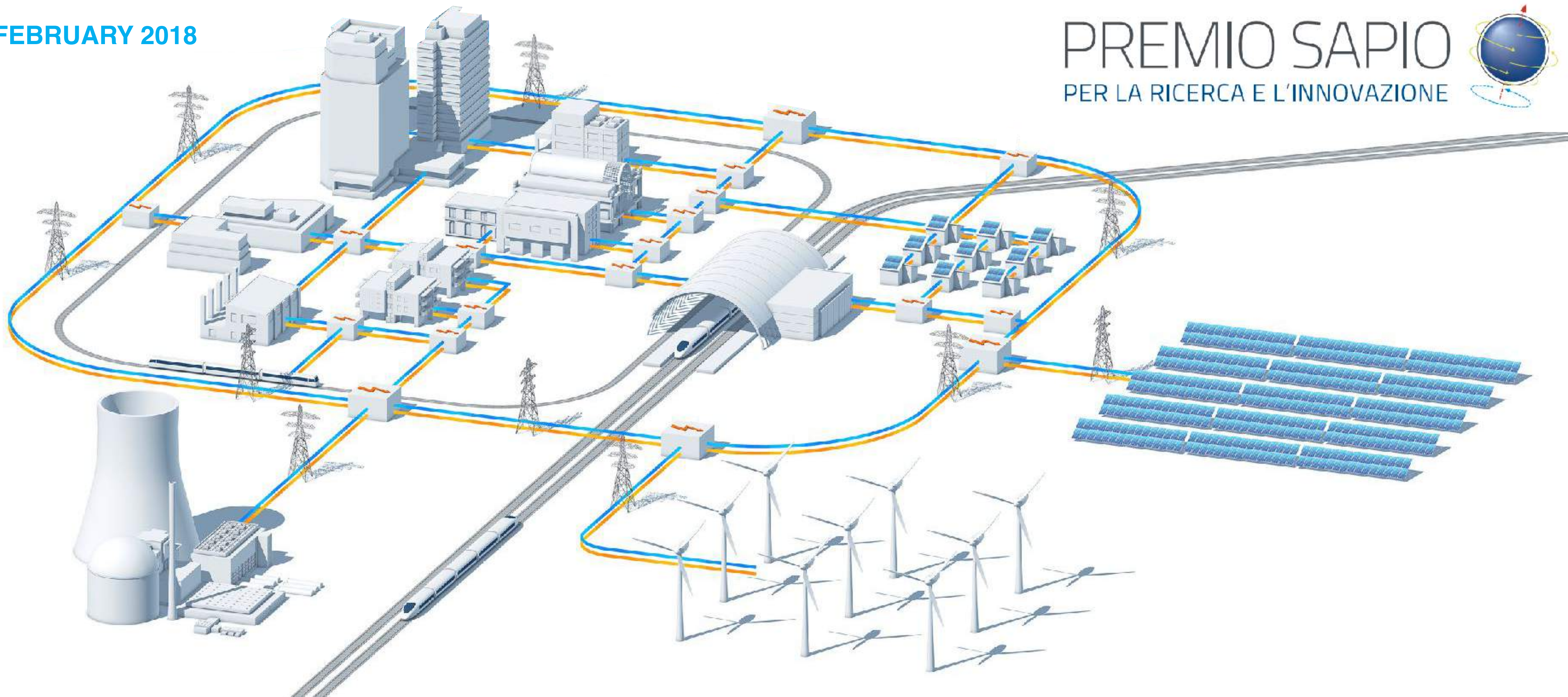
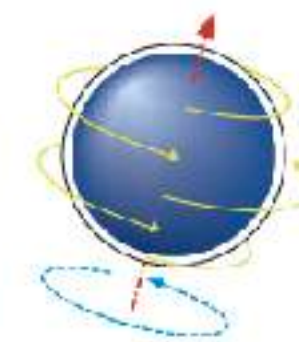


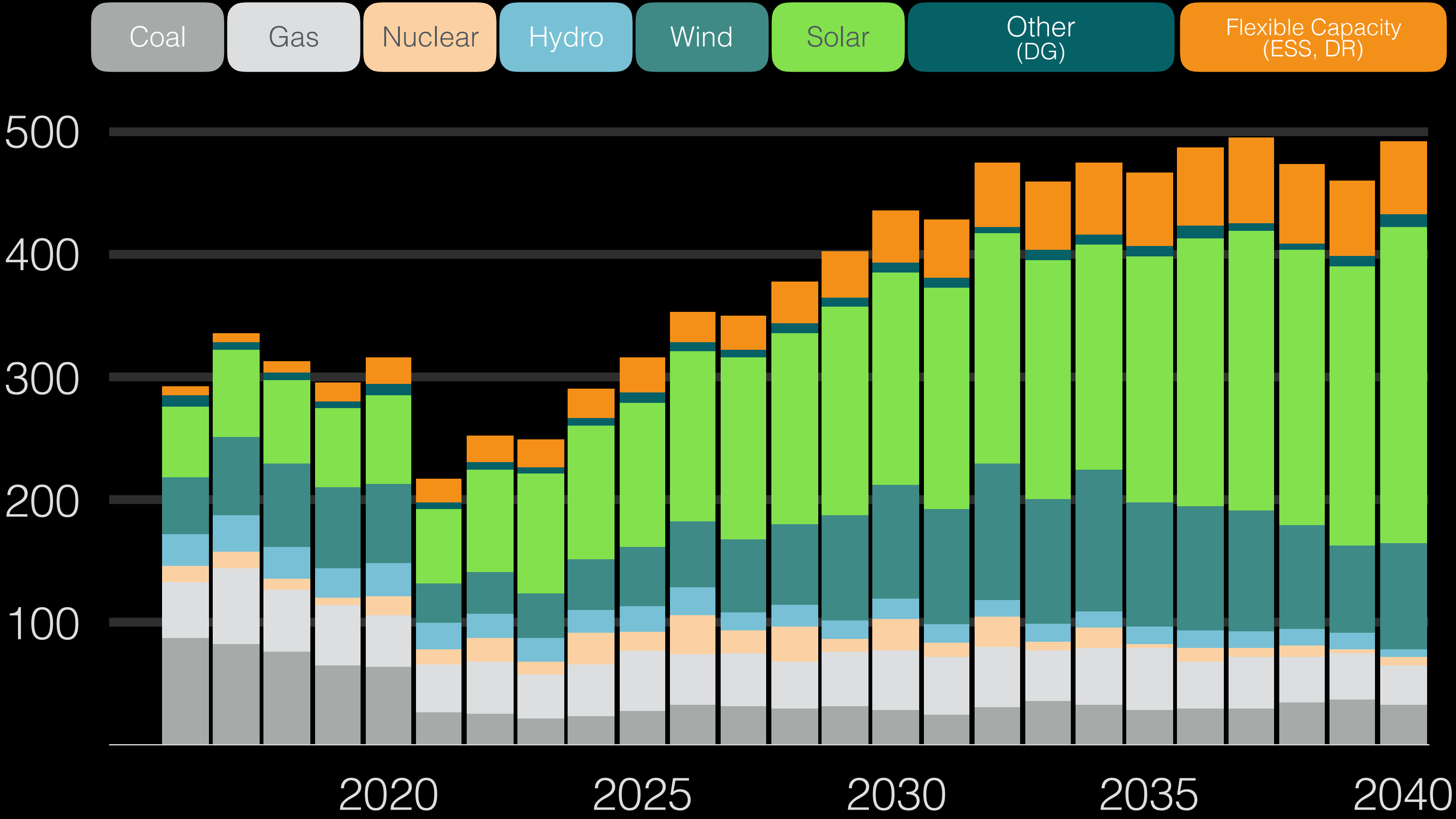
27 FEBRUARY 2018

PREMIO SAPIO
PER LA RICERCA E L'INNOVAZIONE

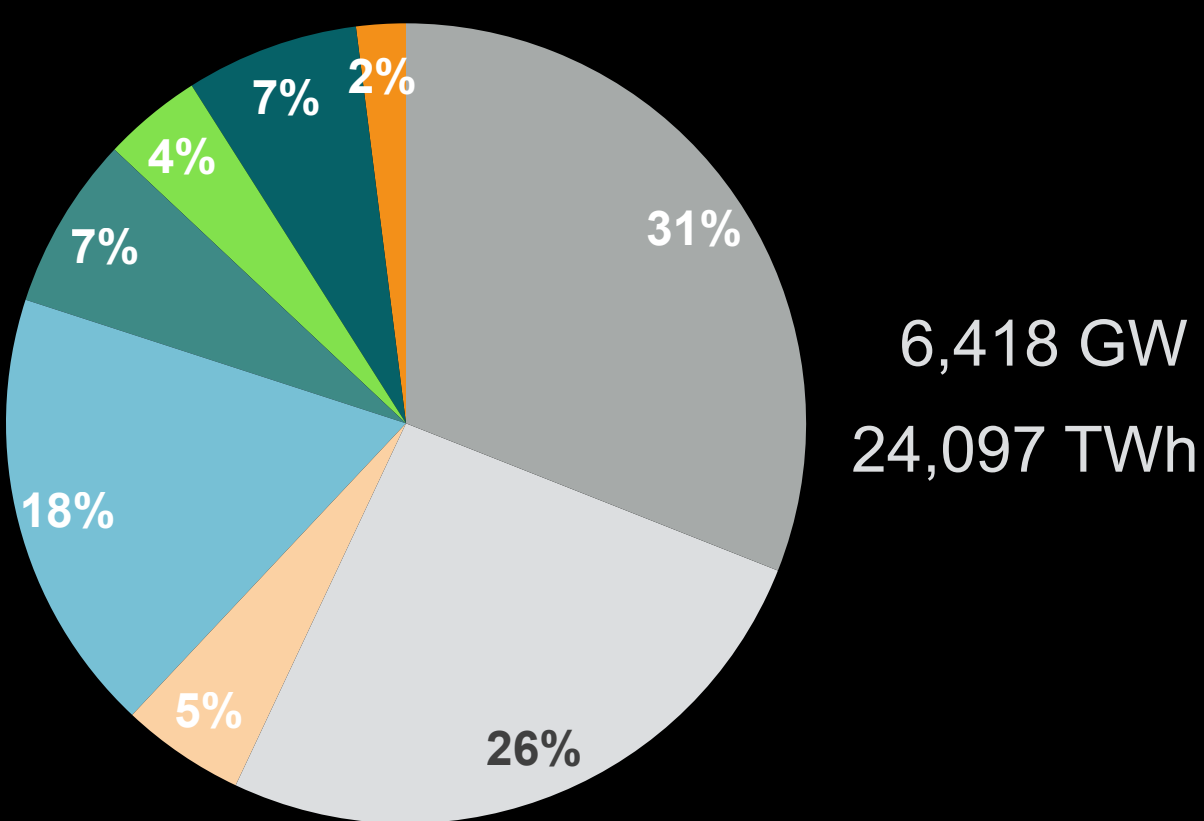


I sistemi di accumulo, necessari a stabilizzare la fornitura di energia da fonti rinnovabili. I driver della competitività nel mercato energetico

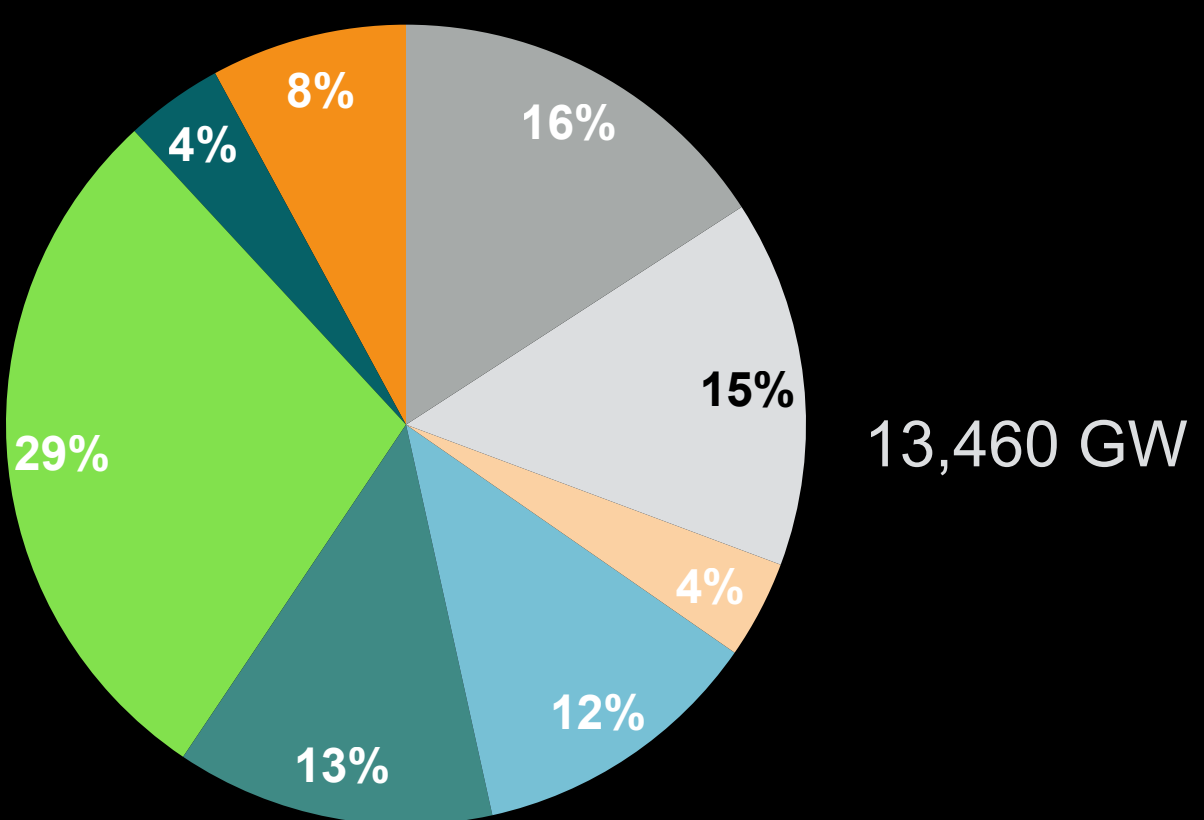
Gross annual capacity additions 2016-40, by Technology (GW)



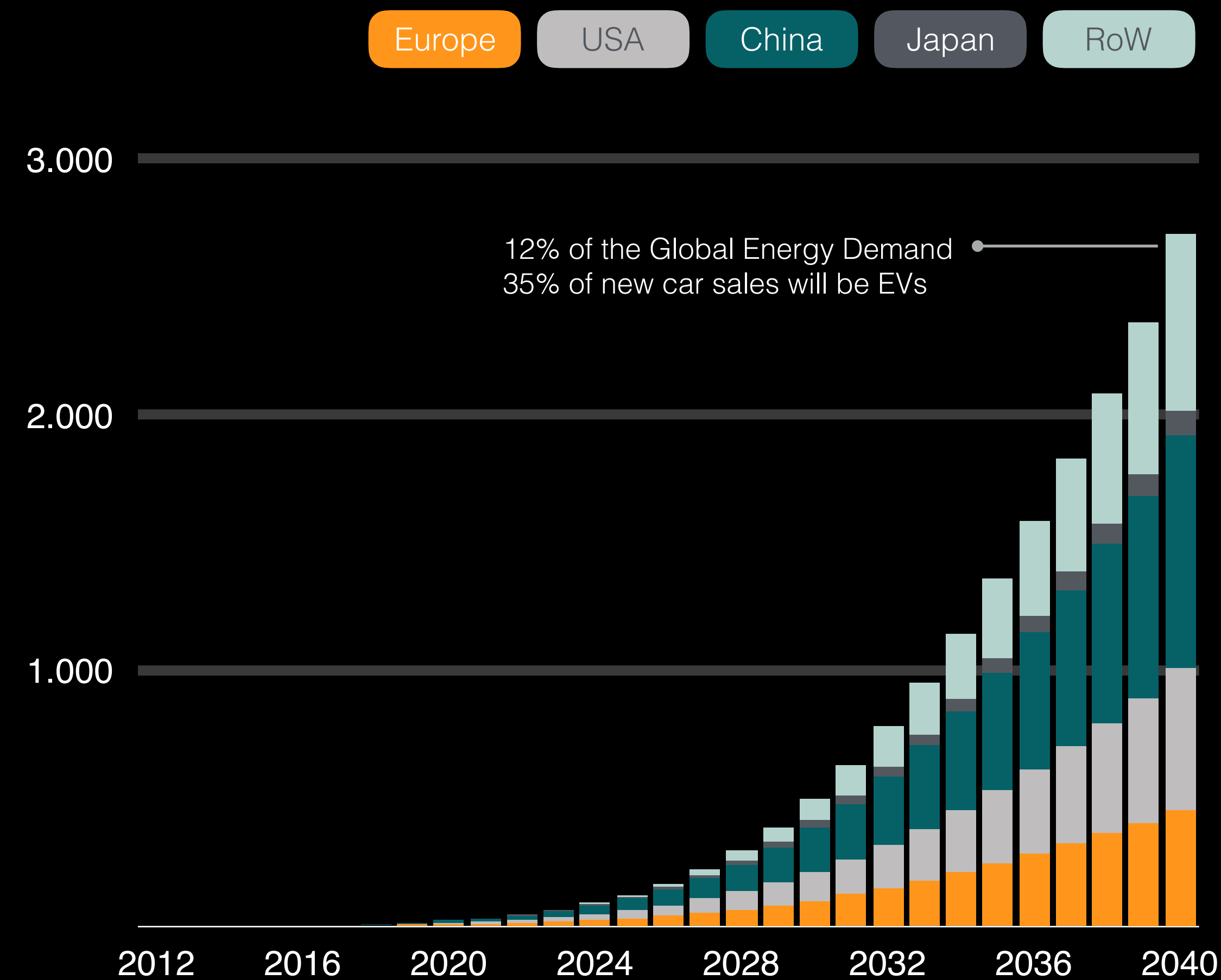
Power Mix
2015



Power Mix
2040



Electrical Vehicles: wrong myths and real challenges



EVs Electricity Demand by Region (TWh)

Source: bnef.com

Assumptions:

38mln	Italian cars fleet
3.8mln	Enel/Ambrosetti expects 2 to 9mln EVs by 2030
15kW	Meter to charge EV city-car in 2h
55GW	Additional Peak Power at 10% penetration
60%	EVs sales growth 2015. Like 1909-1916





EU **CHALLENGES**

- Decarbonization
- Market Efficiency
- Security of Supply

SECTOR **TRENDS**





- Intermittent RES increase
- Thermal phase-out
- Technological development
- Energy efficiency

SYSTEM **NEEDS**

- Flexibility: RES integration
- Security: of the whole supply
- Adequacy: at system level

At the lowest cost with the highest quality

European Guidelines and 2030 targets
are devoted to safety, affordability and lower
environmental impact of the Energy supply.
Electrical vector plays a pivotal role

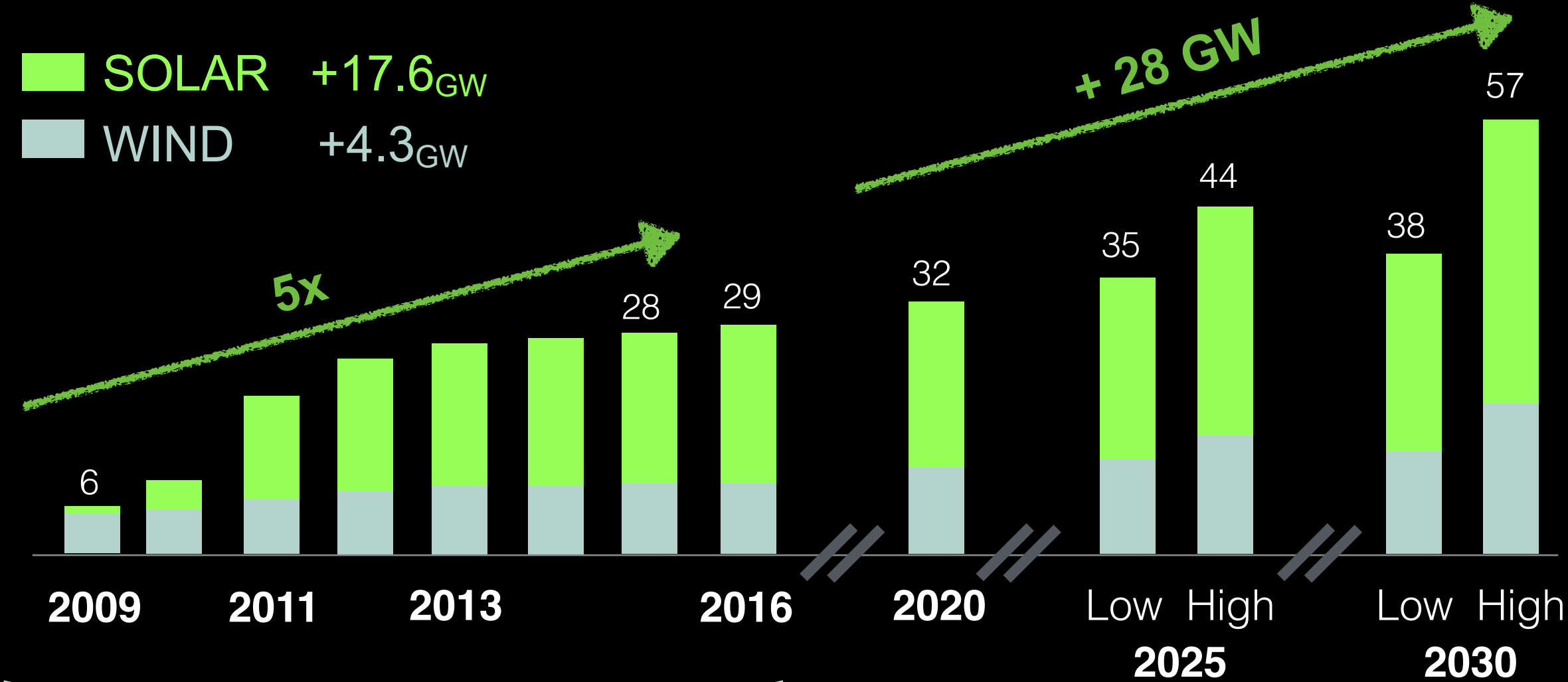
<div> Guidelines</div>	Decarbonization			2020 EU 20-20-20		2030 The energy bridge
	Market Efficiency					
	Security of Supply					
	Greenhouse gases reduction			- 20%	- 13% ¹	- 40%
	RES penetration (<i>energy</i>) ²			≥20%	≥17%	27%
Energy Efficiency (<i>vs BAU scenario</i>)			+ 20%	+ 20%	+30% ³	
Interconnection (<i>vs. installed capacity</i>)			≥ 10% ⁴	≥ 10% ⁴	≥ 15% ⁵	

1. Italian target set by ESD (Effort Sharing Decision)
2. RES % over gross energy consumption (transports + electricity + heating & cooling)
3. EC Winter Energy Package proposal (preceding target 27%)
4. "Barcelona criterion" European Council 2002 held in Barcelona
5. Single Member State target, under assessment by the EC

The Italian showcase

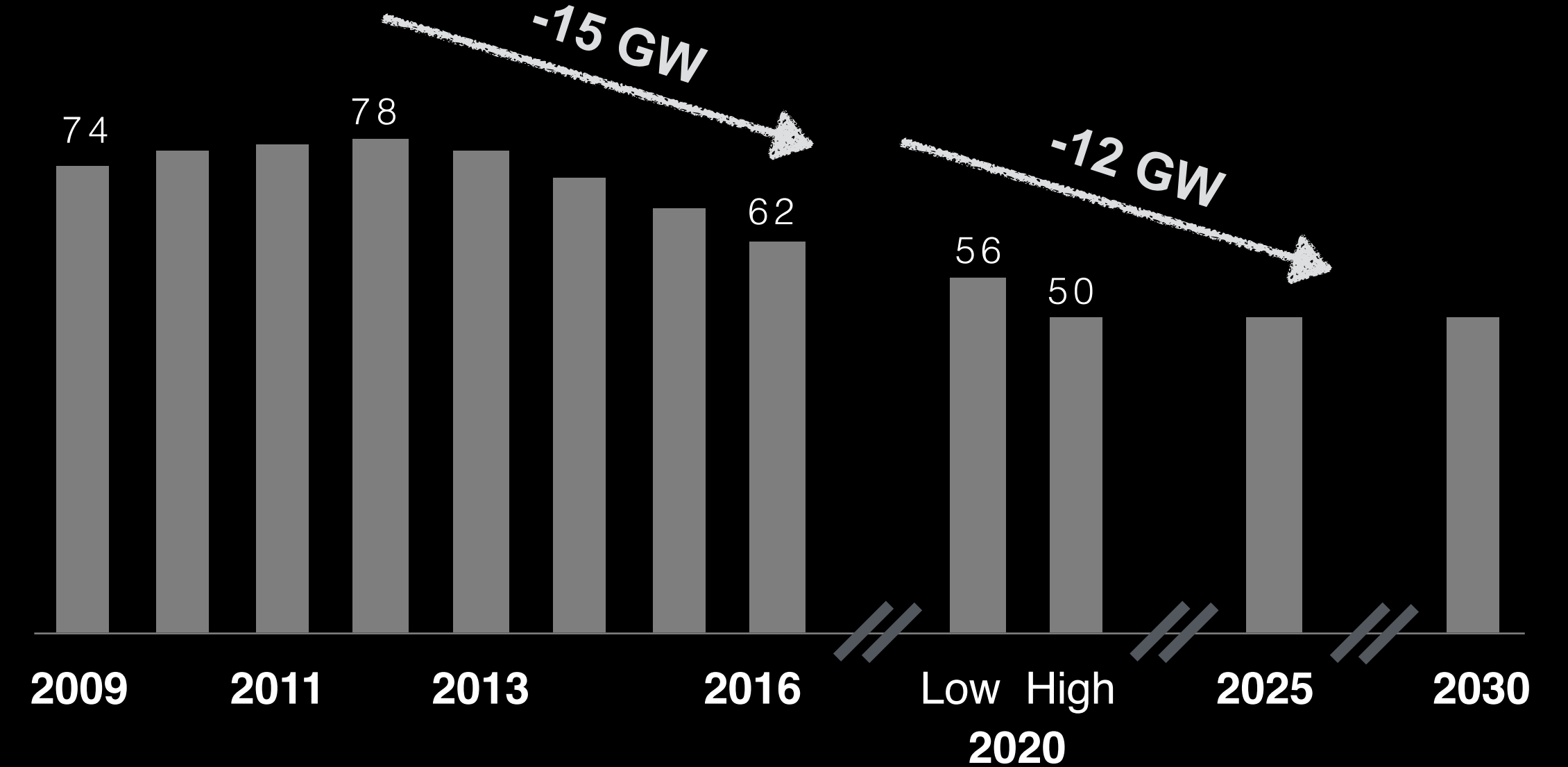
RES GROWTH (GW)

2009 TO DATE TOMORROW



THERMAL PHASE OUT (GW)

2009 TO DATE TOMORROW



87%

21 MAY
3:00pm

Hourly

60%

21 MAY

Daily

39%

MAY

Monthly

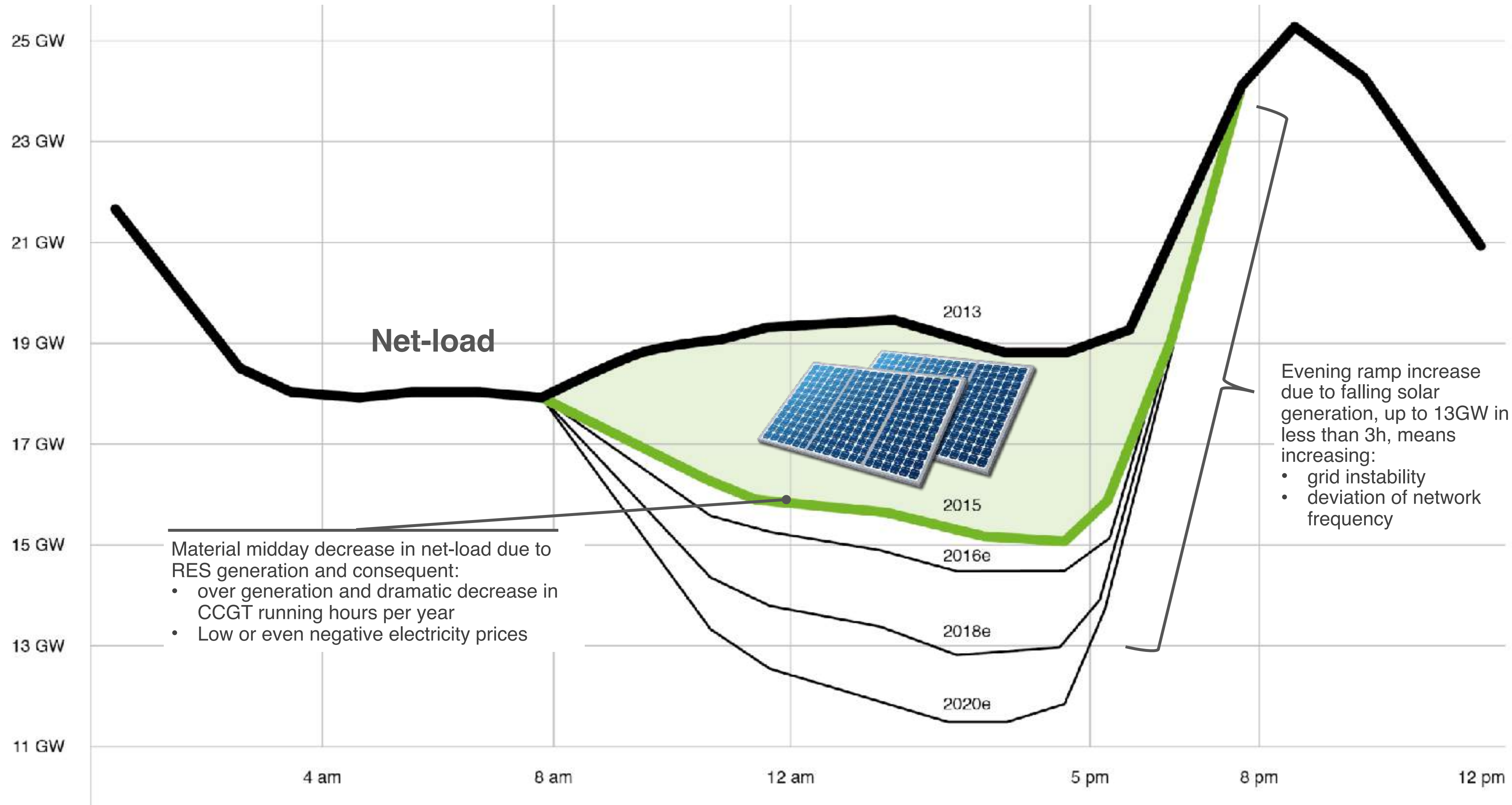
26% of the European storage installed capacity has been developed by Terna in Italy

RES load coverage H1 2017

Source: Terna estimates for Italian Electricity Market, 27 September 2017

SEN3 Targets 50% require further deployments of 51GW solar and 17GW wind

Net Load in RES penetrated countries: ancillary services will blow-up



nationalgrid | UK

20£/MW per hour of availability



26 August 2016

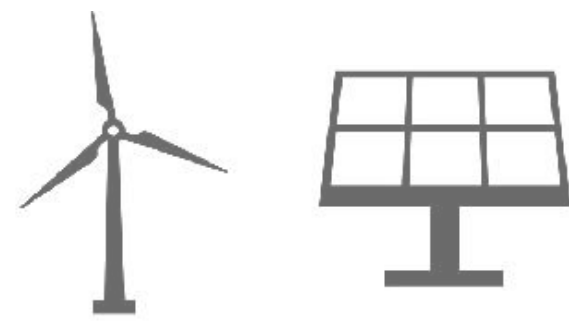
7-11£/MW per hour of availability

* **Net Load** means the difference between the forecasted load and expected electricity production from RES. The Graph shows the net-load in a typical March day in California



The Group's mission is to **unlock the energy transition**, by mastering the intermittency of renewable energy sources.
Being pioneer of **Hybrid Storage Solutions** that enable intermittent **renewable** sources to be **transformed into a stable power source**.
And **enabling renewables to power society**: reliably, affordably and sustainably.

COMMODITIES



Renewable Sources



Generators and Power Plants



Battery Pack



HyESS®
Hybrid Energy Storage System

24/7 stable power supply



Energy Storage Systems



Microgrids



ENERGY MANAGEMENT SYSTEM (EMS)

Pool Algorithms & Black Start



BATTERY MANAGEMENT SYSTEM (BMS)

For all battery chemistries



HYDROGEN MANAGEMENT SYSTEM

Power2Power for long term storage without fossil fuels



SMART INVERTER

Instant RPPT/MPPT for unique microgrid performance



POWER CONVERSION SYSTEM (PCS)

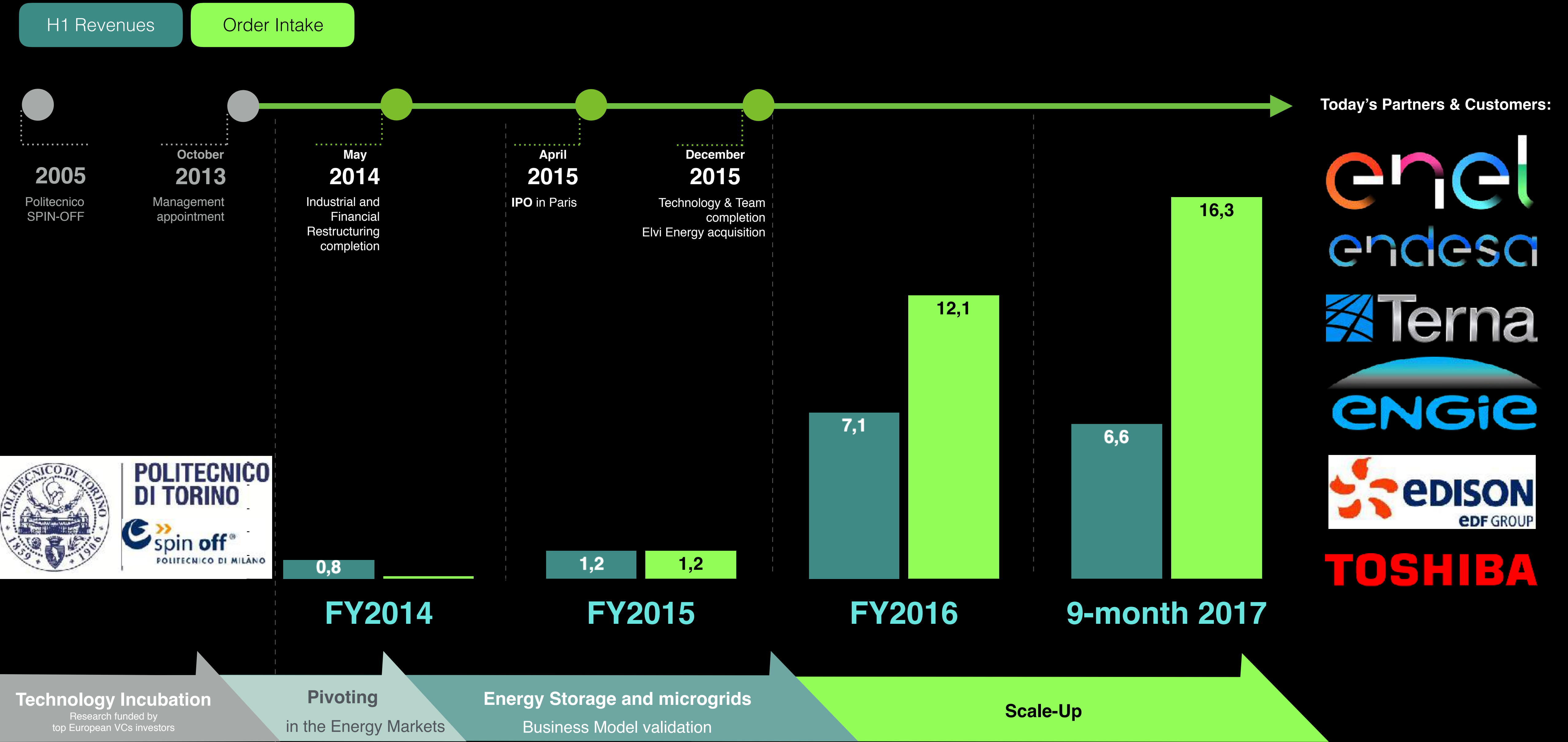
Synthetic Inertia
DROOP Control and Statism



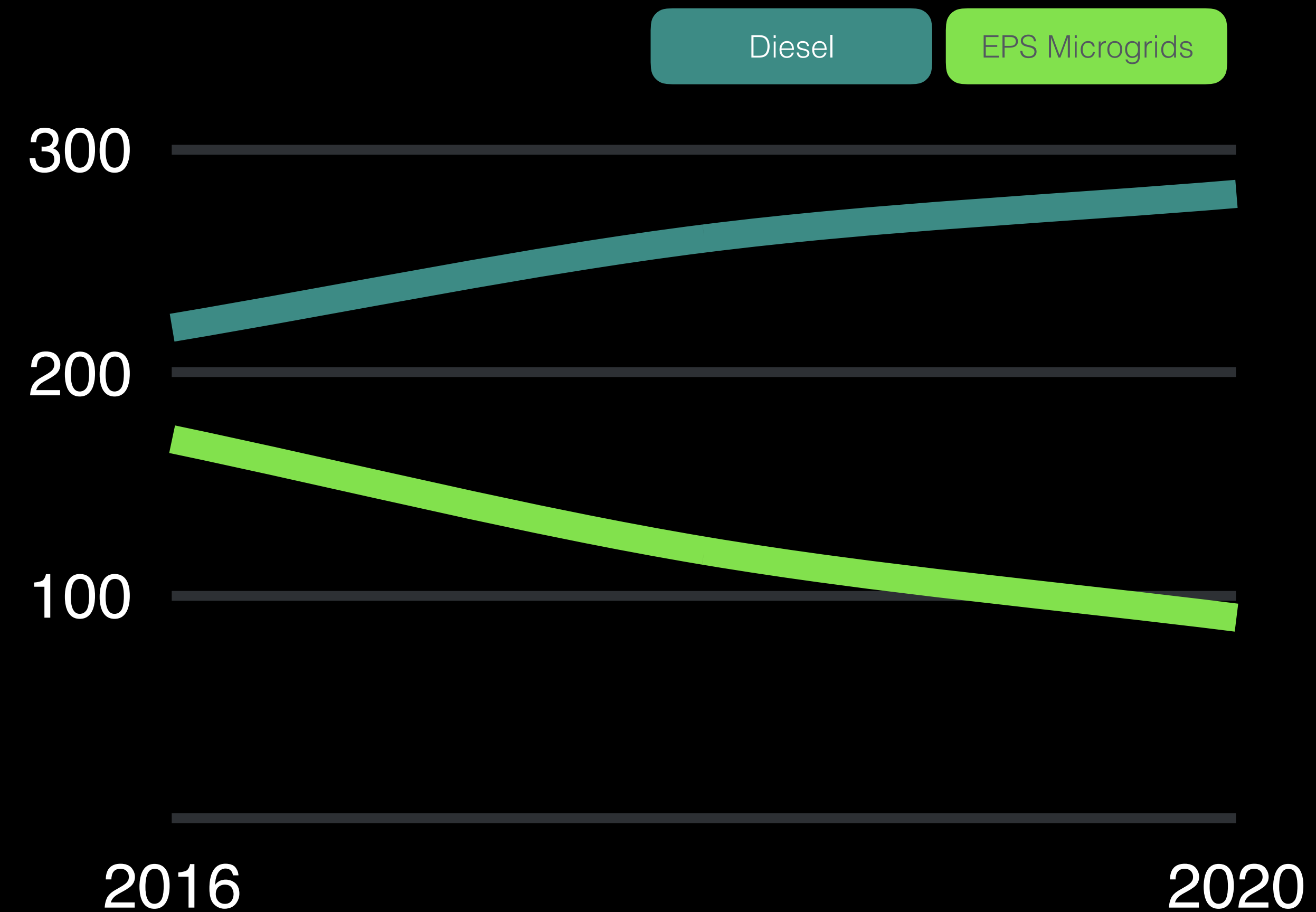
SCADA and AI

Cloud based DERs, Cybersecurity and Predictive Maintenance

Our growth in a nutshell: a transformation strategy

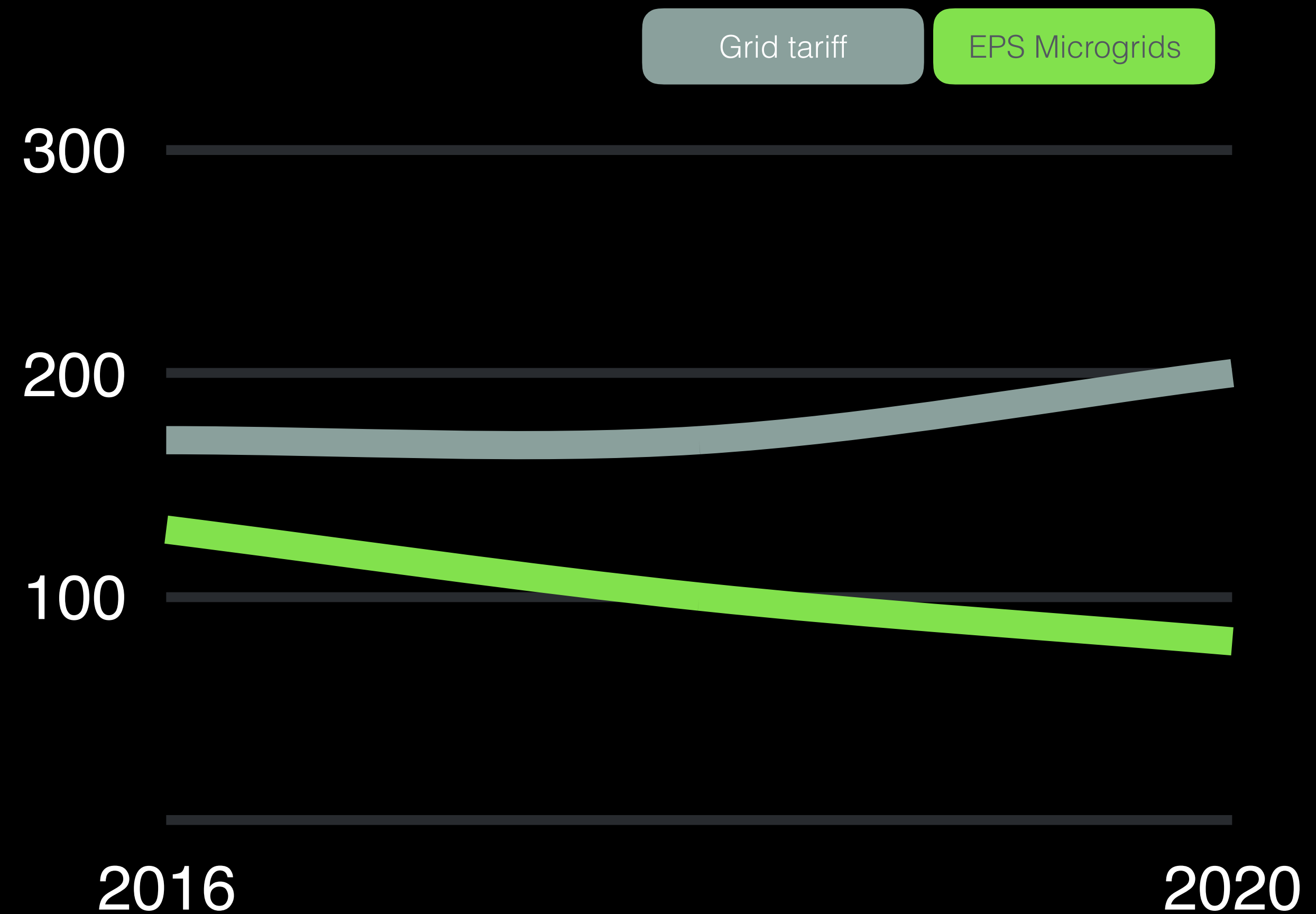


Solid Business Case



Evolution of Power Generation cost (\$/MWh) in emerging countries to 2020

Source: EPS analysis and Diesel LCOE based on bnef.com and a fuel cost of 0.75\$/liter



Evolution of electricity tariffs (\$/MWh) in developed economies to 2020

Source: EPS analysis based on bnef.com, C&I electricity price in Italy and irradiation data related to center-south Italy



POWERING 165,000 PEOPLE EVERYDAY
AT A LOWER COST, IN A CLEAN WAY, AROUND-THE-CLOCK

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