIND ENERGY
THE MAGAZINE FOR RENEWABLE ENERGIES

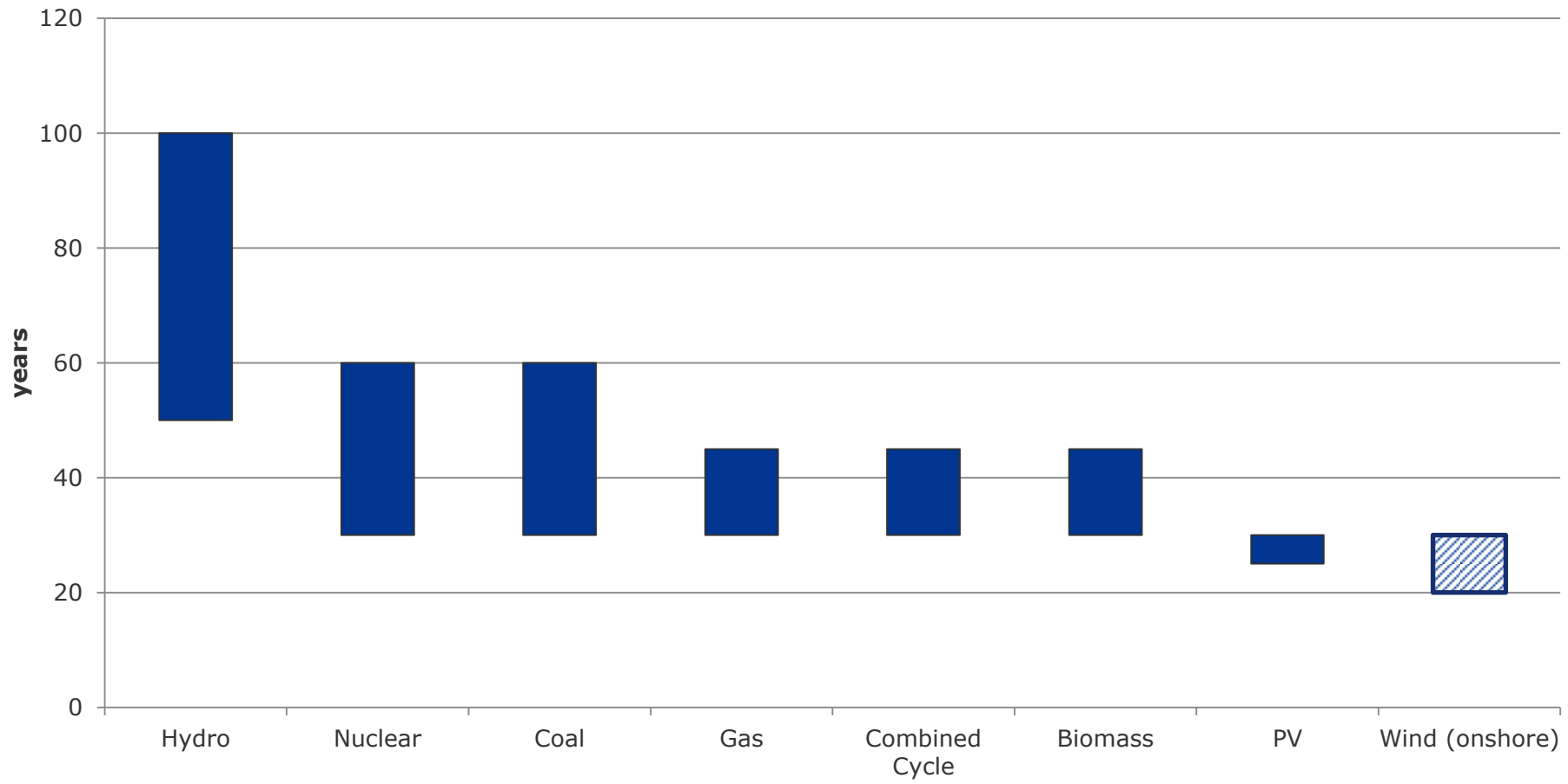
Germany's first large-scale photovoltaic plant is being refurbished

Photovoltaics

27.08.2015

Thirty-two years ago in 1983, the first large-scale photovoltaic plant in Germany with an overall capacity of 300 kW was built on the North Frisian island of Pellworm. During the interim period, it evolved into a complete hybrid power plant, including wind energy and electricity storage. However, its photovoltaic systems now need to be refurbished.

Typical Lifetimes of Power Plants



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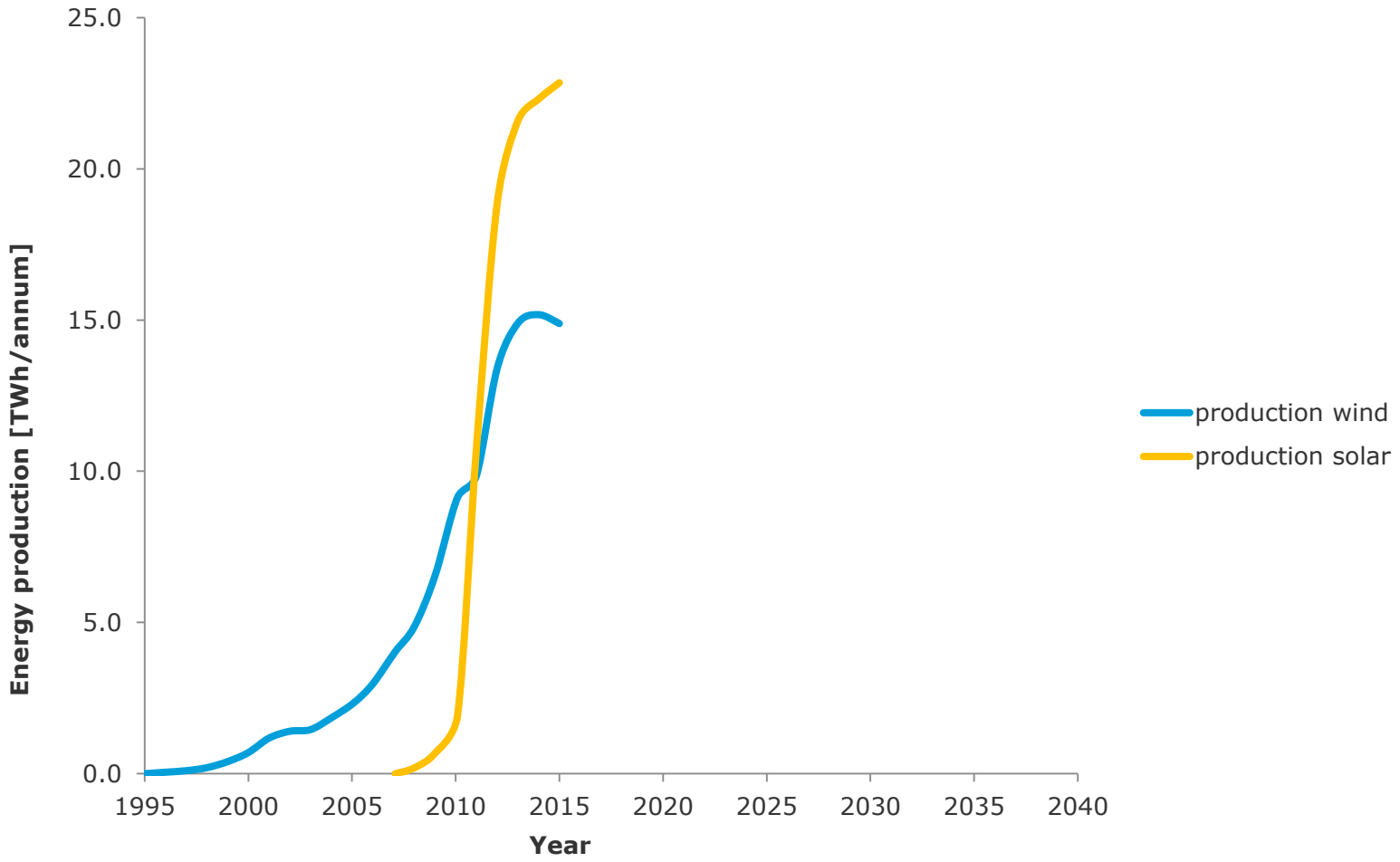
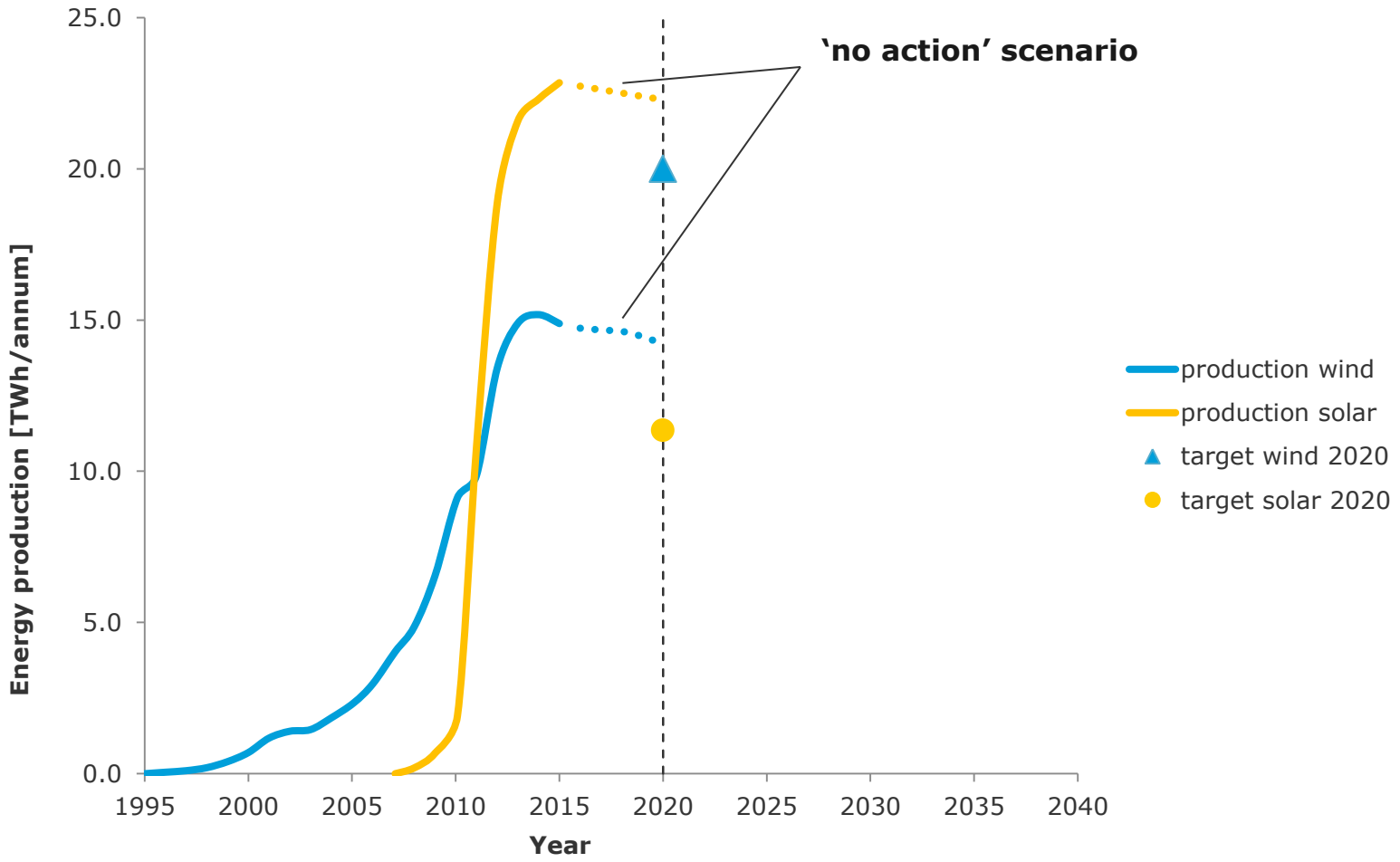
Development of Wind and Solar Plants



Ref: GSE, 'Energia da fonti rinnovabili in Italia - Dati preliminari 2015', 29 February 2016

Development of Wind and Solar Plants



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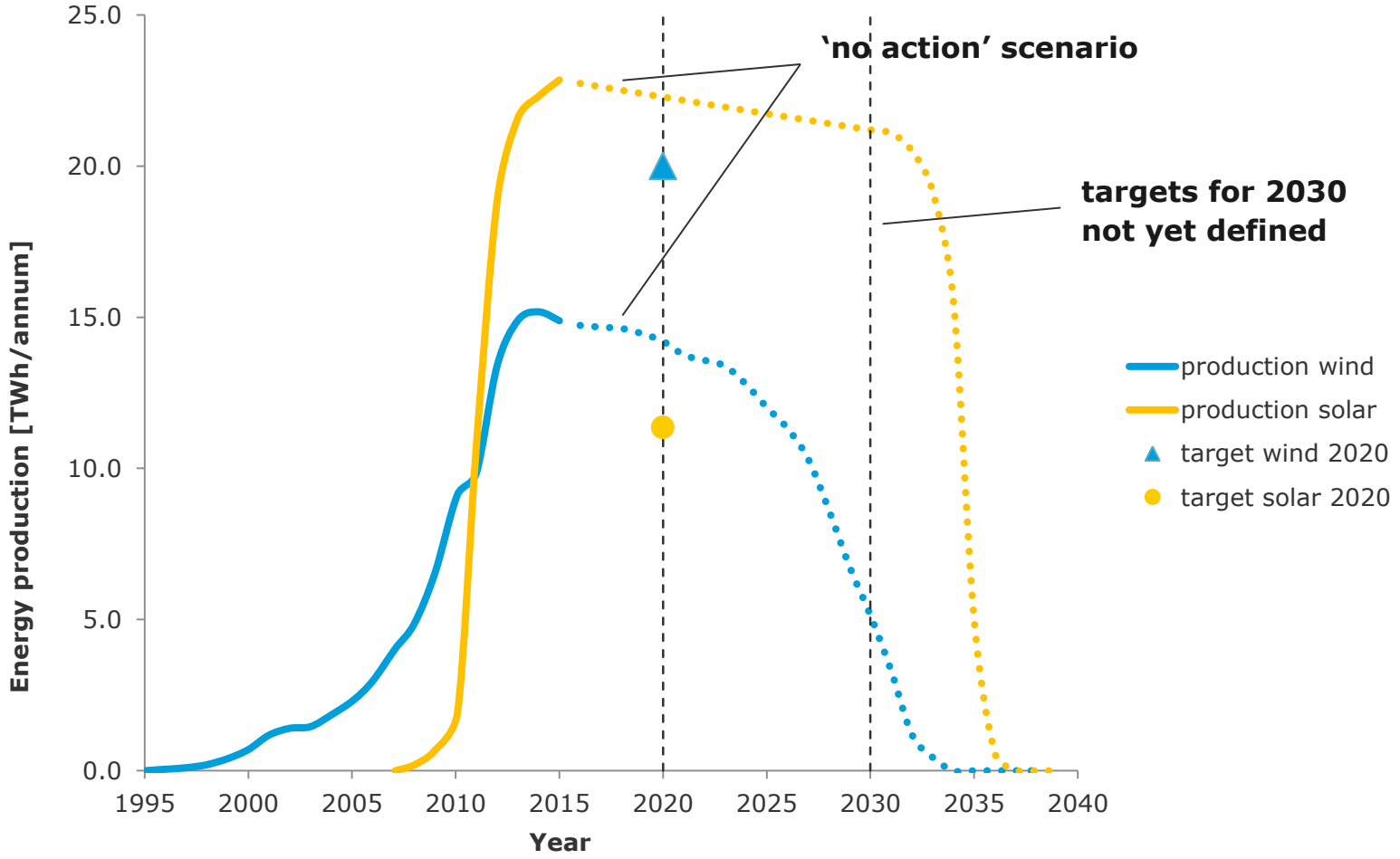
Development of Wind and Solar Plants



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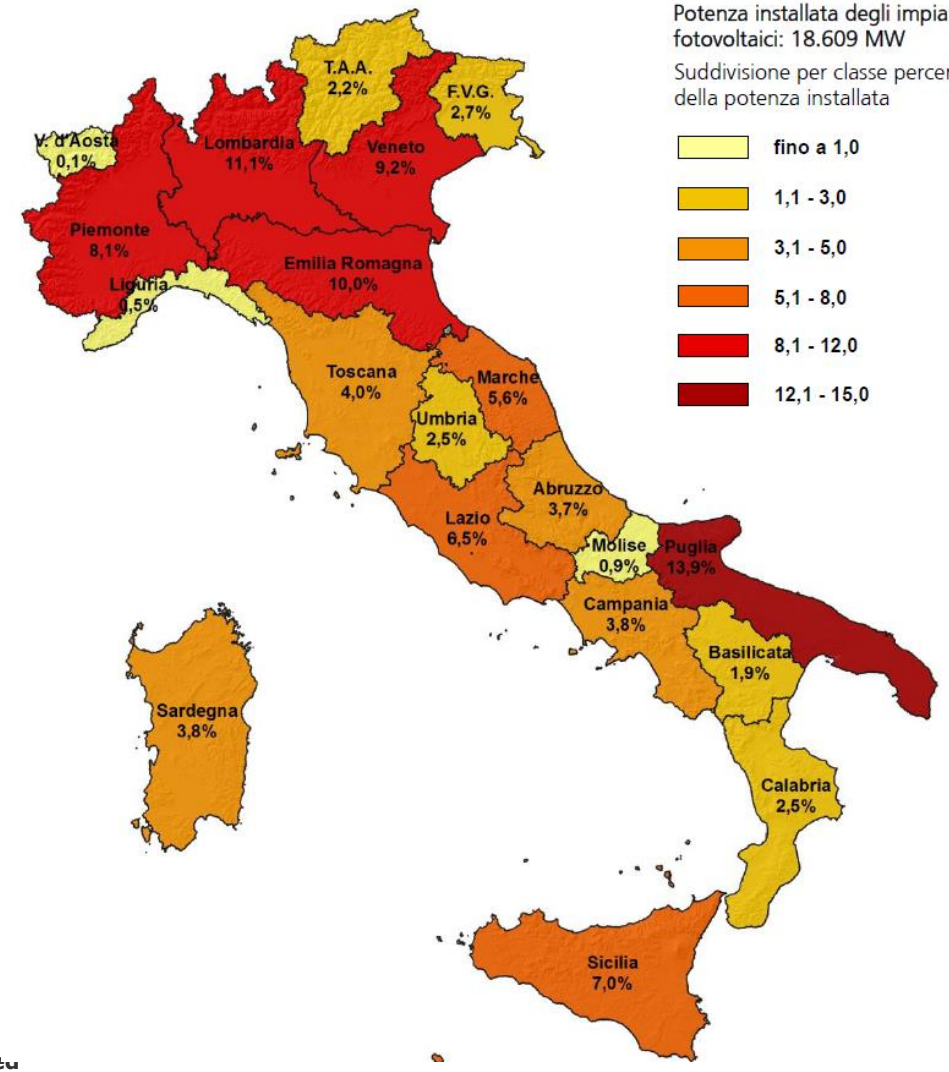
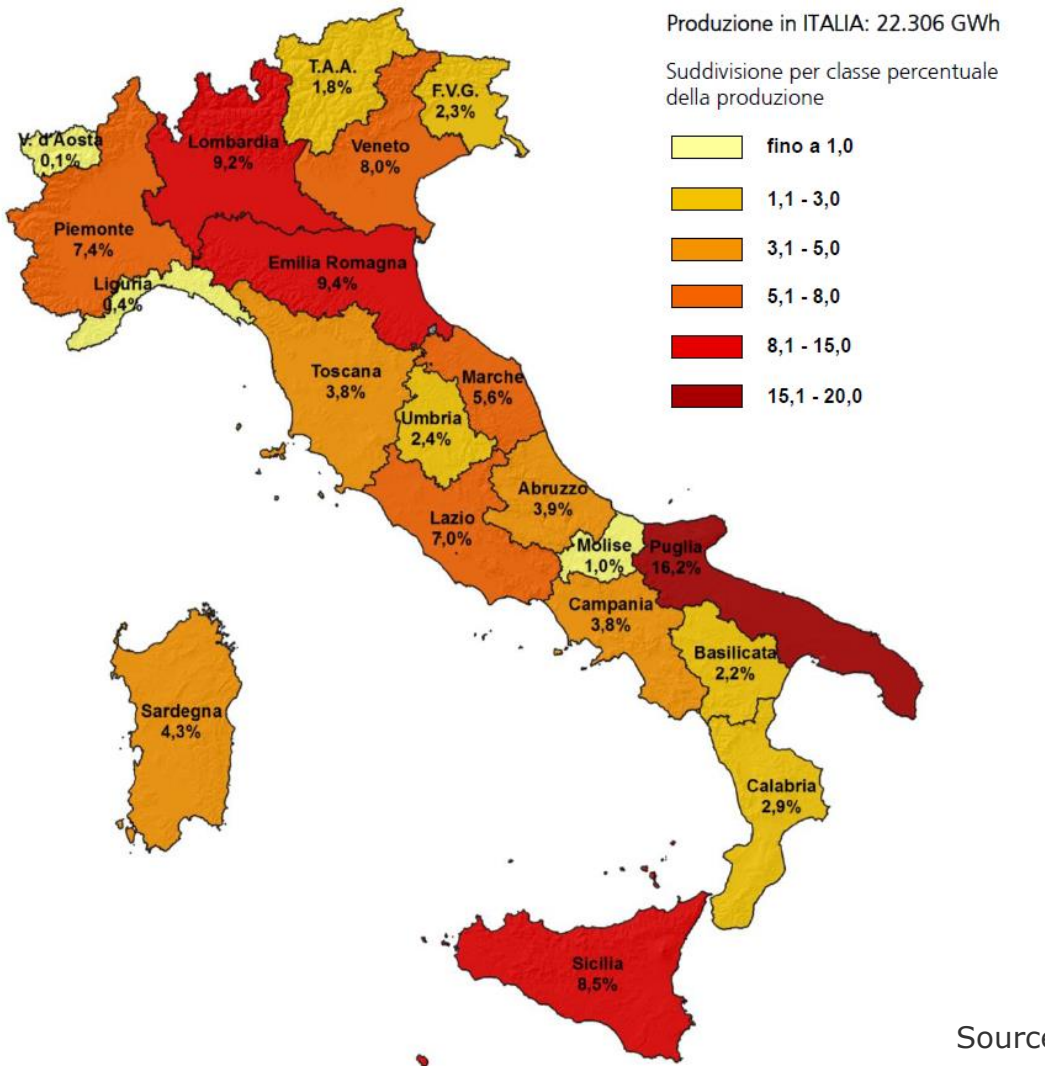
Keeping Wind Capacity after 20 Years of Operation

Measure	Action	Comments - Challenges
Lifetime Extension	• Following analysis it may be possible to extending the lifetime of the turbines by 5 or 10 years	• most Italian projects are located in complex terrain • needs to be supported by the designer and/or through site specific certification
Refitting (Refurbishment)	• Replacing the current wind turbines with new turbines of same or similar model	• models remain on market typically <10 years • lifetime of infrastructure needs to be confirmed by the designer and/or through site specific certification
Repowering	• Replacing the current wind turbines with new turbines of modern design	• advanced turbine size • only limited parts of the existing infrastructure can be re-used (e.g. roads) • complete new permitting

Geographical Spread of Solar Capacity and Production (data end 2014)





Source: GSE

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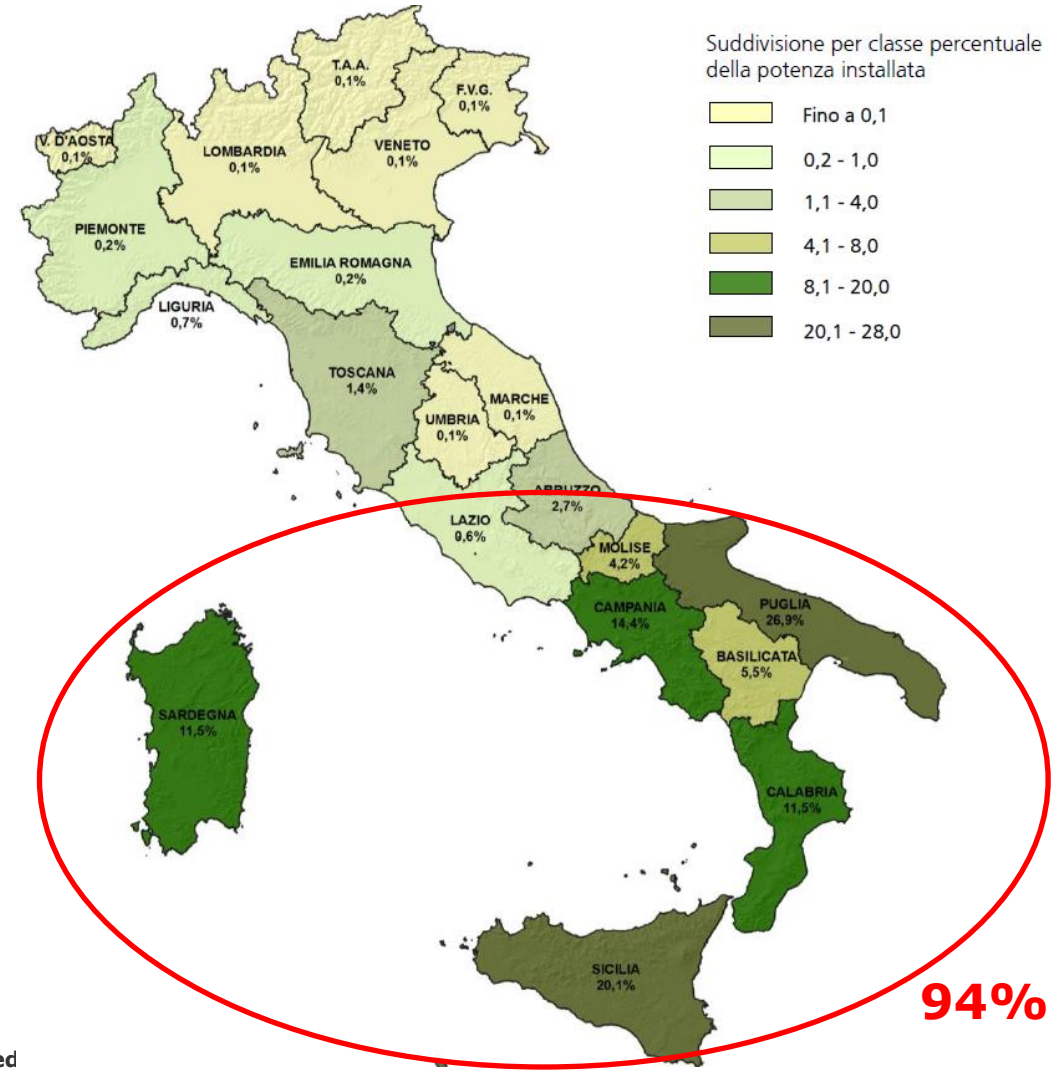

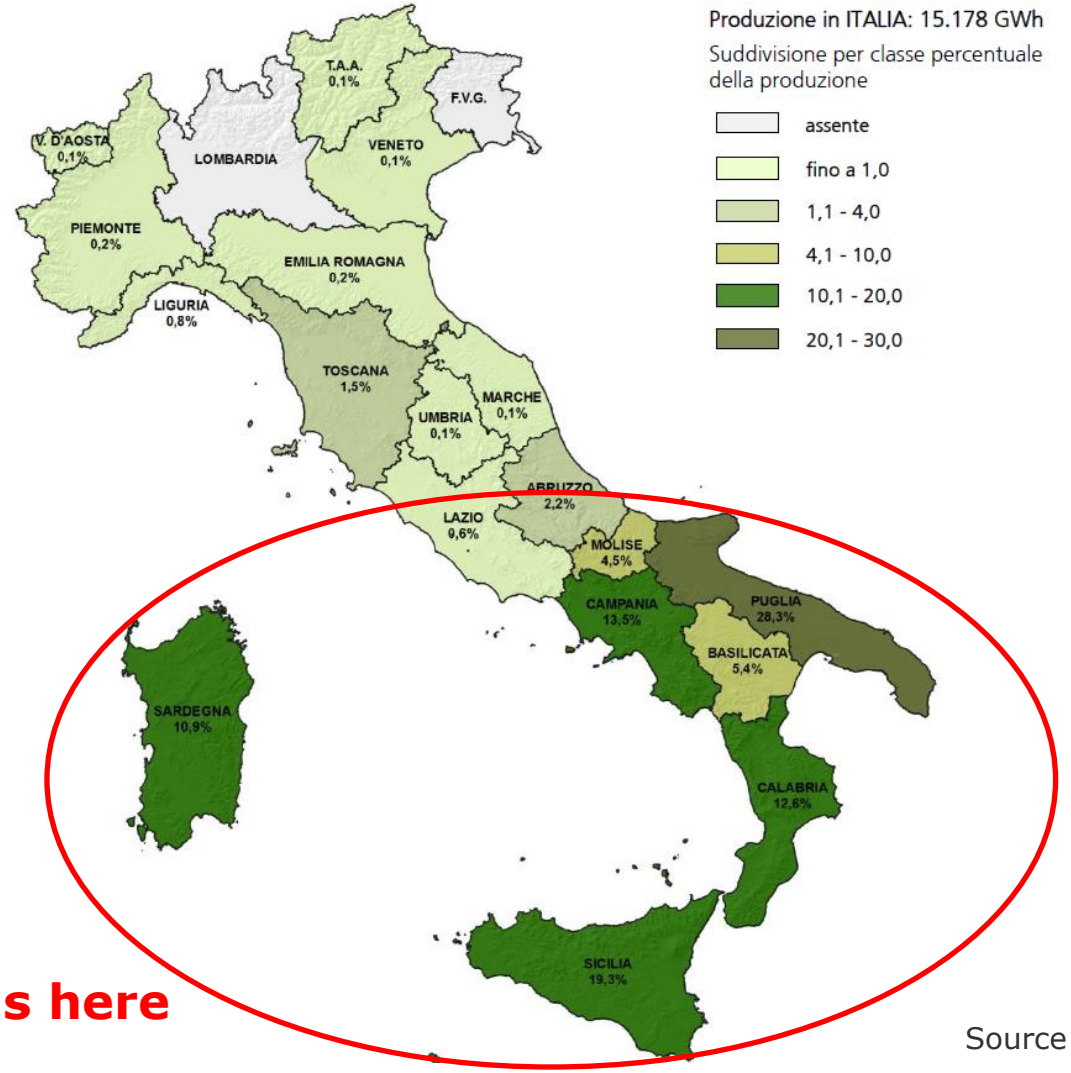

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Source: GSE

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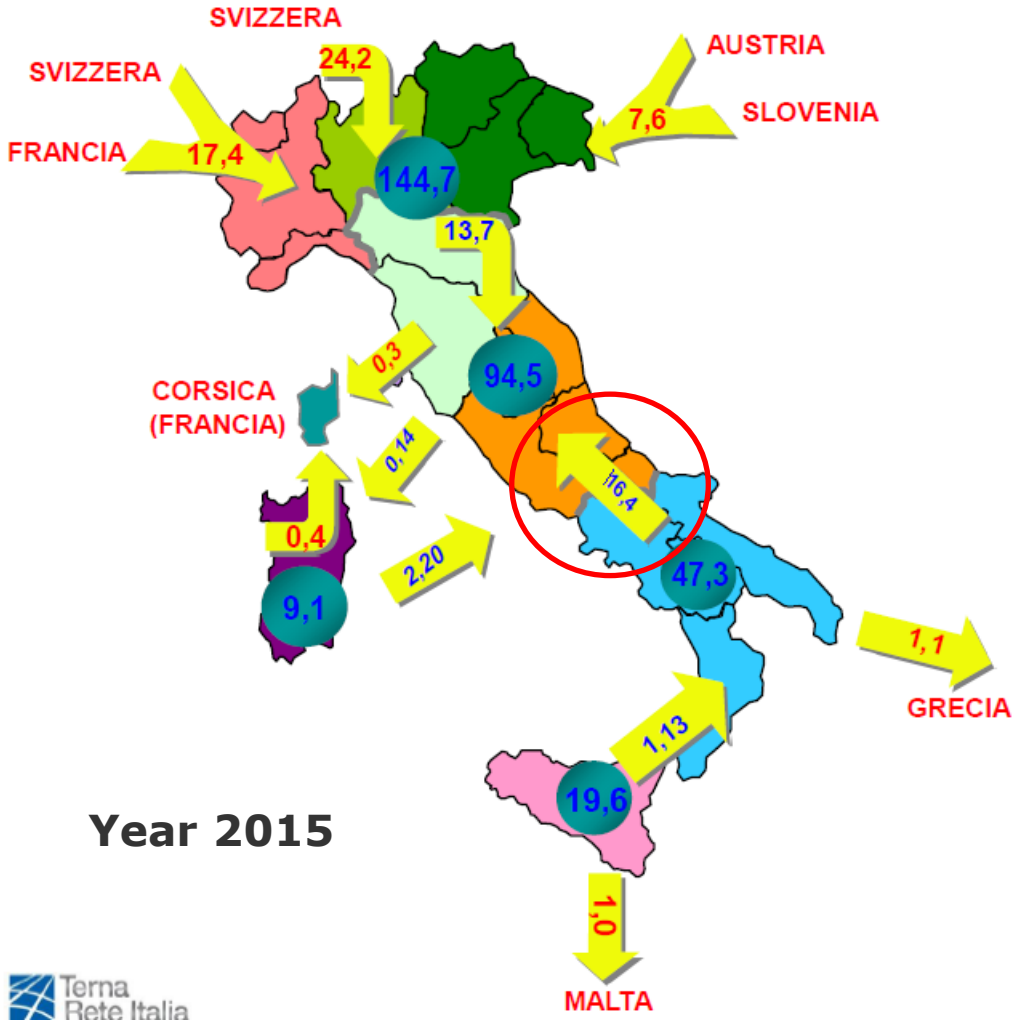
Energy Balance



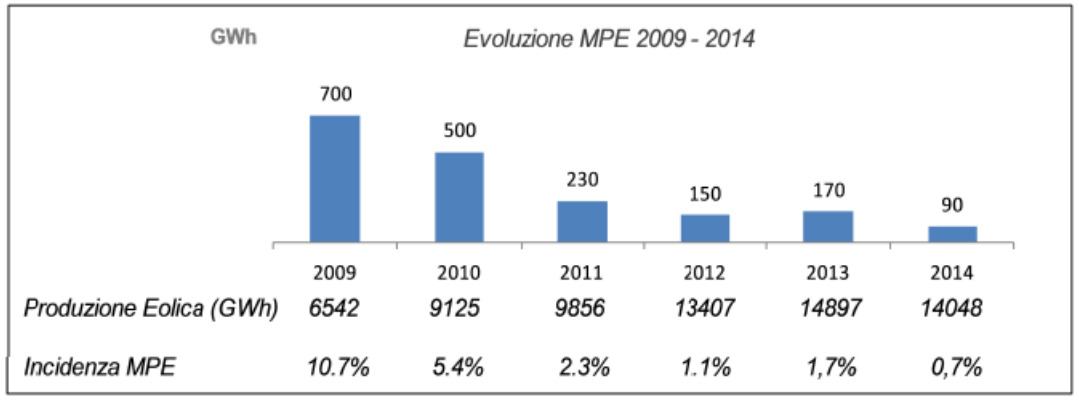
Terna Rete Italia

Source: Terna

Electrical Transmission Network

Main planned or ongoing improvements to better manage the relative high renewable power penetration

- Red dots primary stations
- Red lines are very high voltage lines



Source: Terna

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Thanks for your attention

Please contact me in case of questions
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