

Repowering or extended operation -Spain-

driven by ener9y

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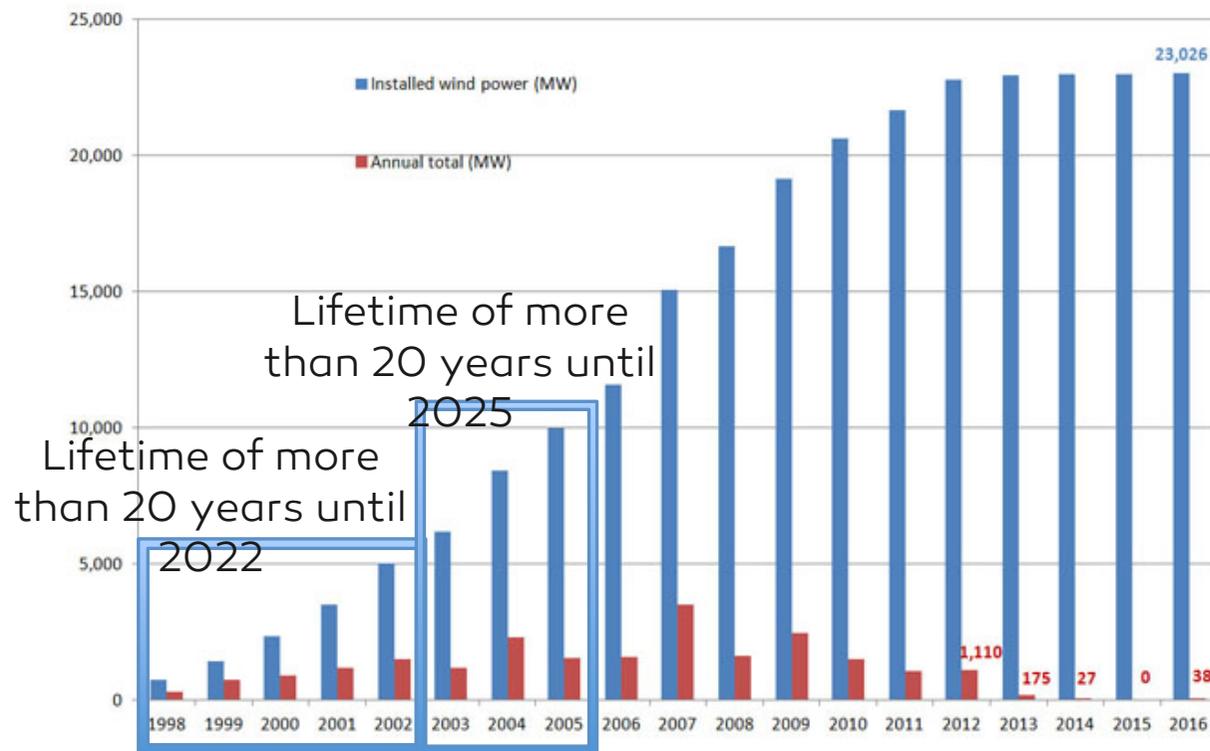
- Beaufort 9 is an innovative and flexible Service provider along the whole value chain of Wind power projects
- Beaufort 9 as well acts as a Turn key provider and owner of projects based on new or Second hand turbines
- With the experience of 12 market entries in different EU and non EU countries we offer support for German players aiming for successful market entry



- You benefit from more than 30 years of wind experience in more than 12 Countries
- We focus on European markets but also on Emerging markets with strong connections to Eastern Europe, Central Asia and North Africa
- We build bridges between Markets transferring know-how
- Our target is to consult customers in a holistic way looking at projects with a 360° view to bring them to the finish line.

Until 2022, 5.000 MW attain a lifetime of more than 20 years.

Until 2025, 10.000 MW attain a lifetime of more than 20 years.



Annual evolution and total installed wind capacity in Spain (in MW),
Source: AEE, Spain 2017

- January 2012, Spanish feed-in-tariff support schemes were abolished for newly registered wind farms.
- July 2013, retroactive support scheme for a so-called “reasonable profitability” was introduced.
remuneration depends on a wide variety of factors (age, cost, amount of subsidies already received)
- January 2016, auction system established for new WF’s and solar systems (only 500 MW in first round), auction based on “reasonable profitability” and the offered discount to this amount
- 26.07.2017, next auction with 3 GW of wind and solar power
- 31.03.2017, repowering projects and second hand turbines are excluded from the retributive regime and can not participate in the auctions for remunerations.

2° Section Royal Decree 359/2017 states:

- “The specific retributive regime cannot be granted to:*
- *Installations which construction implies the closure or capacity reduction of other installations of the same technology.*
 - *Installations built from main equipment previously used or not brand new.”*

Repowering or Ongoing Operation ?

Decision criterias in Spain

Market price for electricity

Average wholesale prices in 2016 at the day-ahead market in Spain (OMIE) in 2016 were 1,41 times higher than in Germany (EPEXSpot). Average market price for wind is approx. 20-25% lower.



Day-ahead:

Spain: 39,67 €/MWh

Germany: 28,02 €/MWh

Intraday:

Spain: 40,78 €/MWh

Germany: 30,53 €/MWh

Spanish electricity day-ahead market 2015-2016,
Source: AleaSoft, 2017

Standard Cost Items:

- Insurance, ca. 1,8%
- Land lease, ca. 19%
- Maintenance (incl. foundation, infrastructure), ca. 48%
- Electricity purchase, ca. 3,8
- Technical & commercial management, ca. 14%
- Business administration, ca. 1%
- Compensations (paths, neighbours), ca. 0,6%
- Dismantling provision, ca. 1%
- Bookkeeping and P&L, ca. 2%
- ...

Source: 8.2 consulting, 2017

Average prices for agricultural land in Spain in 2015: ca. 10.500 €/ha, ranging from 5.600-19.800 €/ha (Canaria excluded) depending on region. (MAGRAMA, 2016)

Average prices for agricultural land in Germany in 2015: ca. 19.500 €/ha, ranging from 11.000-47.000 €/ha depending on region. (BzfE, 2016)

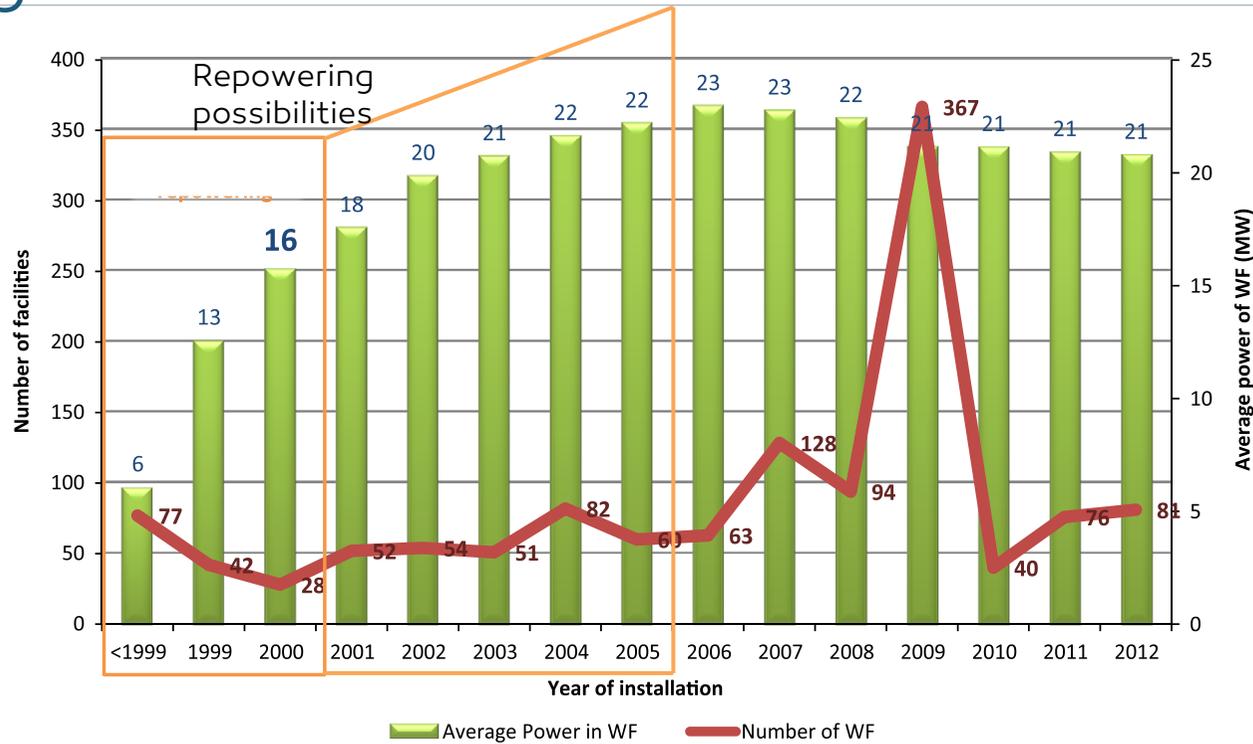
Prices for arable land in Spain were in average 46% lower than in Germany in 2016,
Land lease costs very much depending on location

After subsidies cuts due to the economic crisis, operators had to reduce their service costs.

New contracts for service already resulted in:

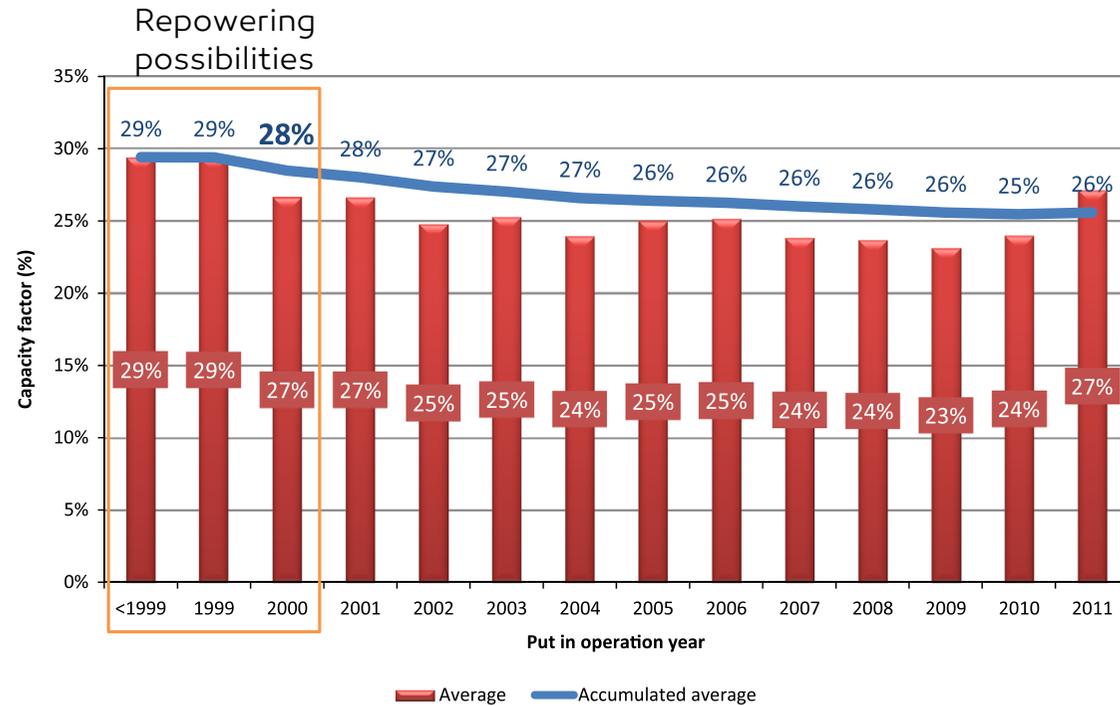
- Reduced service costs to meet reduced revenues
- New concepts for manpower (temporary employment)
- Reduced availability
- Partly guaranteed costs for repairs

Main goal: Increase service efficiency with regard to volatile wholesale prices



Average power installed in WFs per year of installation,
 Source: CNE, Spain 2013

- Average wind farm size in Spain already since 1999 relatively high
- Reduced management costs to be expected based on economy of scale
 - Additionally reducing maintenance costs



Average CF of WF's build per year,
Source: CNE, Spain 2013

Possible WF's older than 20 years have average CF's higher than 27%.

Spanish government estimated opex costs of **24,95 €/MWh** for a reference type installation in 2015. (IEA, 2015)

Deutsche Windguard (2016) expects maximum cost spread of **21,4 - 40 €/MWh** for ongoing operation, including investment for extended lifetime and operation costs.

In Spain these costs are estimated to be lower due to:

- Lower land lease costs
- Less costs for O&M (economy of scale, adjusted service contracts)
- Bigger windfarms → economy of scale

High CF's of old sites decrease O&M costs per kWh
High wholesale prices in comparison to Germany increase profit per kWh



Decision on extended operation in Spain is more likely than in Germany

Market opportunities for German companies

Extended Operation:

- Longer service period → OEM's, independant service provider
- Sale and exchange of (main) components
- Life time calculation and optimisation from third party experts/innovative Service Companies

Repowering:

- Development of the site → development service
- Dismantling WTG/Demolition of infastructure → Specialised Companies
- Sale or proper disposal of used equipment
- New BOP/E-BOP → infrastructure companies
- New/Refurbished WTG → OEM's / specialised companies



Take care of Quality and Experience



Thank you for your attention

Contact details



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