Geopolitics of Energy Transition
The Italian case

Fabio Bulgarelli – Head of Regulatory Affairs

Brussels, 18th February 2019
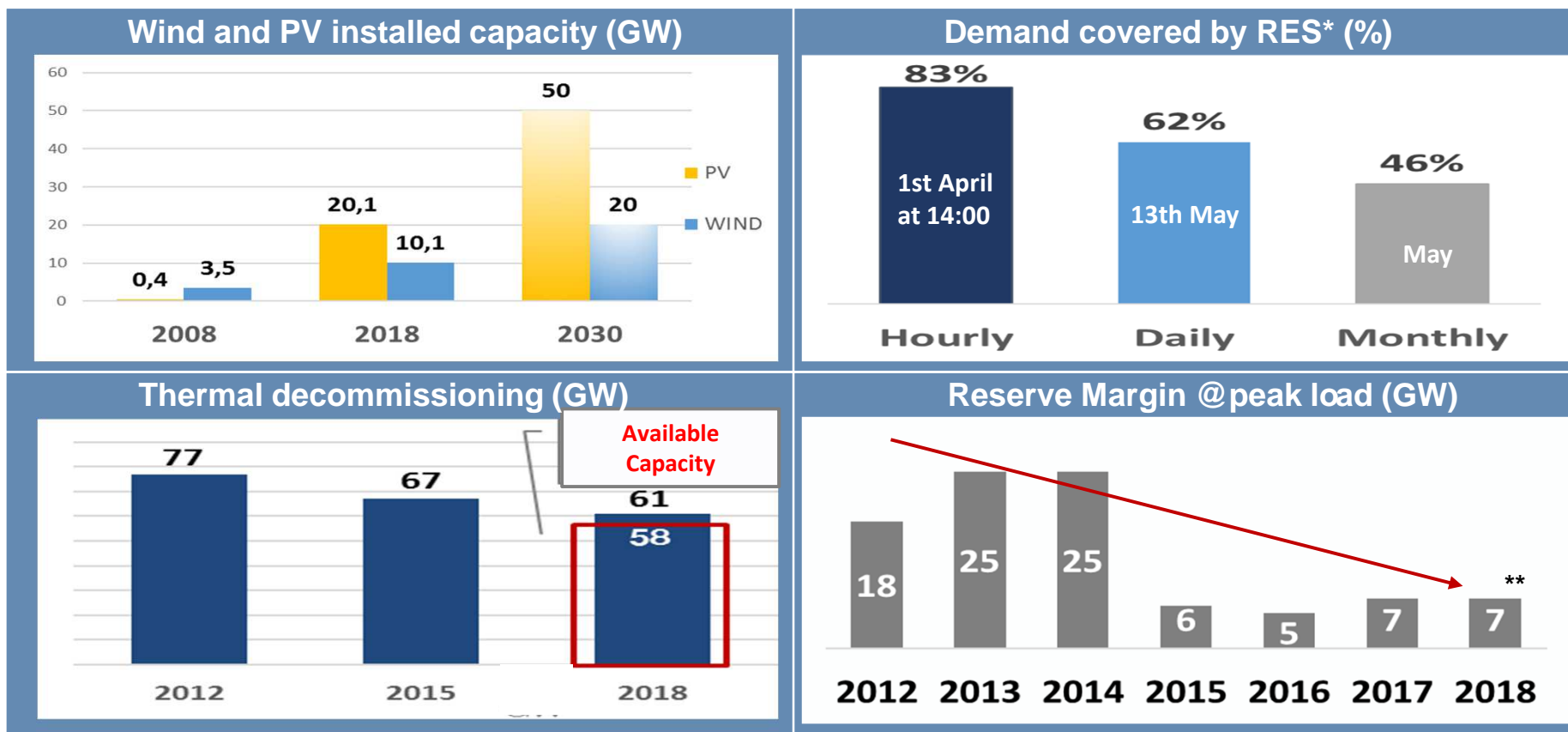
Terna
TERNA GROUP

Agenda

- **Recent trends and future forecast**

- **Key enablers of the energy transition in the electricity system:**

    - **Long term price signals**

    - **Storage**
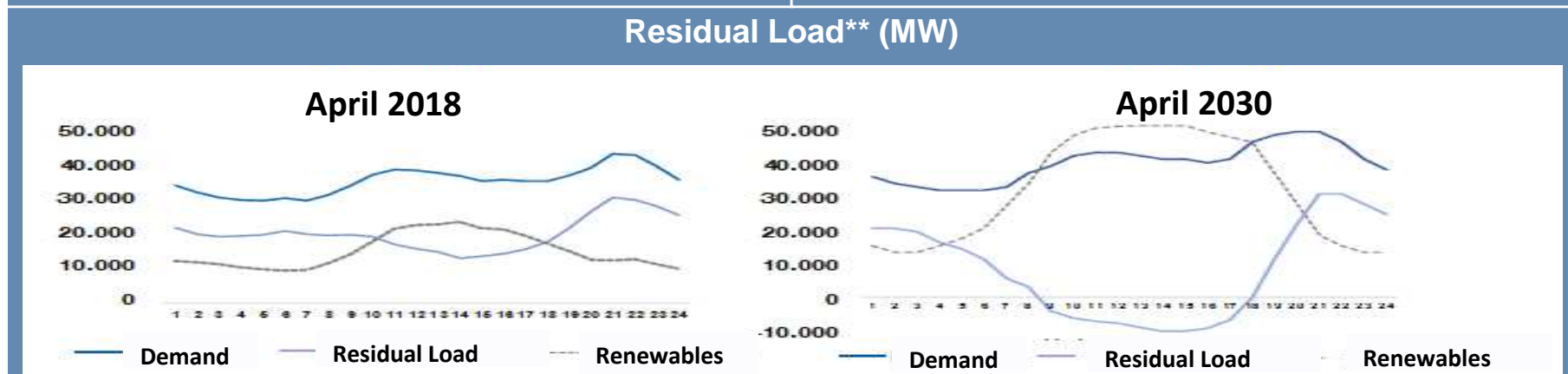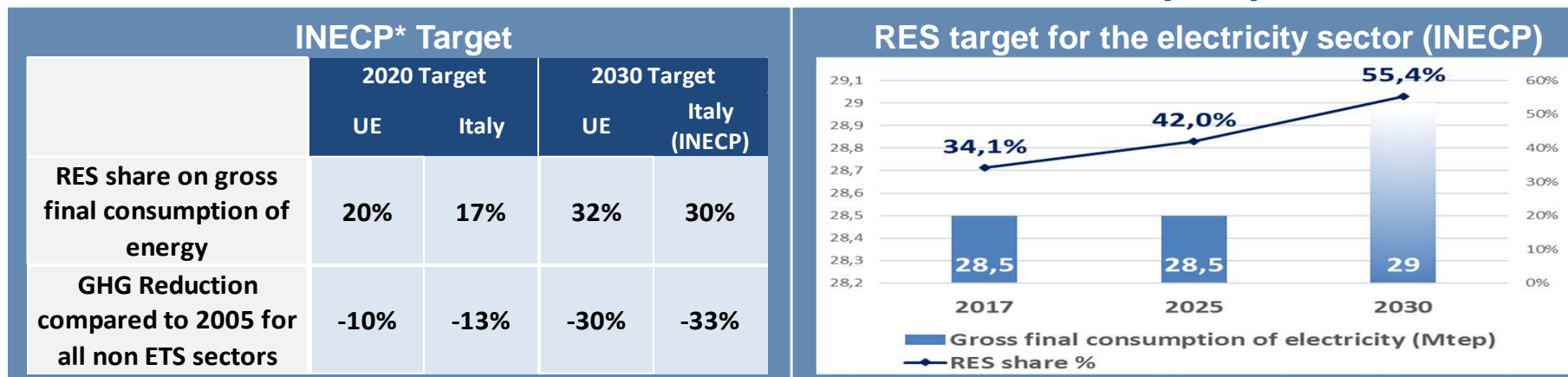
    - **Network Investments**

Recent trends and future forecast (1/2)

Wind and PV installed capacity (GW)

	PV	WIND
2008	0,4	3,5
2018	20,1	10,1
2030	50	20

Demand covered by RES* (%)

Hourly	Daily	Monthly
83%	62%	46%
1st April at 14:00	13th May	May

Thermal decommissioning (GW)

Available Capacity

2012	2015	2018
77	67	61 / 58

Reserve Margin @peak load (GW)

2012	2013	2014	2015	2016	2017	2018
18	25	25	6	5	7	7 **

*Including hydro, on the basis of data available in August 2018
**the figure for 2018 refers to the summer period; the margin is calculated as the difference between available installed capacity (including import) and consumption (including reserve) at peak load

Terna
TERNA GROUP

Recent trends and future forecast (2/2)

INECP* Target

	2020 Target		2030 Target	
	UE	Italy	UE	Italy (INECP)
RES share on gross final consumption of energy	20%	17%	32%	30%
GHG Reduction compared to 2005 for all non ETS sectors	-10%	-13%	-30%	-33%

RES target for the electricity sector (INECP)

- Gross final consumption of electricity (Mtep)
- RES share %

Residual Load** (MW)

April 2018

— Demand   — Residual Load   --- Renewables

April 2030

— Demand   — Residual Load   Renewables

*INECP: Integrated national energy and climate plan
** Residual Load = Load – Renewable Generation

4

Terna
TERNA GROUP

The key enablers

2030 targets are to be considered an **intermediate step toward full decarbonization** of the electricity system, which requires taking action already today, taking into account that a RES ambitious target not only contributes to decarbonization but also positively stimulates **innovation** ant **technology**, **economic growth** as well as supporting the improvement of **security of supply**

MAIN KEY ENABLERS FOR THE ITALIAN ELECTRICITY SYSTEM

We have to be fully committed to contributing to the achievement of a 100% carbon free electricity sector

1 **Long term price signals:** in a system with increasing RES, an energy market providing only spot price signals will be ever less capable of guaranteeing support to investments both for RES and gas flexible power plants (and storage too of course)

2 **Network Developments:** infrastructure investments are essential to deal with new constraints and congestions, improve adequacy and system security, integrate RES and reduce RES curtailments (overgeneration)

3 **Storage:** Both large scale storage solutions and distributed small-medium scale solutions (typically electrochemical storage) has to contribute to adequacy, system security and inertia, by accumulating energy during hours with highest RES production

Terna
TERNA GROUP

Long term price signals

RES

- Support schemes have been transitioning towards **auctioned long-term PPA contracts** in many EU countries. Entering such contracts guaranties long term revenue flows which contribute to reducing investment costs

- Res (very low variable costs) cannot simply rely on spot market price signals

New and flexible power plants

- **Long term price signals** fundamental to drive less efficient thermal power plants towards decommissioning and promote investments in new capacity to manage system needs in terms of adequacy and security

- Long term price signals as a result of **market based mechanisms**

- Promotes **investments in new capacity capable of managing RES penetration** (like **OCGT** plants) and/or promotes the conservation of the most efficient existing capacity (therefore should not be temporary solutions)

- **Strategic reserves**, which have been prioritised in the Clean Energy Package, **do not support investments** in new, flexible solutions

Terna
TERNA GROUP

Network Development (1/2)

TERNA NETWORK DEVELOPMENT PLAN DRIVERS

Decarbonization

Market Efficiency

Security and Resiliency

Sustainability

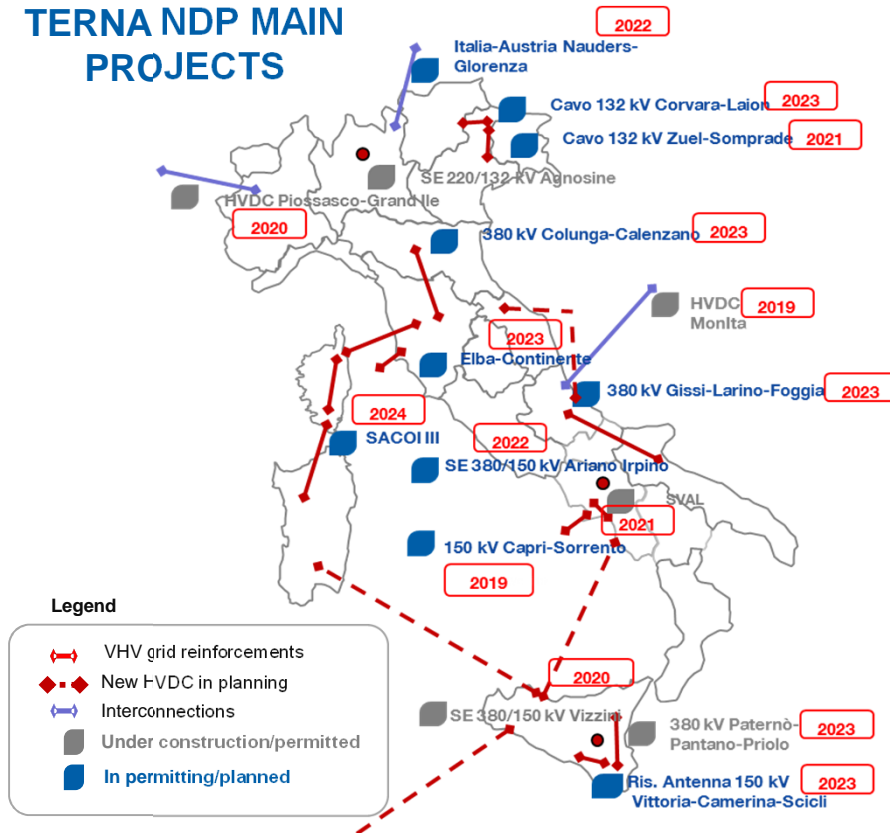**New investments** to upgrade/expand the grid to foster:

- RES growth and integration
- Electricity markets integration
- Higher market efficiency
- Security of supply
- Security of system management (Voltage control, short circuit power, congestions)

To support investments:

- **Simplification** of the **permitting process**
- Improved CBA methodologies so as to reflect **all benefits** (environmental, visual amenities …)
- **investment incentives** steering TSOs in addressing priority issues for the system by aligning TSOs and system interests

Terna
TERNA GROUP

Network Development (2/2)

TERNA NDP MAIN PROJECTS

Legend
- VHV grid reinforcements
- New HVDC in planning
- Interconnections
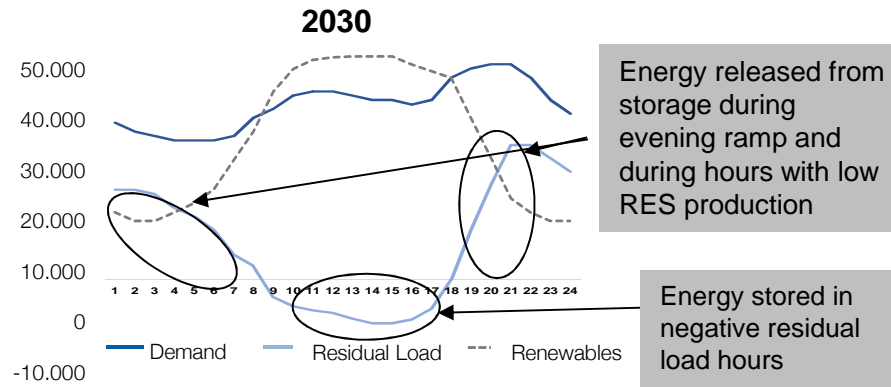- Under construction/permitted
- In permitting/planned

System Benefits

- In its latest "National Electricity Transmission Grid Development Plan" (NDP 2018), Terna foresees €12 bn worth investments over the next 10 years

- All transmission investments are pre-vetted for a **sound benefit/cost ratio**

- The benefits of TSOs in making investments exceed by far their investment costs: according to 2018 NDP, **each euro invested generates 4 euros of benefits**

- The **cost of under-investing is way higher than the cost of investing**

Storage

2030

Energy released from storage during evening ramp and during hours with low RES production

Energy stored in negative residual load hours

Chart legend: Demand — Residual Load — Renewables

Main effects of increasing RES on the electricity system:

- **Steeper evening ramp**
- **Voltage regulation reduction**
- **Reduction of reserve margin at peak**
- **Increasing congestions**
- **Need of faster regulating resources**
- **Overgeneration***

- Storage solutions needed to withdraw energy during hours with negative residual load and to produce energy in the other hours of the day, so as to contribute to:

  – **Meeting the demand** during peak load hours with low RES production

  – **Reducing grid congestions** and **overgeneration**

  – Providing **frequency** and **voltage regulation** and increasing **short circuit power** and **system inertia**

Need for at least 6 GW of storage at 2030, to be located in the Centre and South of Italy and in Sicily and Sardinia, so as to contribute to a secure system management in a context of increasing RES

* RES curtailments

Conclusions

Long term price signals are needed for conventional generation as well as for renewables. Energy only market and spot prices are not a feasible solution. Capacity markets/long term contracts are necessary to guarantee adequacy and facilitate RES integration

Network development contributes to decarbonization, security of supply and market efficiency. Therefore, **incentive schemes**, **simplification of authorization procedures** and simplified **access to EU funds** are key factors for supporting infrastructure investments

Energy storage will play a crucial role in the future of the electricity system, featured by increasing RES, and its development should be promoted by an appropriate set of rules in line with the EU framework

Terna
TERNA GROUP