
Energy Storage Summit

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Crowne Plaza Valley Forge

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*Terna is the Italian
Transmission System
Operator*

Planning

Engineering

Asset Management

Dispatching

Terna is Member of

ENTSO-E



VLPGO



Contents

- **Smart Grids in EU**
- **Storage in Italy**
- **Grid development in Italy v.s. Renewables**

In EUROPE/ The Framework

- Renewables and 20/20/20 objectives
- Smart Grids
- Security of supply

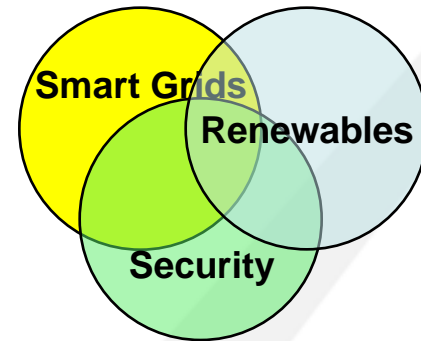
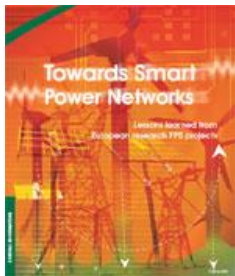
Affect Research Programs

2006 Wind Energy Associations triggers the Smart Grid Process to open the grids:

2006 – 2008. Technical Platform run by an Advisory Council to set a strategic Agenda to address main research topics.

5 Tasks

- 1.Distribution Infrastructure
- 2.Energy Management
- 3.Asset Management
- 4.T&D Interoperability
- 5.Technologies and standards



High content of Innovation and Research

Results beyond the Grid connection:

- Distribution challenges
- ICT opportunities
- TSOs' challenges to make Transmission smarter
 - WAMS and WAPS
 - FACTS
 - ..

- Commitment to reach 20/20/20 Target
- Address the core business:
 - Grid Planning and development
 - Advanced System Operation
- Strong coordination:
 - Scenarios
 - DSO – TSO
 - Support

Barriers:

- Research costs not eligible
- Regulatory Framework

Storage is one of the options but not in the responsibility of TSOs

TSOs are involved in study cases and scenario evaluations.

As an example Terna is investigating residual capability of pumping storage



8500 small dams

540 medium and large dams

Spread in the territory

6,000 – 10,000 MW of additional potential candidates for storage

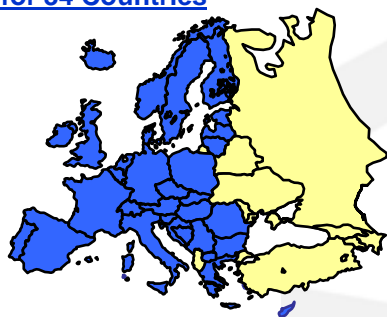
In EUROPE / ENTSOE Vision and Initiatives

~ 500 million citizen served

- 650 GW Generation
- 230.000 km V-HV lines
- 1.500.000 km MV/LV lines
- demand: 3,000 TWh/year
- Exchanges: 300 TWh/year

- Security Operation Committee
- System Development Committee
- Market Committee

42 TSOs for 34 Countries



CLUSTERS OF THE R&D PLAN

- Pan – European grid Architecture
- Power Technology
- Network management and Control
- Market Rules

In the framework of SET PLAN.

No official Smart Grids Programs.

1° ENTSO-E R&D PLAN (2009 – 2010)

- Under the EU 3° Energy Package
- Reinforce TSO position within the EU Set Plan

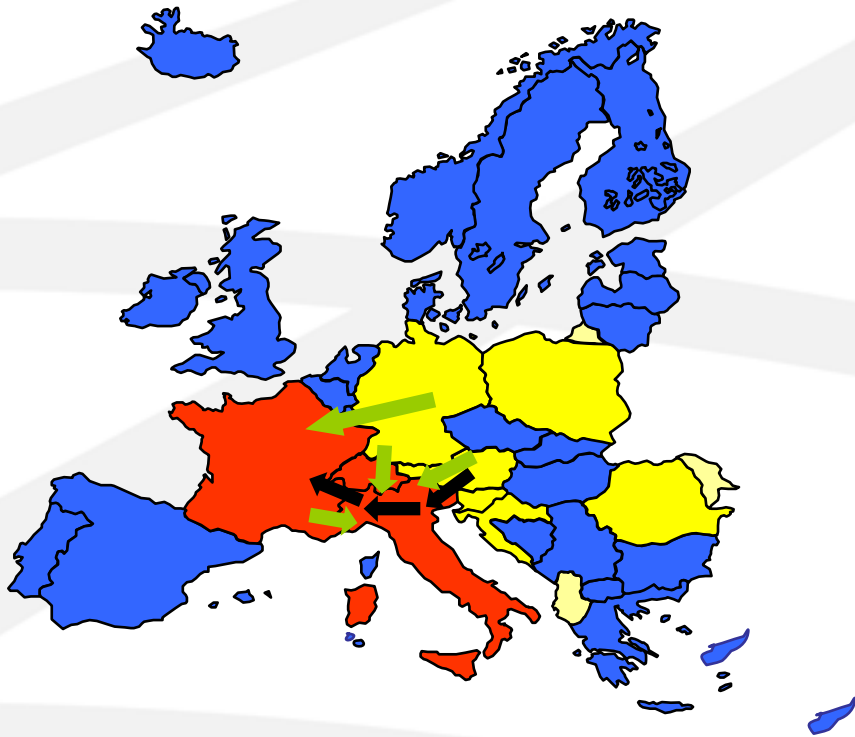
Basically an inventory of individual TSO initiatives





Light Governance under the responsibility of the ENTSO-E Planning Committee

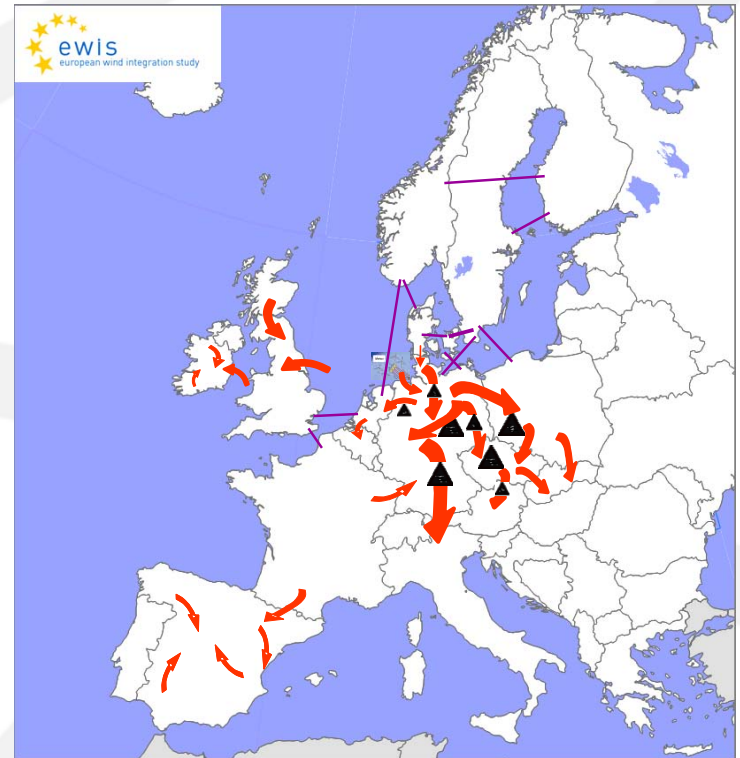
Renevables and Concerns

- Frequency control in isolated systems
- Loop Flows at European Level

WIND - LOOP FLOWS & CONGESTIONS



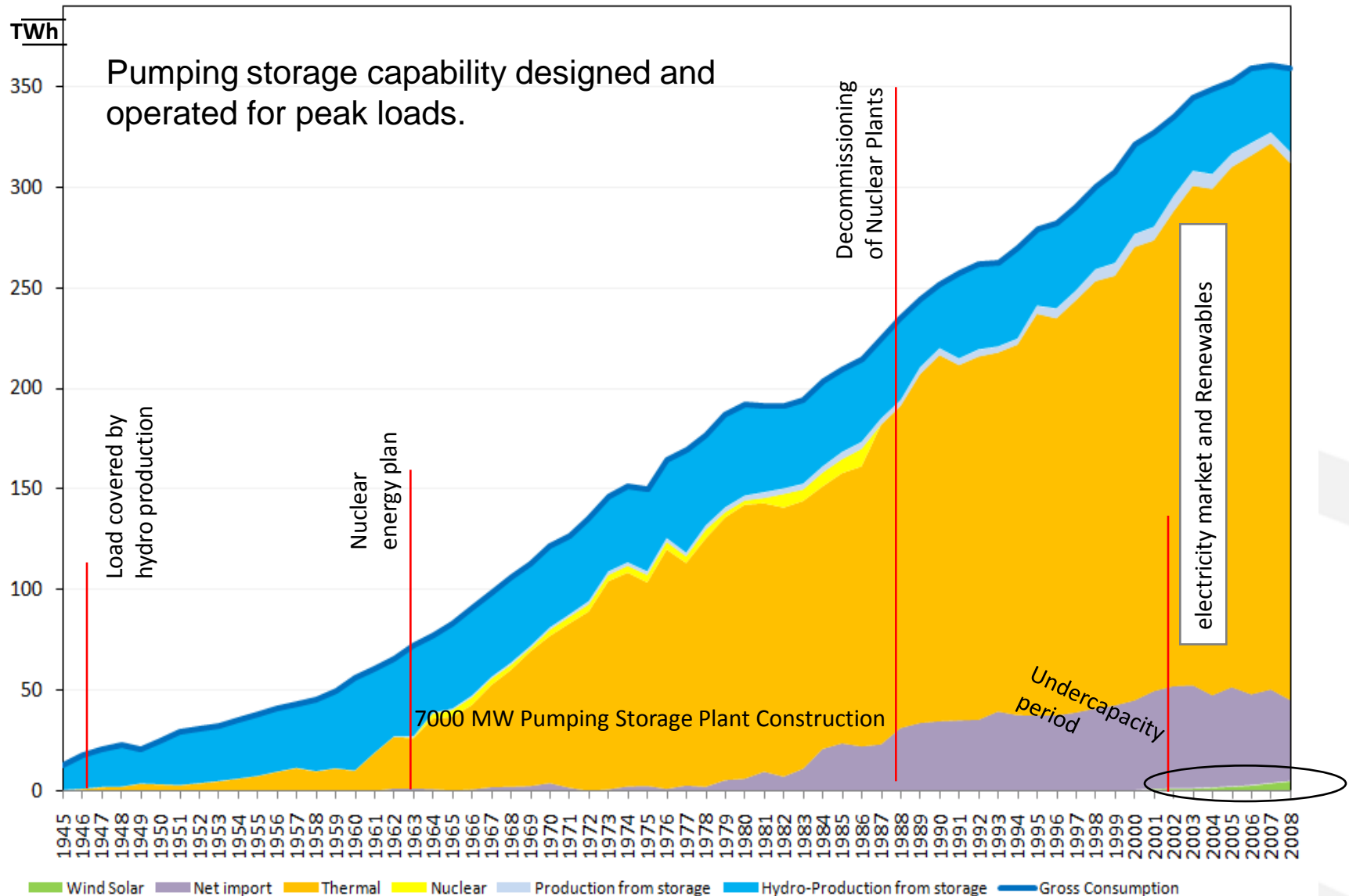
-  IMPORTING SYSTEMS
-  EXPORTING SYSTEMS
-  Commercial Flows
-  Loop Flows



The transmission Network is a key issue.

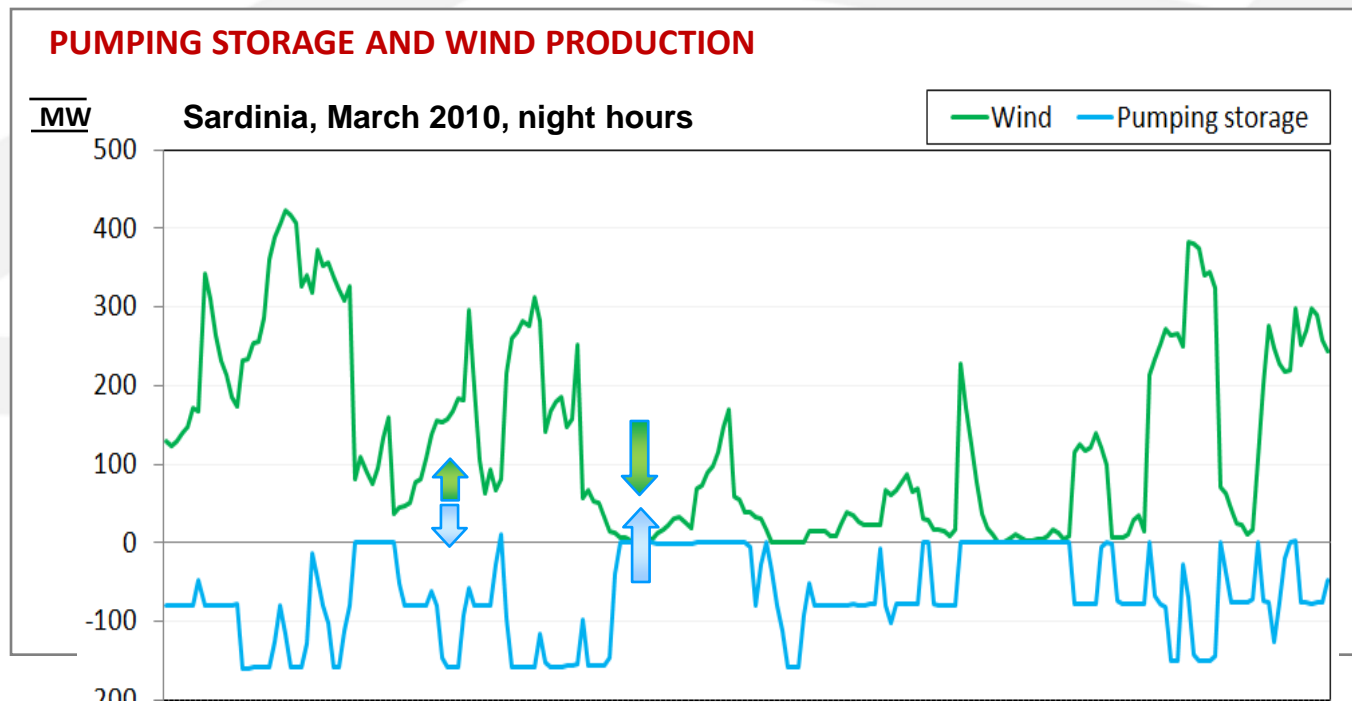
- New lines
- FACTS

Italian production over the year



Operation and intermittent generation

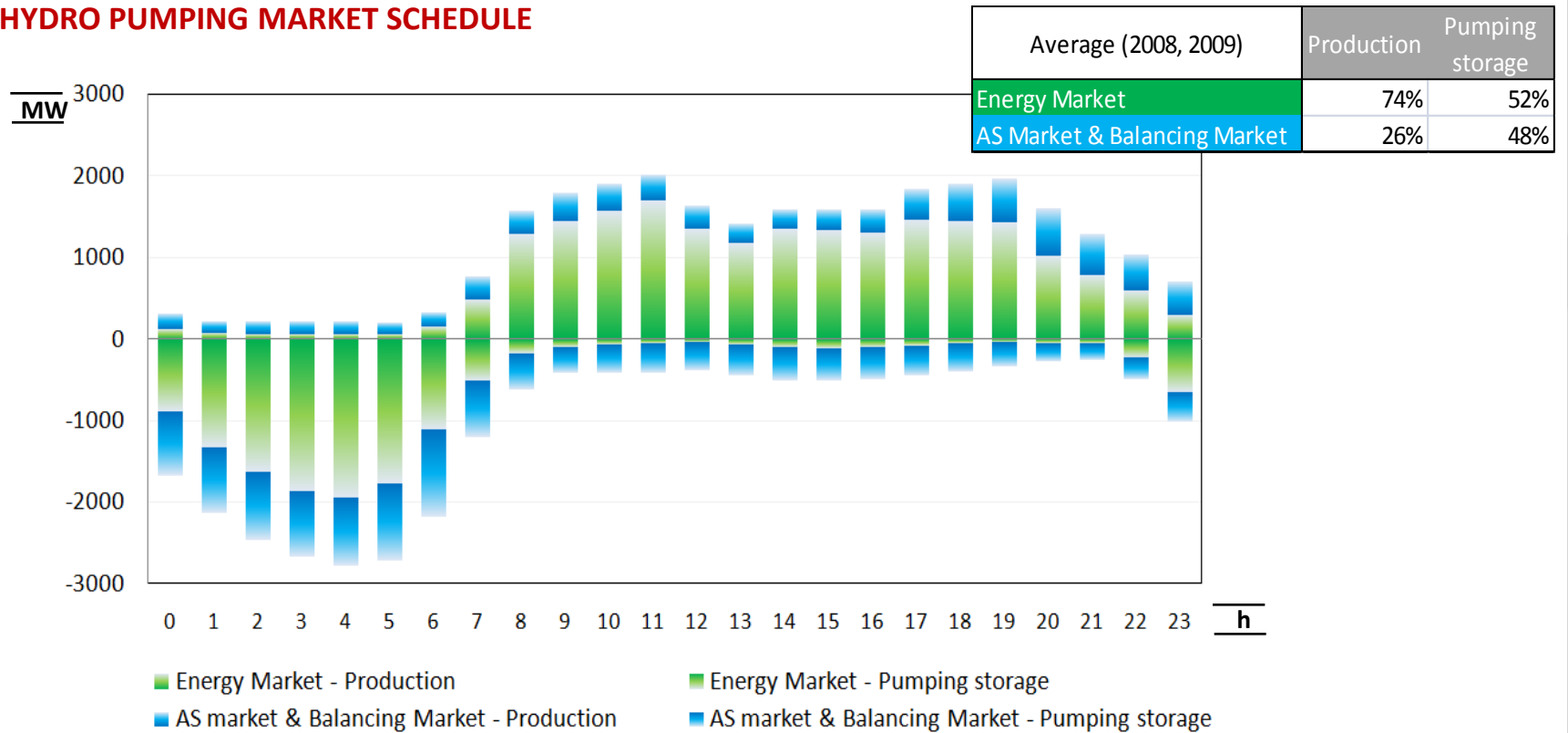
- ❑ Strong interconnection. No balancing problems in the Italian Peninsula
- ❑ Isolated or weakly interconnected systems like Sardinia and Sicily
 - .Fluctuation regulated by other sources (fossil fuels power plants) and if not possible stored



Use of Pumping Plants in the Electricity Market

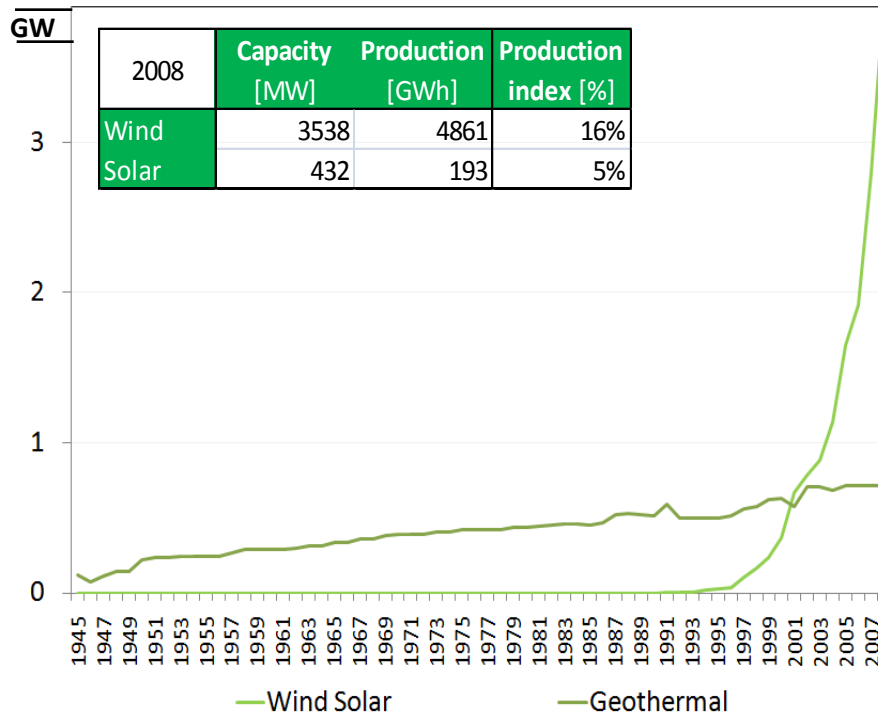
- ❑ managed by the GenCOs to maximize their revenues and to optimize thermal power plants output
- ❑ Used by Terna to supply ancillary services

HYDRO PUMPING MARKET SCHEDULE

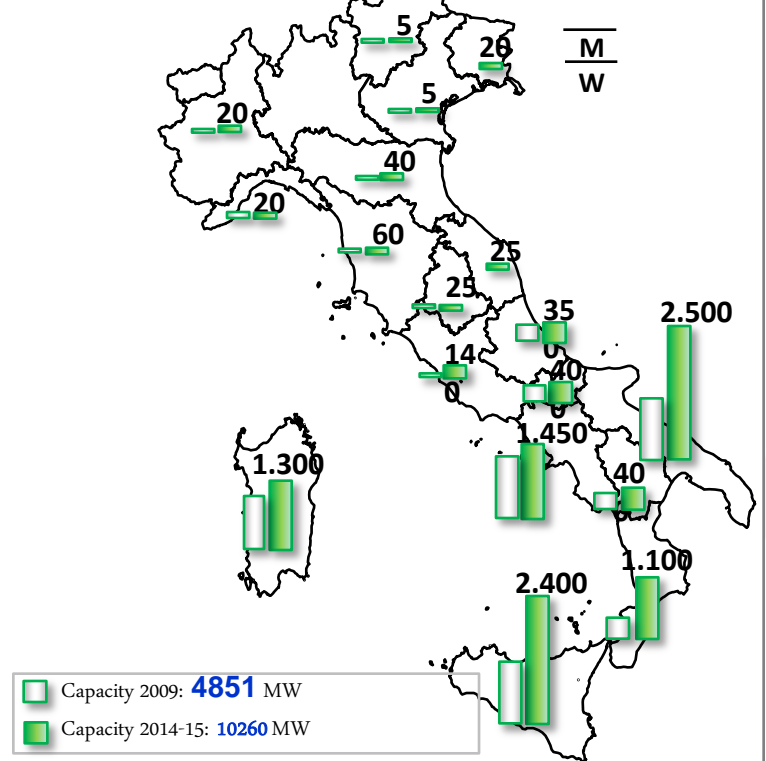


Wind Power Penetration in Italy

INSTALLED CAPACITY OVER THE YEARS

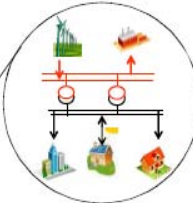
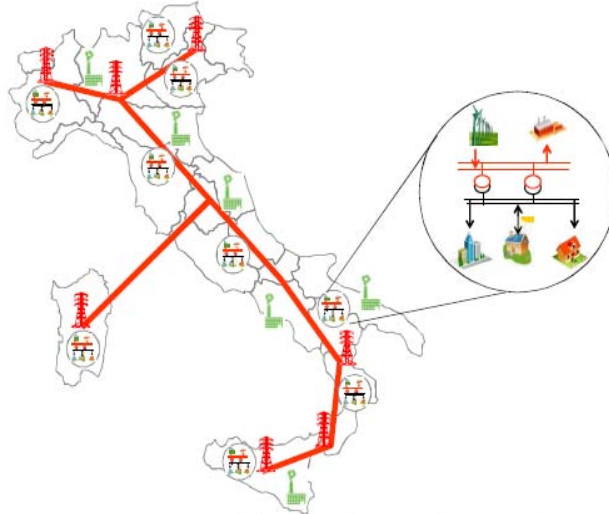


EXPECTED WIND CAPACITY

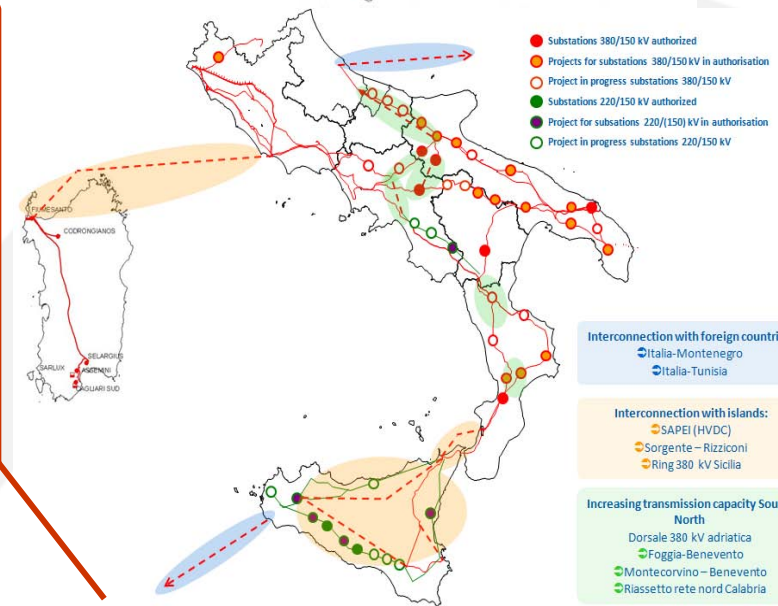


Investment Policies related to Wind Production Penetration

Grid Reinforcements and supergrids in the Mainland



1000 MW dc Link in Sardinia



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END

THANK YOU FOR YOUR ATTENTION

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