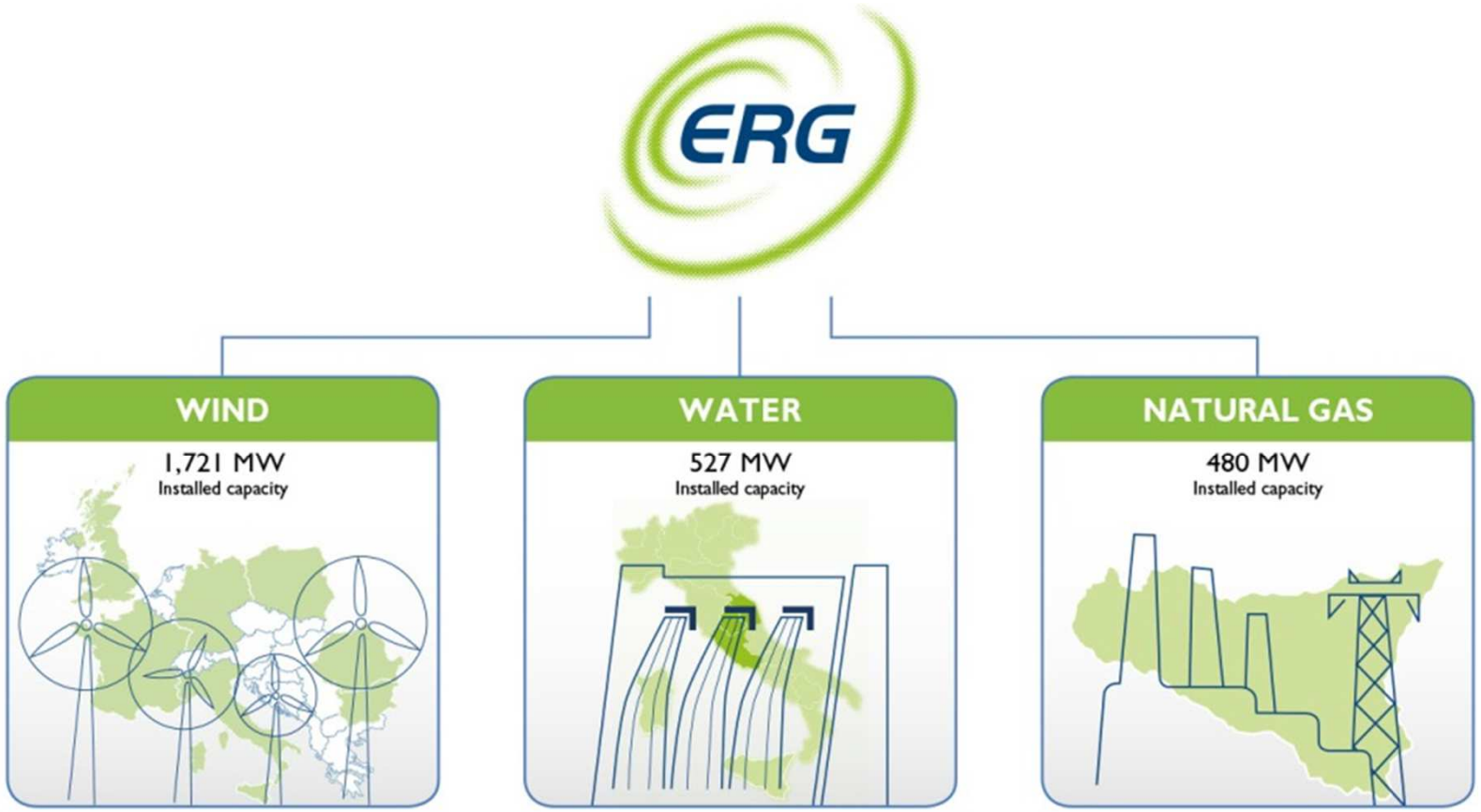
Sviluppo delle fonti rinnovabili: opzioni di crescita e nuove sfide

Paolo Barabucci – Business Development

Group Overview
Portfolio

ERG has been operating successfully in the energy sector for almost 80 years and is currently active in the production of power from wind, water and natural gas

ERG is the leading wind power operator in Italy and amongst the main players in Europe

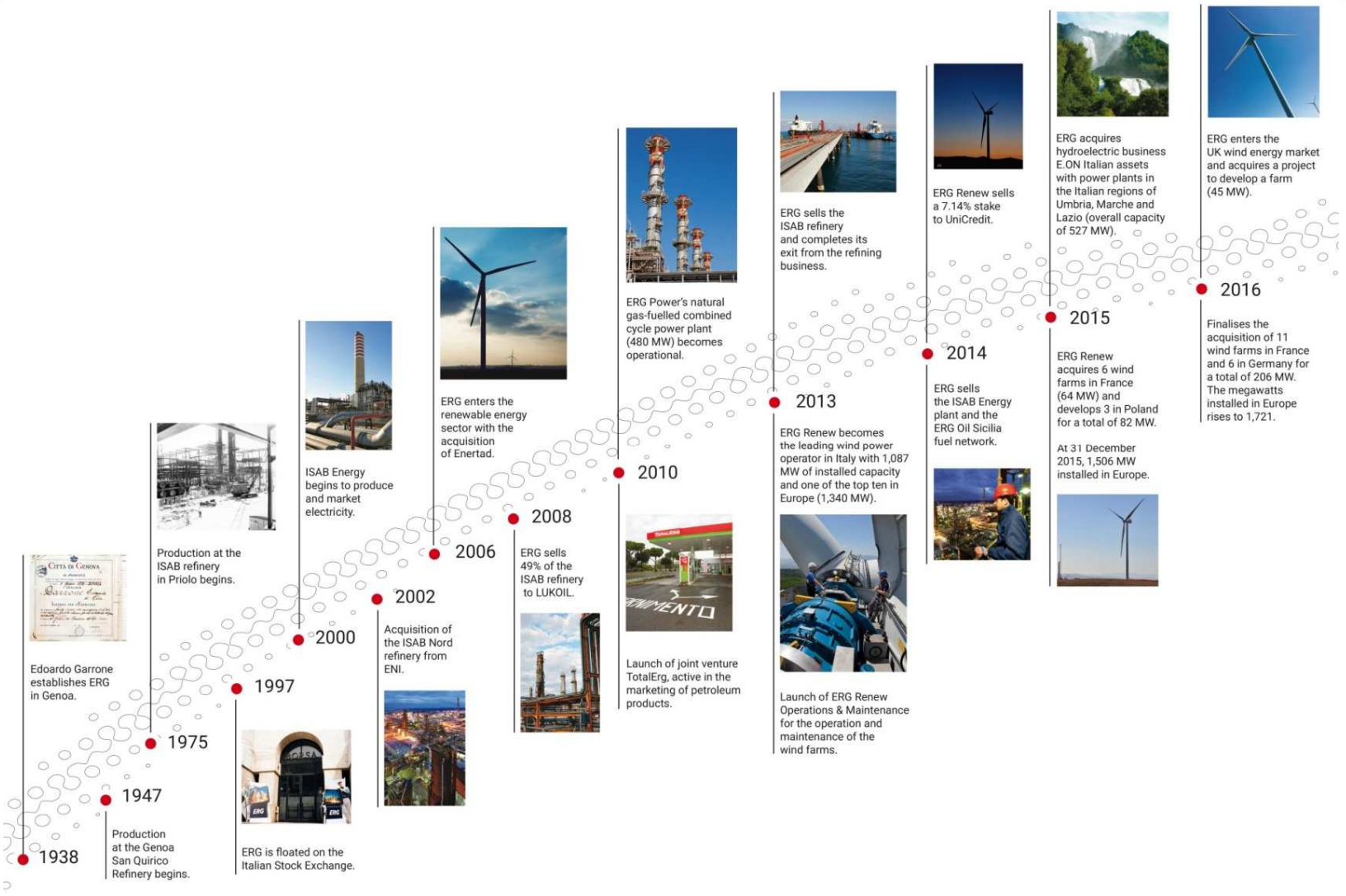


Group Overview

History and Evolution

Throughout its 70 year history, ERG has kept pace and reacted to changes with speed and flexibility, **exiting its original core business (refining sector) and investing in the wind sector**

With 1.7 GW owned and operated over 6 European countries, ERG is now among the 10 largest wind onshore players in Europe



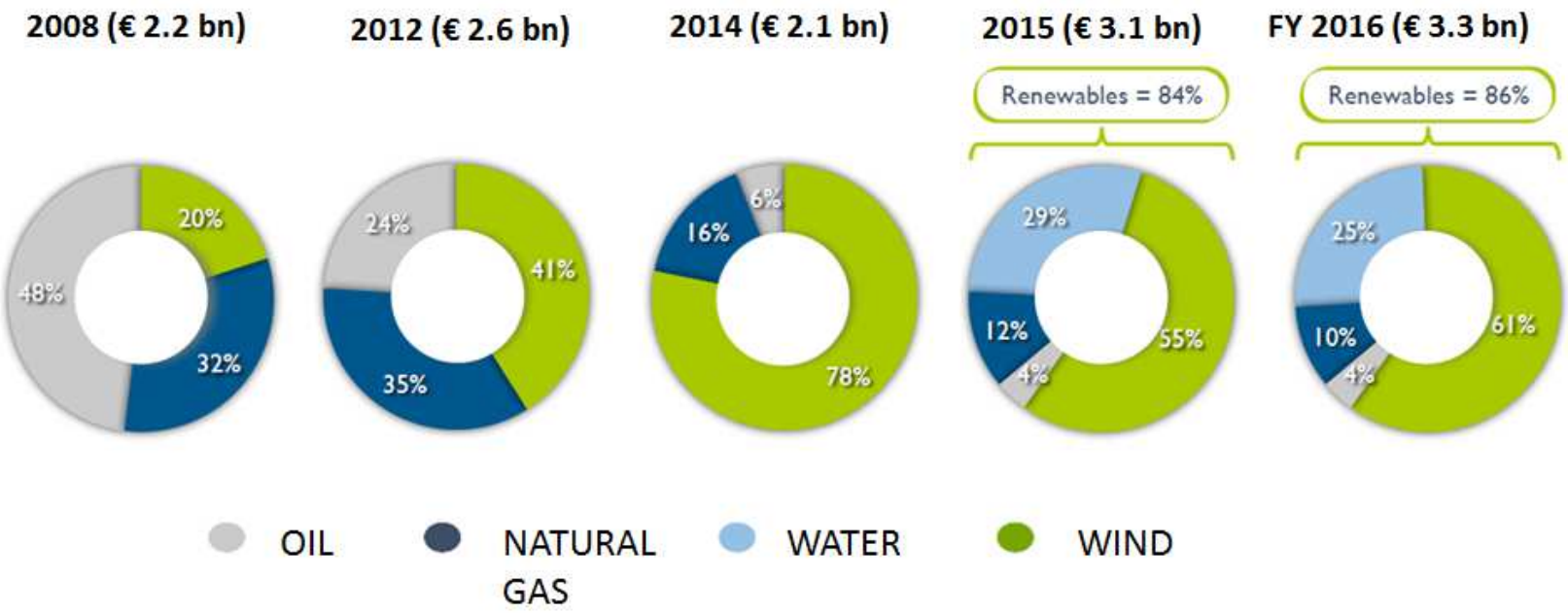
Group Overview

Invested Capital Evolution

Portfolio re-allocation through M&A deals and organic development with the purpose to move from oil to renewables

Definition of a new risk profile with different cost of capital and cask flow generation

Switch from a business influenced by market dynamics to a regulated one

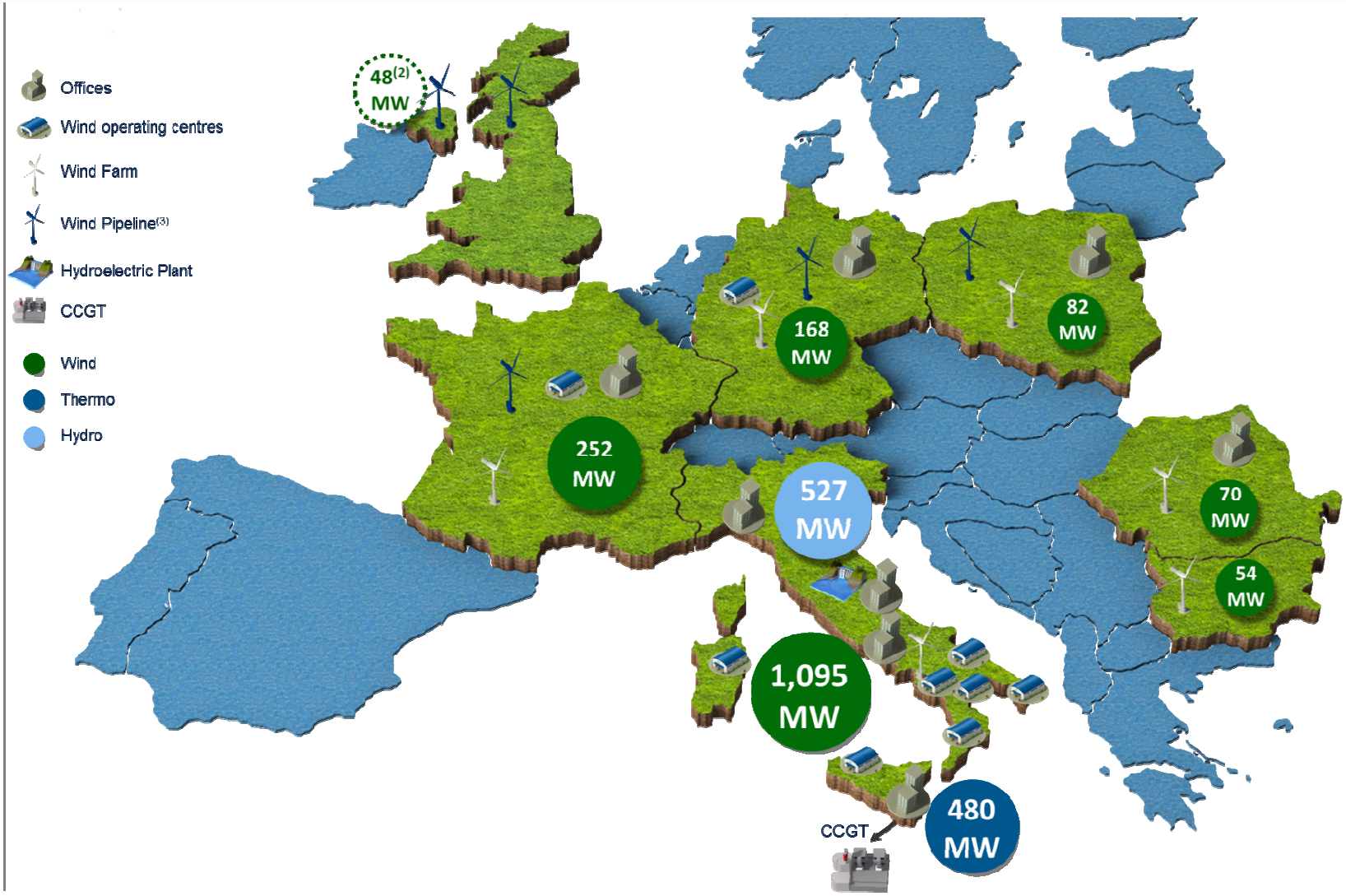


Group Overview
Wind business

With an operating capacity of c. 1.7GW ERG is a leading operator in the onshore wind power industry in Italy (#1) and in Europe (#9, one of the only two players which is not an utility)

Over the last five years the company implemented a focused growth strategy based on a mix of acquisitions and green-field developments both in the domestic market and outside Italy

Business strategy aimed at pursuing strong international growth, in Western as well in Eastern Europe



(1) Brockaghboy wind farm, currently under construction
(2) Current pipeline for about 300 MW under development in the UK, Germany, France and Poland

Agenda

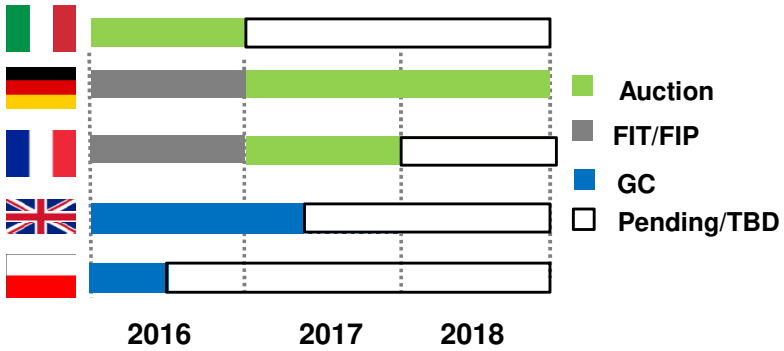
- Introduction
- Group Overview
- Economics
- Business Case
  - Repowering
  - O&M

Economics
Regulatory Framework

Incentive scheme under revision in all targeted Countries with passage from Feed in Tariff scheme to Auction System (for new projects)

Only Germany today has a clear and visible scheme, with France involved in a transition not yet well defined

UK and Poland experiencing hostile situation against wind development

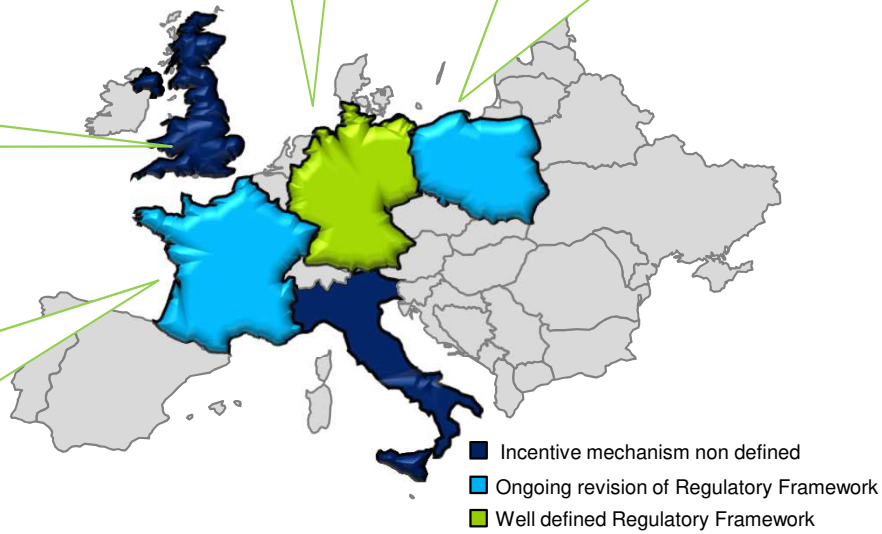


- Framework Agreement approved and defined (EEG 2017) with clear definition of Auction System

- New Framework Agreement defining the passage from GC scheme to Auction System against the development of wind farms installation
- «Distance Law» and» Property Tax» deeply affecting both new projects and existing ones

- For new installations developed after June 2015 no incentive mechanism is defined

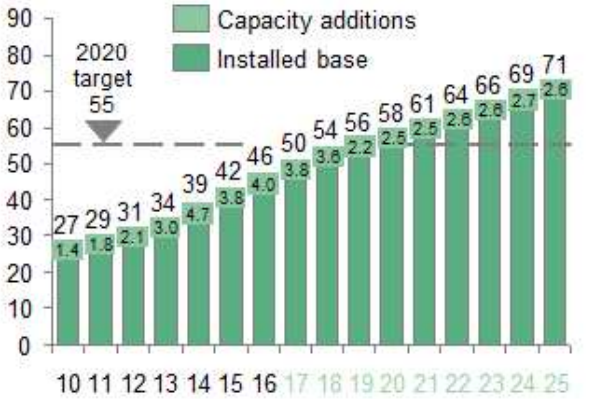
- Framework Agreement for the new plants not approved and under discussion
- Expected passage from FIT to Auction System with transition period with FIP
- Not yet clear if Auction System will apply for wind farms below 6 turbines



Economics

Regulatory Framework

Market potential



Drivers

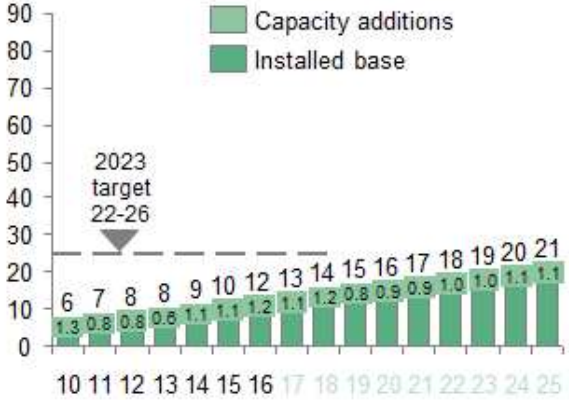
- Predictable regulatory framework
- Limited social resistance through broad ownership

Obstacles

- Highly fragmented ownership
- Feed in level expected to come down through auctions

Market curtailed at 2.8GW but sustained by a clearly defined incentive scheme

Market potential



Drivers

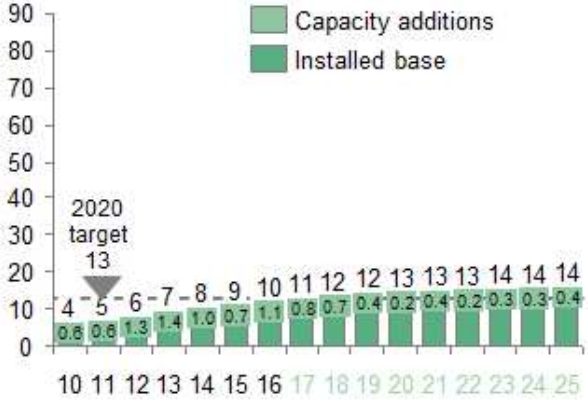
- Country lagging behind 2023 targets
- Current favorable regulatory environment

Obstacles

- Uncertain transition to auction
- Complicated permitting process and bottleneck in project authorization

Growth needed to reach 2023 target, but regulation environment still unclear

Market potential



Drivers

- Good wind sites with low LCOE
- Merchant price level may rise with delays in new generation assets (CCGT and nuclear)

Obstacles

- ROC scheme halted
- Political aversion in England

Little growth expected in absence of incentives

Source: IRENA, MAKE, BCG analysis

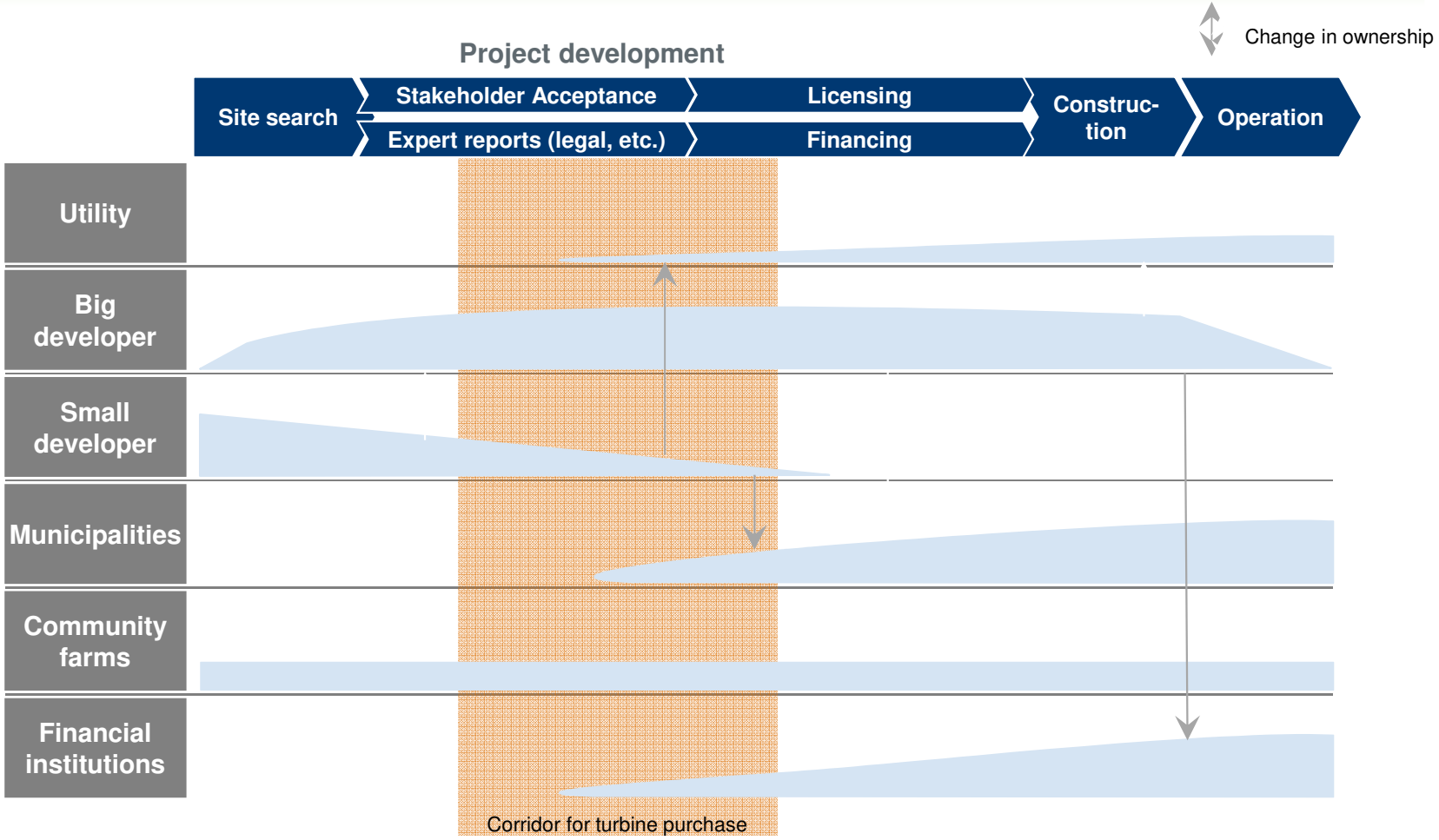
Economics
Business Model

Different business models available in the market with main difference between Developer, Utility, IPP and Financial Institutions

Developers with strong relations with local communities and with a business model consisting in selling assets during /at the end of project development

Utilities and IPP not vertically integrated and mainly focus on construction, operations and maintenance

Financial Institutions only active in acquisition of asset in operation



Economics

Technology upgrade: LCOE

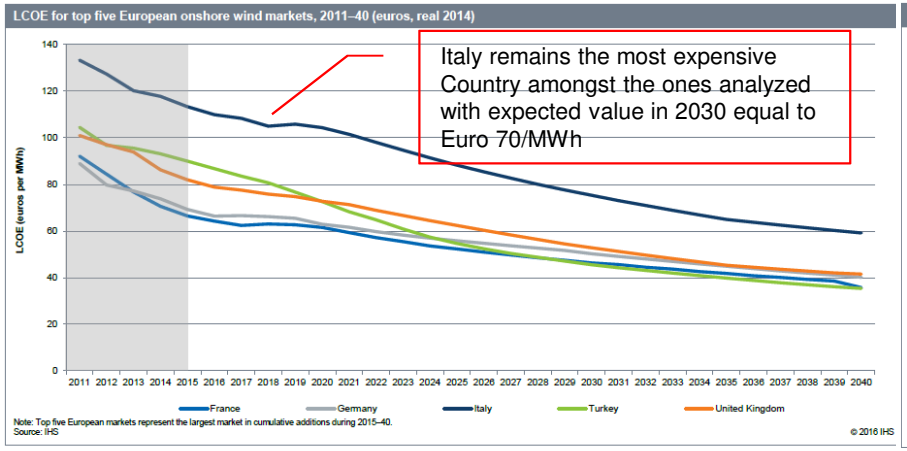
C

B

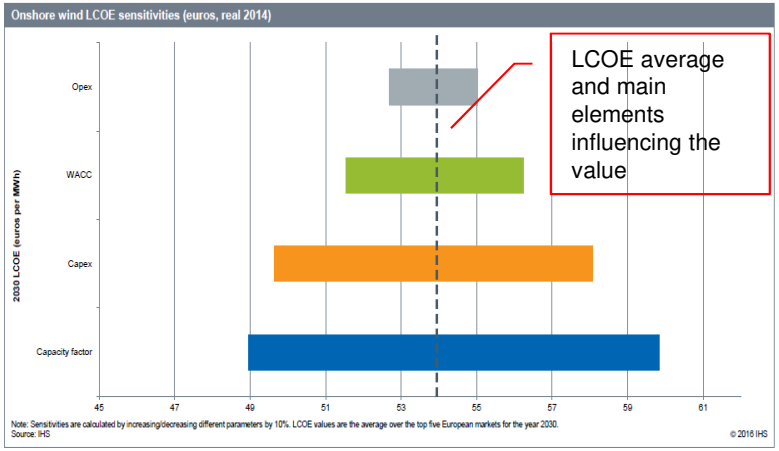
A

A

LCOE Wind Onshore – Source: IHS Analisys September 2016



Italy will continue to be the most expensive country for onshore wind among the featured markets. The LCOE for the remaining markets will stay close, between €65/MWh and €90/MWh in 2015 and between €36/MWh and 42/MWh in 2040.



Similar to offshore wind, capacity factors and capex have the greatest impact on the cost of wind, as a 10% change to each of these variables could decrease the LCOE by about 10%.

Note: CAPEX contain WTG, installation, connection, development costs and BOP

- Average LCOE 2015 (excluding Italy): **74 Euro/MWh**
- Average LCOE expected in 2040 (excluding Italy): **40 Euro/MWh**. Decrease mainly due to **(i) increase in the Load Factor and (ii) CAPEX reduction**

METHODOLOGY

- Cash Flow model with estimation of the following costs: WTG, BOP, OPEX, financials costs and taxes – WACC equal to 6,5%
- CAPEX estimation through a «specific learning rates» calculated for each Country from historical values
- Project Duration: 20 years
- Leverage: 70/30

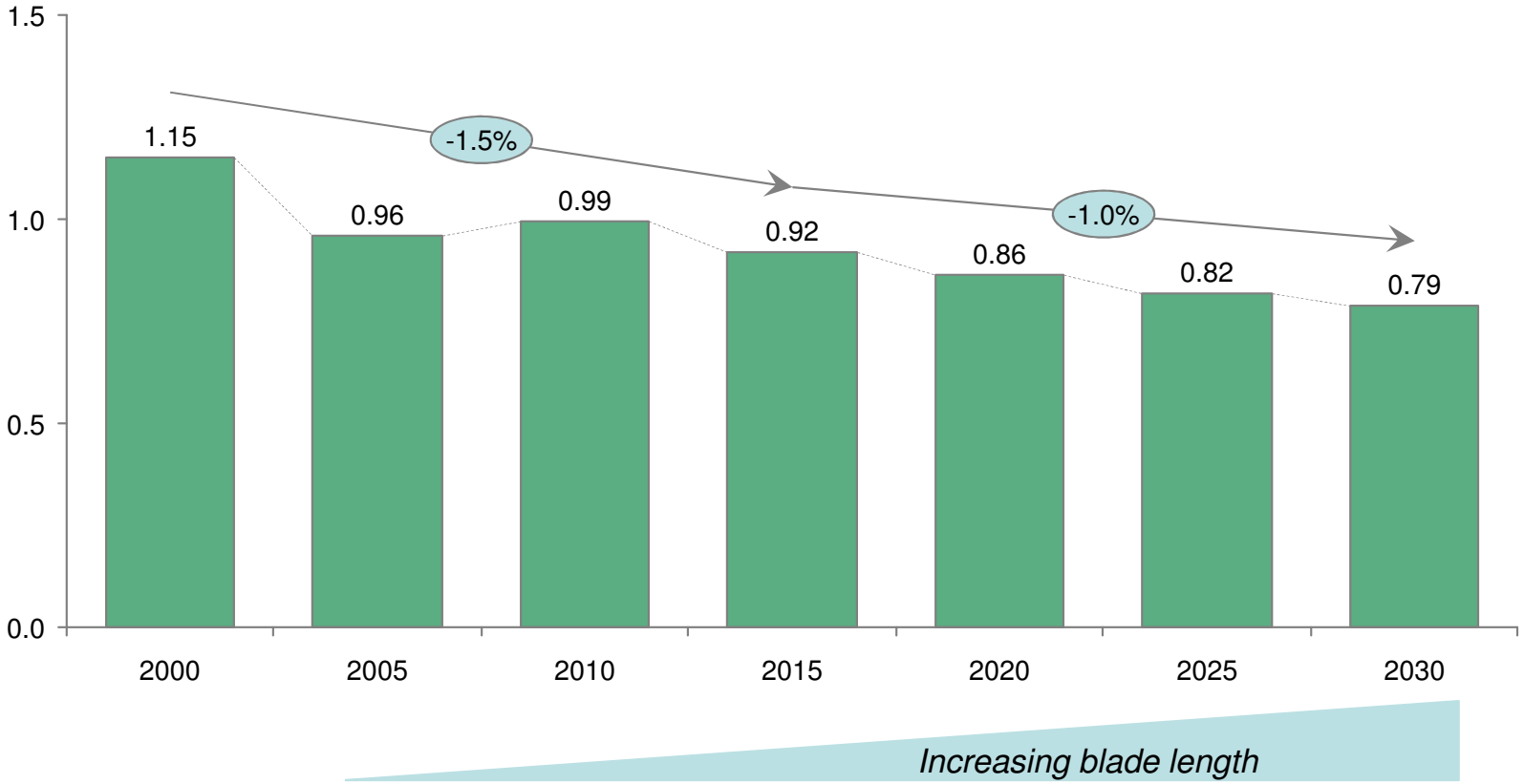
Economics

Technology upgrade: CAPEX Evolution

CAPEX expected to decrease, albeit at a slower rate as performance improvements are costly

CAPEX decrease mainly driven by cost of wind turbine, accounting for about 80% of total costs

EU wind turbine price evolution
(Mln € / MW)



Note: All costs in 2010 euros; Note 2: 50 MW wind farm considered in all cases composed by wind turbines of 2MW in 2010, 3MW in 2020 and 4MW in 2030 and from 10 km of the grid connection
Source: IEA, IHS, EWEA, BCG Model

Economics

Technology upgrade: Capacity Factor

Capacity Factor improvement mainly due to:

- Longer and more performing blades
- Hub-height
- Site optimization

Example of an old model

LONGER BLADES

LOW-WIND TURBINES AT HIGH-WIND SITES

SITE-OPTIMISED POWER CURVES

HIGHER TOWERS

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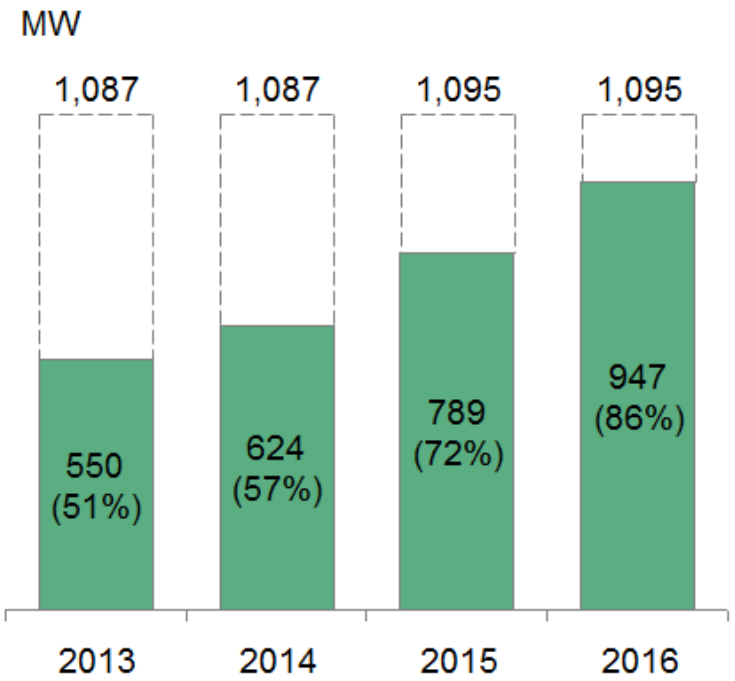
Business Case
O&M

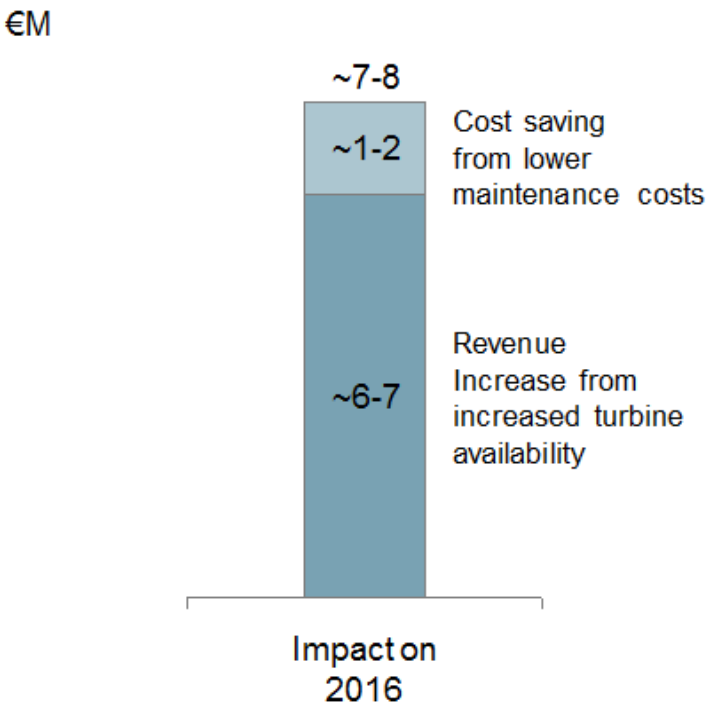
ERG successfully insourced O&M activities in Italy, generating 7-8 Mln € between revenues and cost savings

Sizeable insourced asset base, which ERG can potentially leverage and start offering O&M services to 3rd parties in Italy

ERG capacity with insourced O&M



Estimate of benefits for ERG from O&M insourcing



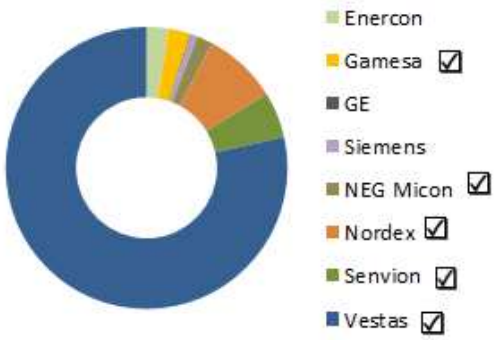
Business Case
O&M

ERG was one of the first mover in internalizing O&M services, setting a specific program/collaboration with main Vendors

Key elements to optimize O&M activities:

- Homogeneous cluster of WTGs
- Location
- Strategic hub to manage the spare parts and reduce the “time to site”

1,059 MW (out of 1,721 owned) directly managed*



5 (out of 8) WTG technologies directly managed

25 Substations

166 Employees

1,350 km of grid cables

* For a total of 943 WTGs (out of 1,294 owned)

Business Case
O&M

Self-performed O&M

- 24/7 Control Room
- Predictive Maintenance
- Proprietary TCM
- Top Tier Projects

Operations are organized through 11 Operating Centers located close to wind farms (within a radius of ca 60 km)

Response rates are continuously monitored

- Chartres– The first Operating Centre in France

- Celle – The first Operating Centre in Germany

Business Case
O&M

Real time analysis:

- Visibility over the whole ERG Italian portfolio
- Remote control of turbines and electrical substations
- Control room 24/7 in Sicily (Carlentini) with hot back-up near Naples (Montefalcone)

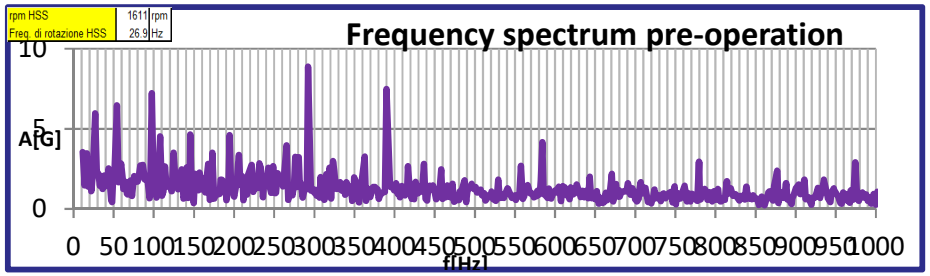
Performance management:

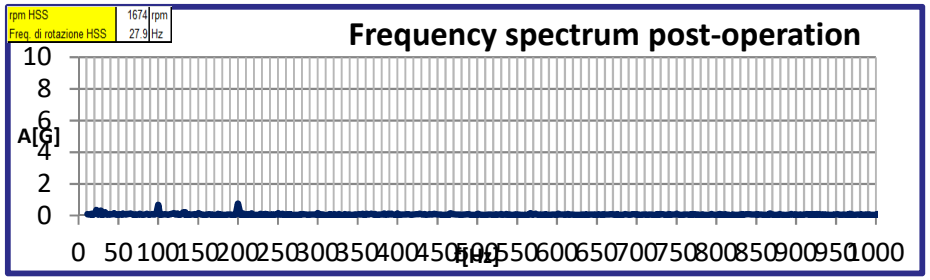
- Calculation of plant availability
- Analysis of trends, status, events, faults
- Data export

Business Case
O&M

"CMS" consist of hardware (vibration sensors in nacelle of turbine) and software which allow to (i) acquire and monitor vibrations (ii) measure the particle state of gearbox lubricant oil (iii) analyze single events and trends (iv) identify prematurely wear and failure events

All gearboxes and generators within the Italian fleet of multi-megawatt turbines, and part of the international fleet, have been or are being equipped with CMS





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Business Case
Repowering

Medium-long term project with «knock-on effect» in all value chain

Possibility to install new wind farms replacing the existing ones, with WTGs more performing, reduction of operating costs and lower visual impact (keeping the same installed power)

Technology evolution, associated with downward trend in interest rates, makes more competitive the electricity production with relevant reduction on LCOE

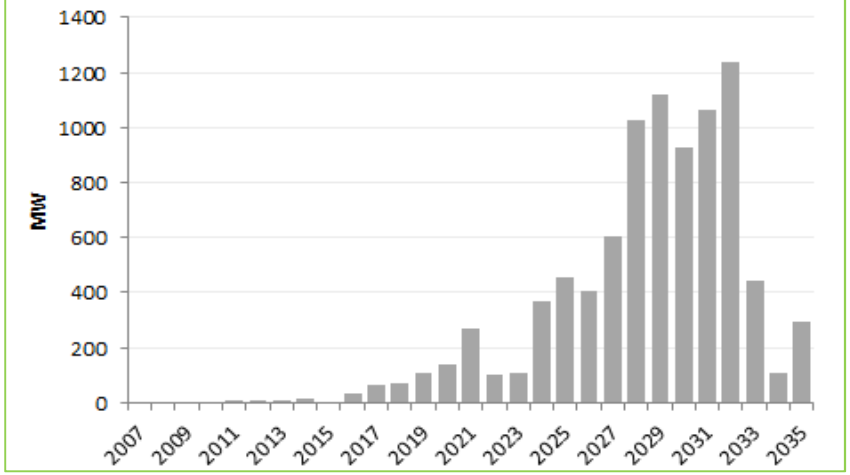
Framework	
Wind portfolio	• A huge portion of the Italian wind portfolio, with no modernization, is concluding the incentive period and useful life, with impact on the overall installed capacity
Technology	• Wind farms erected between 2000 and 2005 have an old technology not more available on the market with negative effects in terms of efficiency , production and spare parts
Scenario	• Growing trend on electricity price and LCOE reduction lead wind energy close to «market parity» (no incentive) with positive effects in the medium-long term over the burdens to support renewables («oneri per il sistema»)
Legislation	• The current legislative framework doesn't provide any support for the repowering (DM 2012 not in line with expectations) and in some case hinder the process («Decreto Spalma Incentivi»)
ERG case	
Portfolio	• Total portfolio of 1 GW with 300 MW close to the end of the incentives in the period 2017-2020 and equipped with old WTG (V47 and V52)
Technology	• Replacing old WTGs (V47 e V52) with new model «multi MW». Current average production equal to 1.751 equivalent hours with expected new production equal to 2.403 equivalent hours (+37%)[1]
Tariff	• Current incentive scheme replaced with FIT (20 years)
Business Case ERG	• Decommissioning of 300 MW and installation of new WTGs, with new layout, cost optimization and higher producibility. No change in the total installed capacity

[1]Value at P75

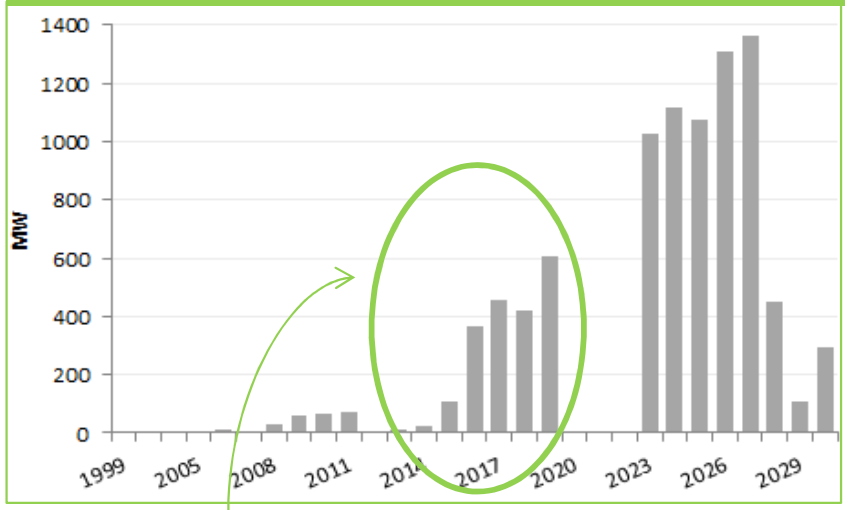
Business Case
Repowering

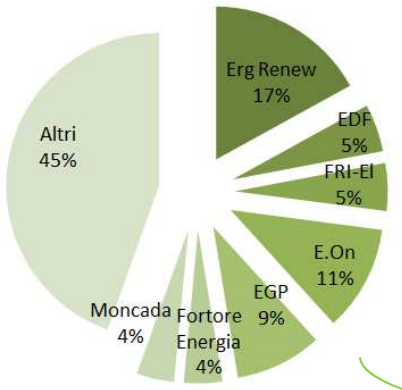
Wind portfolio in Italy is composed of several wind farms approaching the end of the incentive period. By 2020 **2 GW** will exit the market generating a gap with the medium and long term target (target 2020: **12 GW, target 2030: 16,8 GW[1]**)

Wind portfolio in Italy - End of useful life (MW)



Expiration of incentives (MW)





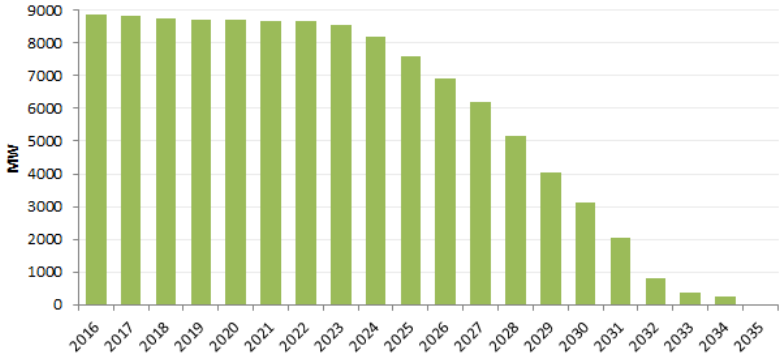
[1] Source: PAN (Piano di Azione Nazionale) and Althesys

Business Case
Repowering

19% of WTGs (corresponding to 1.639 MW) older than 10 years and 363 MW older than 15 years

After 20 years of operation most of the wind farms are no longer efficient and a huge portion will be dismantled with effect on the overall installed capacity and the 2020 and 2030 targets

Trend of installed capacity in case of dismantling



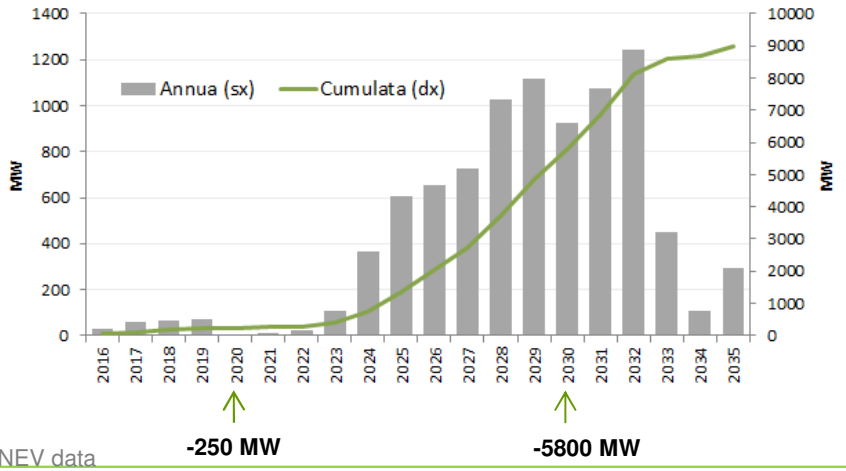
ERG Elaboration - ANEV data

Trend in case of:
- No repowering
- No new installations

Yearly and cumulated phase-out

Trend calculating according to the combination of the following assumptions:
- End of incentives
- 20 years of operation

Note: useful life longer than 20 year for wind farms already «repowered»



ERG Elaboration - ANEV data

[1] Source: Althesys March 2016

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