



ENERGY INDUSTRY CHALLENGES TO A LOW-CARBON ECONOMY THE RES AND GAS ROLE IN THE TRANSITION

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EDISON AT A GLANCE

FOCUS ITALY

Power Generation



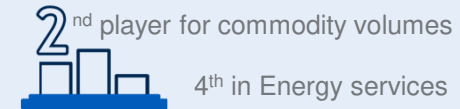
- Unique balanced portfolio with ~20% RES production (target 40% @2030)
- 3+ GW 55% efficiency CCGTs
- The first two new high efficiency CCGTs (2 x 800 MW) coming on stream on the Italian market
- 1 GW hydro
- 1 GW wind
- 0.1 GW grid scale PV (growing)

Gas



- 22% market share of Italian gas imports
- Diversified and flexible long term gas portfolio (duration, routes, gas/LNG, ...)
- Diversified uses (captive, third party thermo, industrial, resellers, wholesale)
- New gas uses under development (e.g. SSLNG for transport)

Downstream



- Energy services mainly for large industrial and PA customers
- ~1.5 M contracts to final customers (commodities + services)

Well balanced portfolio across the value chain and across technologies

TIME HORIZONS FOR ENERGY TRANSITION

KEY DRIVERS

2030

Right in the middle:
***Ensure enough momentum
to reach 2050 targets***

- Set challenging targets for RES development (from 55% to 65% of power demand)
- Use gas to substitute more polluting energy sources (e.g. coal, fuel, ...) and to allow for RES development
- Foster electrification
- Pave the way for Green Gas large scale adoption
- Intensify R&D efforts to speed up production efficiency increase and new technologies development

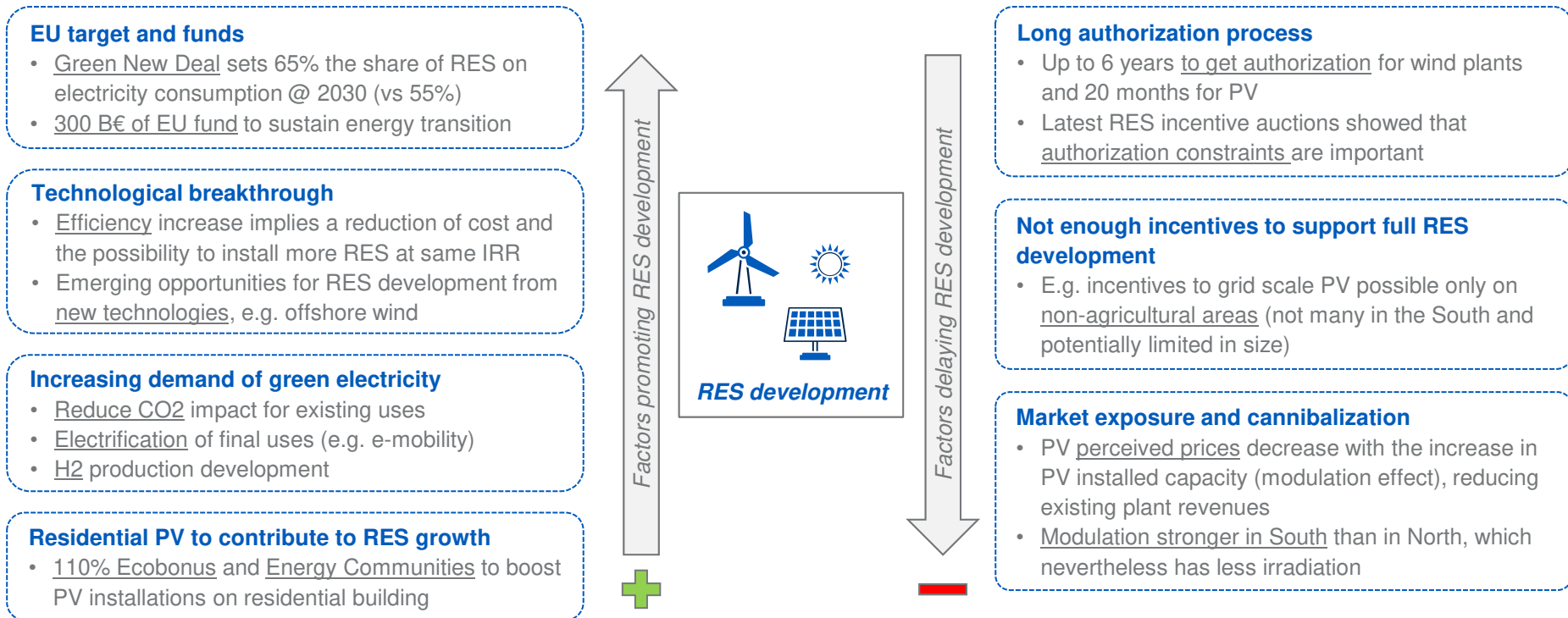
2050

The end game:
EU carbon neutrality

- Identify the optimal mix to reach carbon neutrality (country specific ... but EU coordinated)
 - Technology evolution is key
 - Electrification to play a major role
- RES and gas still the two main ingredients, but with different challenges to face
 - RES: deployment speed and land competition
 - GAS: as much Green Gas as possible/affordable, CCS on the remaining gas uses

THE RES DEVELOPMENT DILEMMA

POSITIVE AND NEGATIVE IMPACTS ON DEVELOPMENT

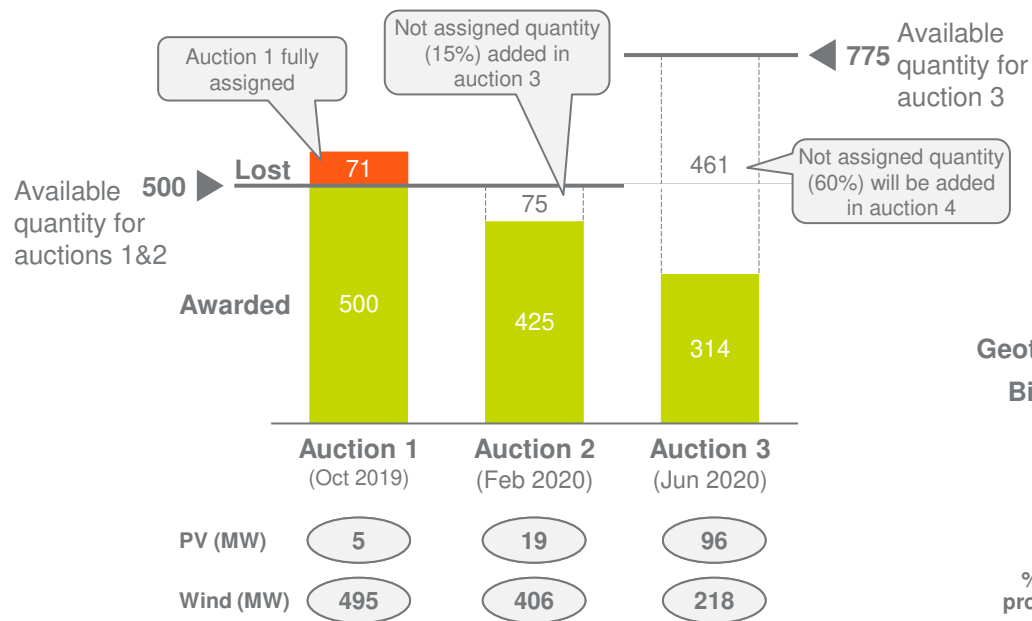


**Possibility to install RES is the real bottleneck of the energy transition
Incentives, regulation and technology could accelerate RES development**

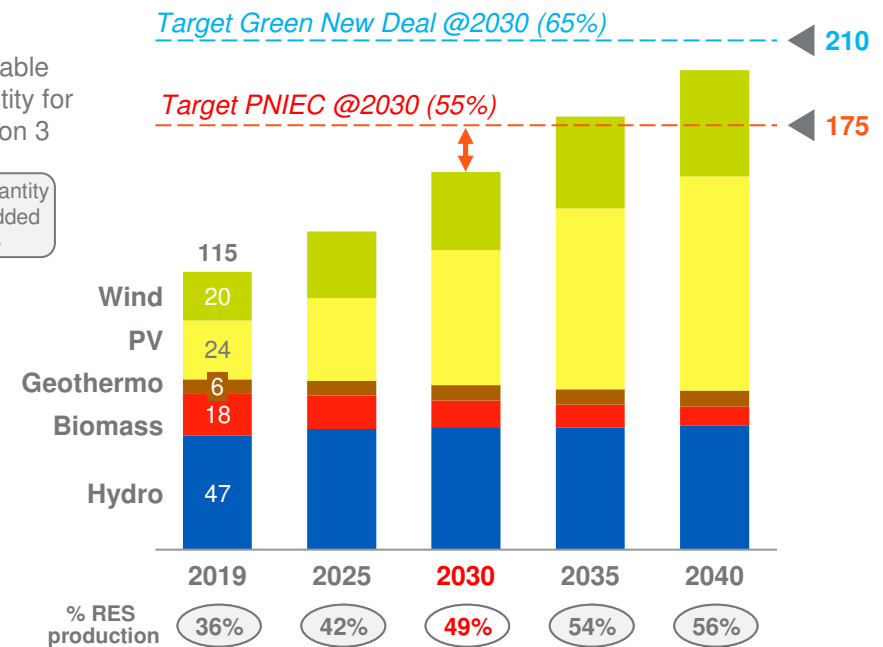
RES DEVELOPMENT POTENTIALLY 5 YEARS LATE

VS. PNIEC TARGETS

Awarded RES capacity (MW)



RES production at current dev. pace (TWh)

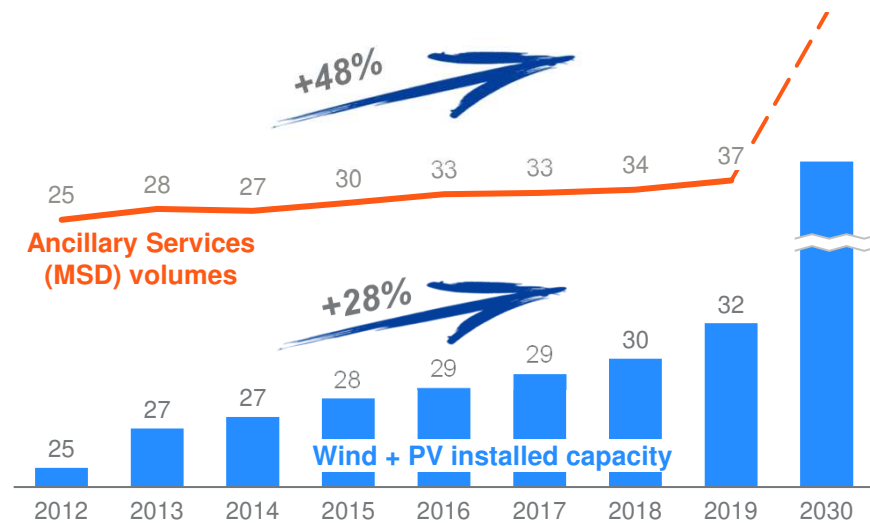


Difficult to access the auctions due to authorization issues
With the current deployment pace Italy risks to miss 2030 RES targets

IMPACTS OF RES GROW ON ENERGY SYSTEM

CCGTs AND POWER STORAGE ROLE

Ancillary Services volumes (TWh) and RES capacity (GW)

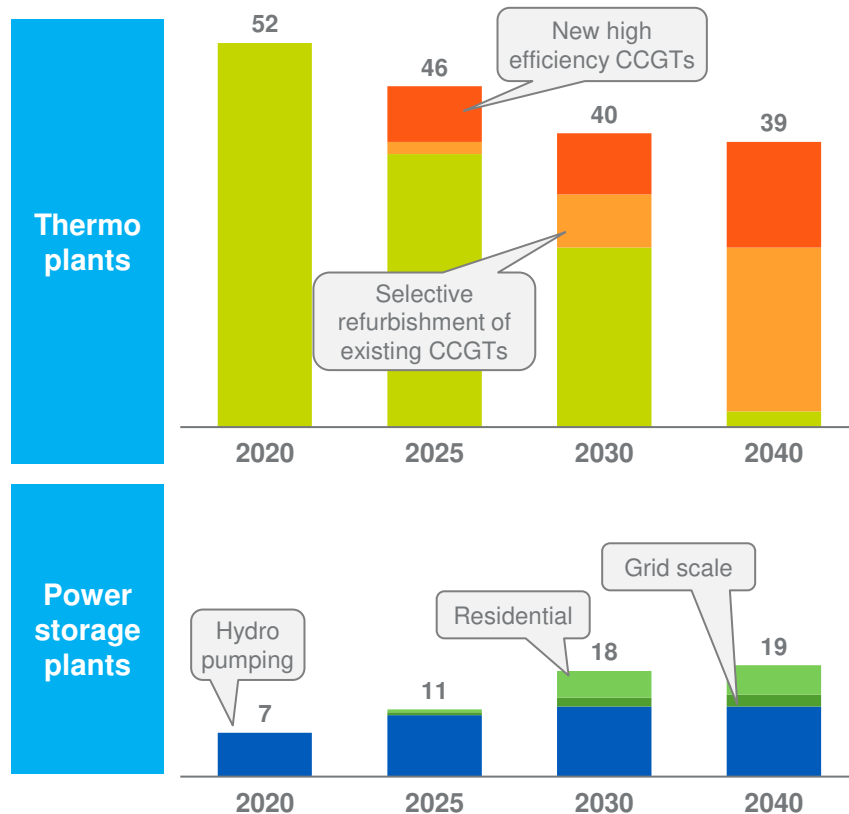


- With the increase of PV and wind capacity, **Day Ahead volumes** (MGP) of **CCGTs** will be reduced mainly during daily hours and increased during ramp and evening hours
- Nevertheless, **CCGT plants remain essential** to provide **system adequacy** (peak load coverage)
- With the increase of variability due to RES production, **Ancillary Services** (MSD) provided by CCGTs **have grown** over time, to compensate non-programmable generation
 - Batteries may be needed for fast reserve
- To reduce PV overgeneration, **hydro pumping plants and Demand Side Management** (including H2?) will be needed (time shift services)

CCGTs essential in the long term to provide flexibility and adequacy
Hydro storage and Demand Side Management to reduce overgeneration

EVOLUTION OF ITALIAN FLEXIBLE CAPACITY

GW



- **H-class CCGTs**: shift to **high efficiency CCGT**
 - Capacity Market key to give the proper market signals
- **Hydro pumping**: development only with incentive (4.5 GW of new pumping plants @2030)
 - Remuneration mechanism yet to be defined
- **Grid scale batteries**: limited development, only in critical areas (1.5 GW @2030)
 - e.g. provide **fast regulation services** (Terna pilot)
- **Residential batteries**: large development associated with PV rooftop (4.5 GW @2030)
 - **self-consumption** increase (electrification)
- **V2G and Demand Response**: still a question mark

GAS ROLE ALONG ENERGY TRANSITION PATH

Support RES development, addressing system needs

- **Adequacy and flexibility**: provide to the system programmable power generation capacity (high efficiency CCGTs)
- Allow to cope with **RES development delays or accelerations**

Displace more polluting fuels

- Enable **coal phase-out**
- Use of **Small Scale LNG for heavy and maritime transports**: reduce CO2 and other pollutant footprint

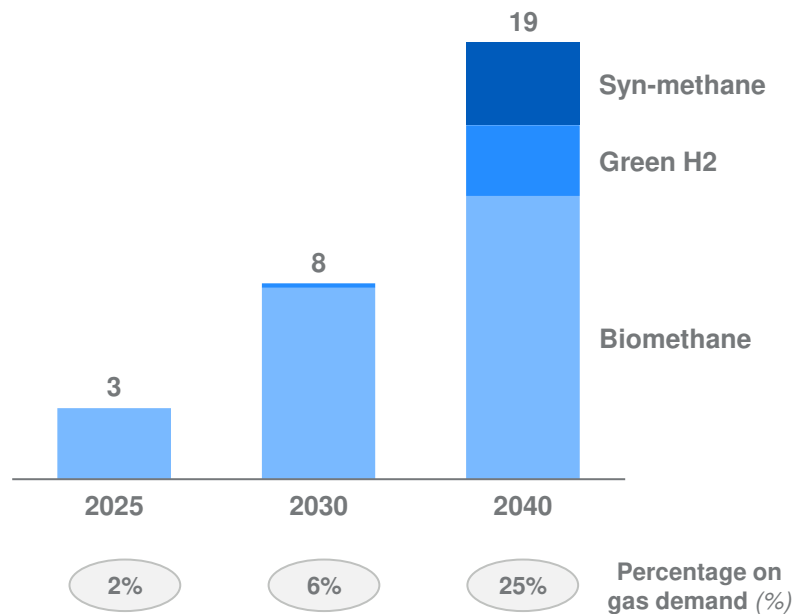
Direct support to decarbonation through Green Gasses

- Support to **decarbonation of industrial energy intensive uses** that may not be electrified with Green Hydrogen and bio-methane
- Support **sustainable mobility** with bio-CNG, bio-LNG and Green H2

THE GREEN GAS CHALLENGES

ILLUSTRATIVE PROJECTIONS

Italian Green Gas potential by type¹ (Bcm)



- **Bio-methane/LNG:** "CO2 neutral" methane
 - **Incentives** to foster bio-methane/LNG production from **organic waste** and **agricultural waste** till 2022-2023
 - >50% market potential to come from dedicated agro monocrop, not incentivized and potentially conflicting with food agricultural activities
- **Green Hydrogen:** H2 produced with RES power
 - Need for large additional **RES investments** (in the range of 2x PNIEC targets) in competition with electricity decarbonation efforts
 - Need to develop a supply chain for **electrolyzes** and benefit from economies of scale



Thank you!