



Key enablers of the energy transition

5th GO15 & ICER Workshop Meeting

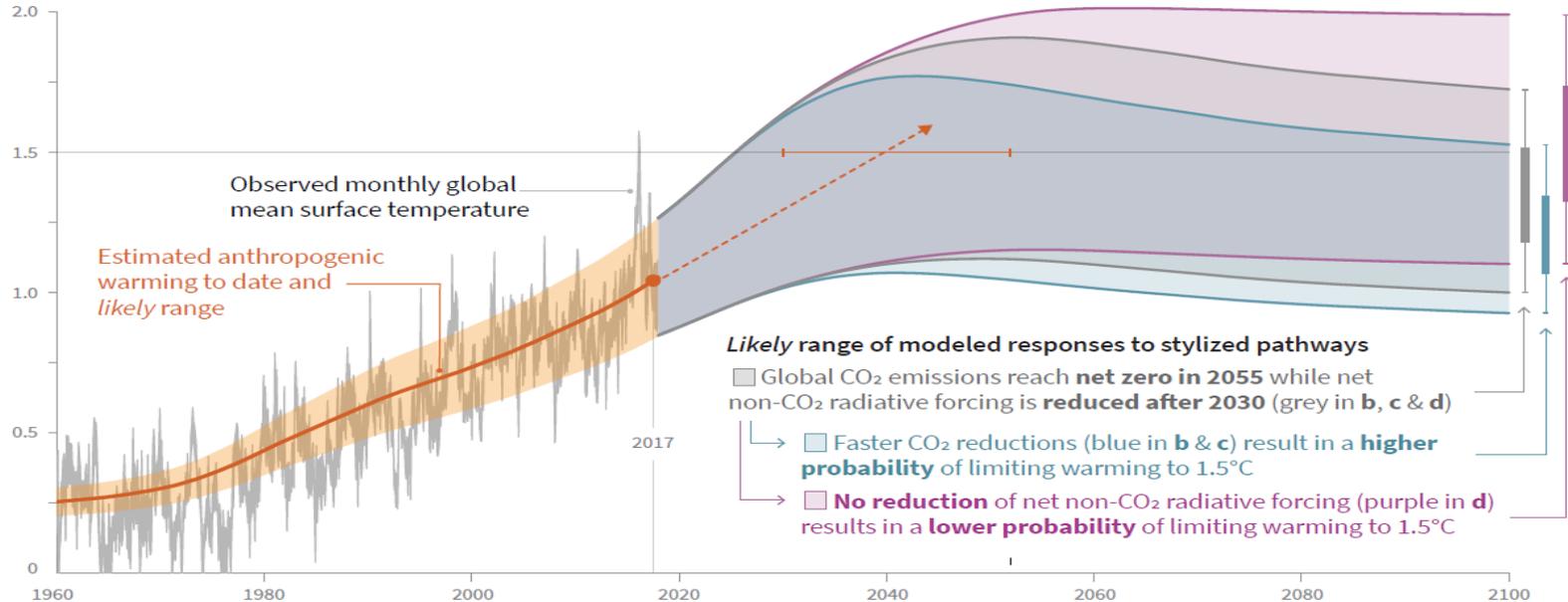
Luca Marchisio

Head of System Strategy, Strategy Development & System Operation

Milan, October 11 2018

Global warming of 1,5 ° C

Global warming relative to 1850-1900 (°C)



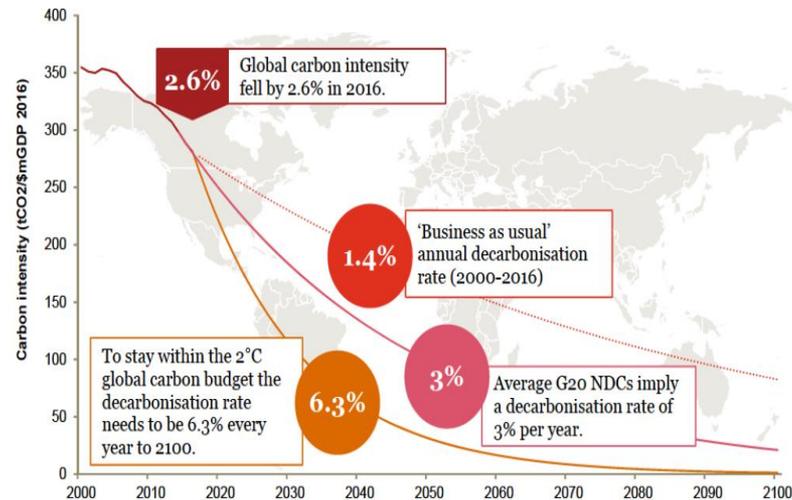
According to the recent IGCC study, **Observed global temperature change is very coherent with modeled responses** to stylized anthropogenic emission.

New energy paradigm: renewables & electrification

EU – Clean Energy Package

	2020		2030
			
RES share in final energy consumption	≥20%	≥17% 	≥32%
Reduction of GHG emissions	-20%	-13% 	-40%
Interconnection vs. installed capacity	≥10%	≥10%	≥15%
Energy efficiency	+20%	+13%	+32.5%

“Low Carbon Economy Index 2017”, PATHWAY TO 2°C



Source: PWC 2017

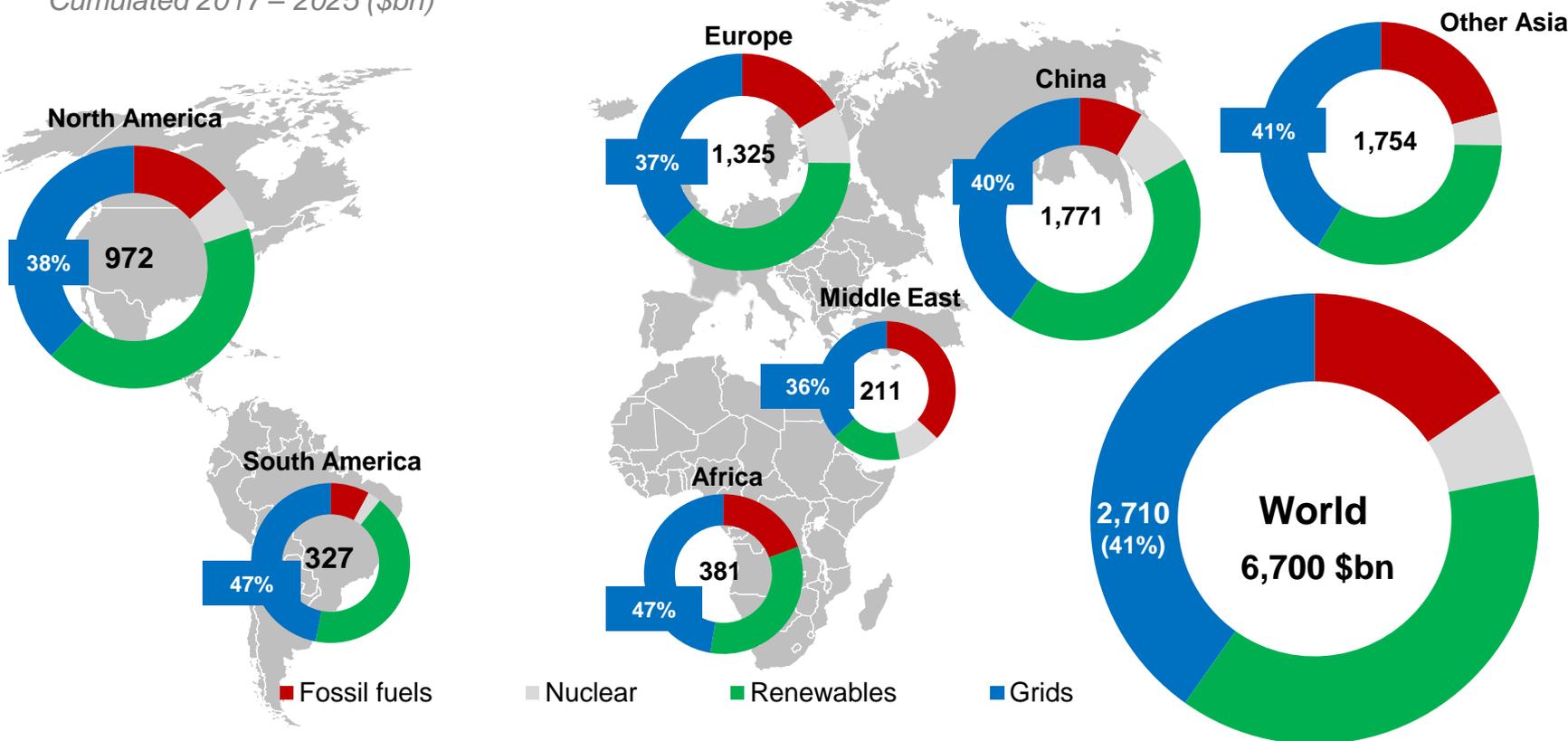
There is **general consensus** that **renewables and electrification** are essential ingredients **to reach the ambitious decarbonisation targets**.

The **role of infrastructure** and **infrastructure operators is fundamental**, because they can **enable the energy transition**, i.e. the deployment of renewables and a more electrified economy.

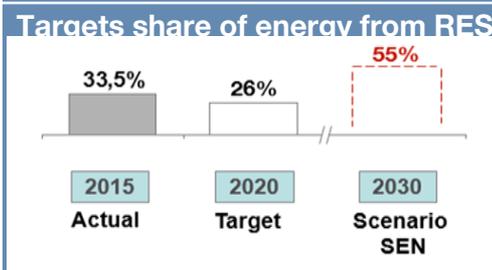
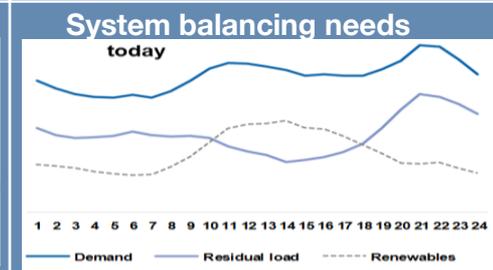
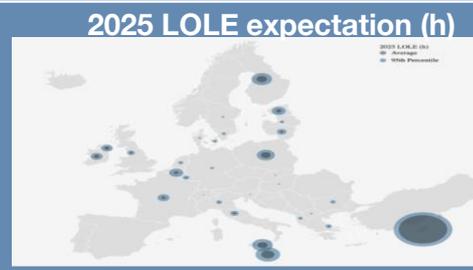
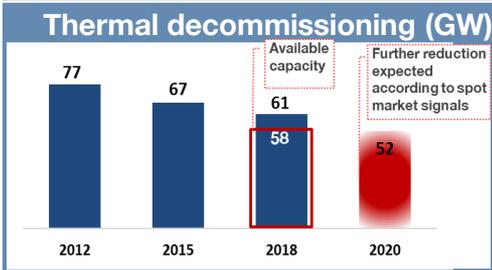
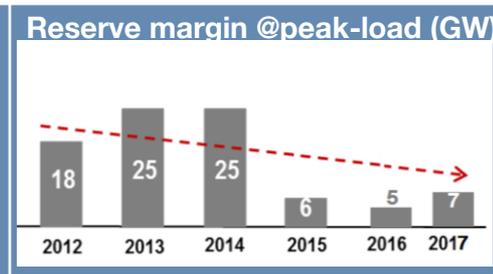
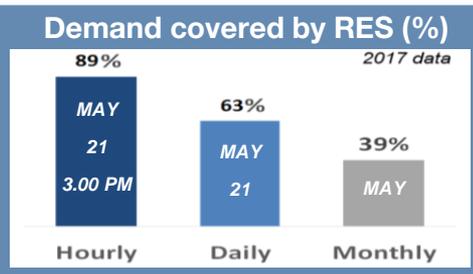
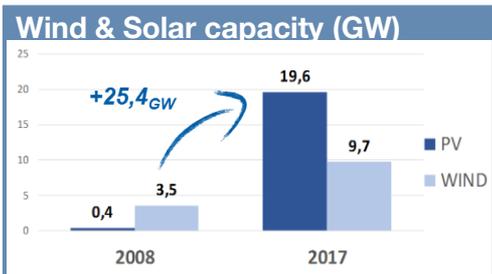
1. Share of renewable energy in percentage of gross final energy consumption (transport + electricity + heating & cooling)
 2. Target of Effort sharing decision for Italy

Global 2017-2025 Energy Investment Outlook

Cumulated 2017 – 2025 (\$bn)



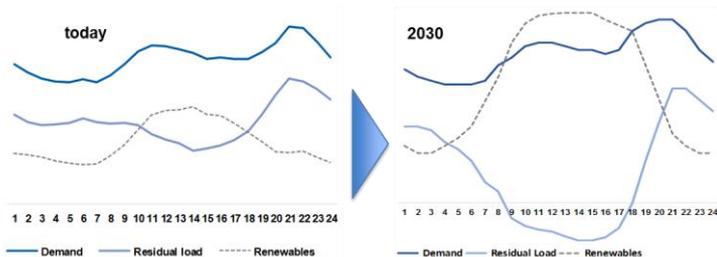
Snapshot of the Italian electricity system trends



Operational Challenges for TSOs

- ✓ RES explosive growth
- ✓ Thermal installed capacity decommissioning
- ✓ New distributed electricity resources
- ✓ Progressive further reduction of demand covered by traditional plants substituted by non programmable RES

TYPICAL RESIDUAL LOAD CURVE ON 24 HOURS*



Main effects on the electricity system

- Steeper evening ramp due to sudden reduction of solar production
- Voltage regulation reduction, as a result of the increased shares of RES capacity on total installed capacity
- Reduction of reserve margin at peak, mainly due to thermal power plants decommissioning
- Increasing Congestions due to RES development concentrated in areas where primary sources are available
- System inertia reduction resulting from limited contribution of most RES

Infrastructure development and market design adjustments are essential to address these challenges

*Residual Load = Total Demand – Renewables generation

Key enablers of the energy transition

Long Term price signals

- In a system with increasing RES, an energy market providing only spot price signals will be less and less capable of guaranteeing support to investments both for RES and traditional power plants
- Capacity market and [auctioned long-term PPA contracts](#) provide long term price signals capable of promoting investments in Thermal and RES power plants

Network Development

- [Transmission capacity increase](#) on a zonal and local basis; [interconnections](#) with other countries

Storage

- Both [large scale storage](#) solutions (5GW additional storage might be necessary by 2030 in Italy) and [distributed small-medium scale](#) storage solutions (typically electrochemical storage)

Demand Response

- Enabling demand to provide ancillary services based on [explicit and/or implicit price signals](#)

Smart Grid

- Investments in [FACTS](#) (Flexible AC Transmission System), [voltage compensators](#) and [real time digital management](#) systems

Market Evolution

- Driving the evolution of Ancillary Services Market to [foster the participation of new resources](#) (demand, distributed generation, storage). In Italy we are experimenting successfully pilot project

Data Management

- [Full availability of metering data, both real time and ex post](#), is a fundamental enabler to allow for the safe management of the grid and for the participation of new resources to ASM