

Lifetime extension reports

Results and challenges

Lifetime extension reports and the approach to analyze the trend of old turbines for the period of the remaining lifetime

Results and challenges based on >1 000 lifetime extension assessments

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8.2

8.2 network



8.2 | The Experts in Renewable Energy

8.2 Group: Established 1995

- » Technical consulting
- » Operation optimization
- » Damage and value analysis
- » Production surveillance
- » Lifetime extension assessment
- » ...



130
Experts
worldwide



32
Offices



40000
Technical
inspections -
Wind



5
GW - Condition
Monitoring



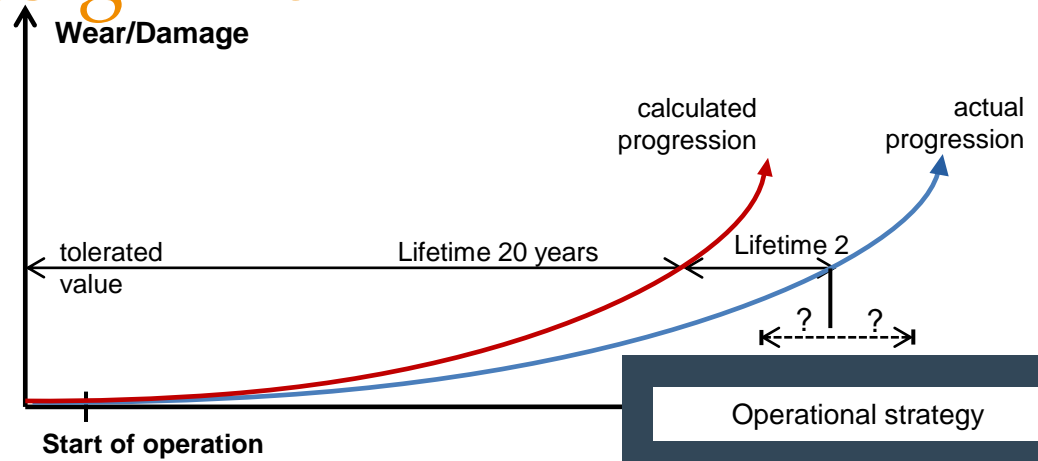
20
GW TDD - Wind



4
GWp PV-Projects

Reaching end of design life

- Dismantling?
 - Repowering?
 - Lifetime extension?
- Strategic question



Operational strategy

Price of electricity / PPA

Service vs. insurance

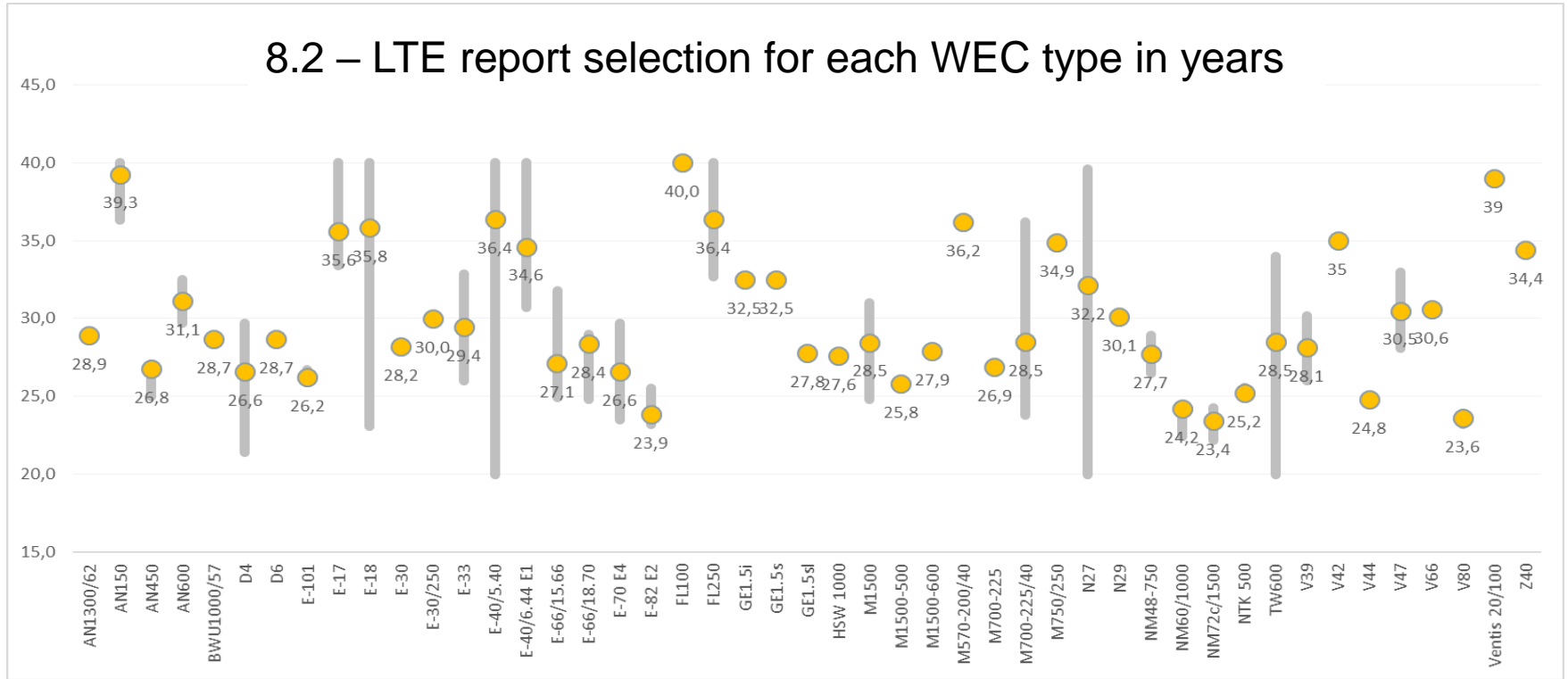
Type of WEC

Prediction through monitoring

...

Results of >50 turbine types

8.2 – LTE report selection for each WEC type in years



Results of >50 turbine types

Based on 1 000 LTE reports of 8.2 we can state:

Average remaining lifetime >12 years*

→ In total > 12 000 years of prolonged operation

* Each LTE report is an individual assessment

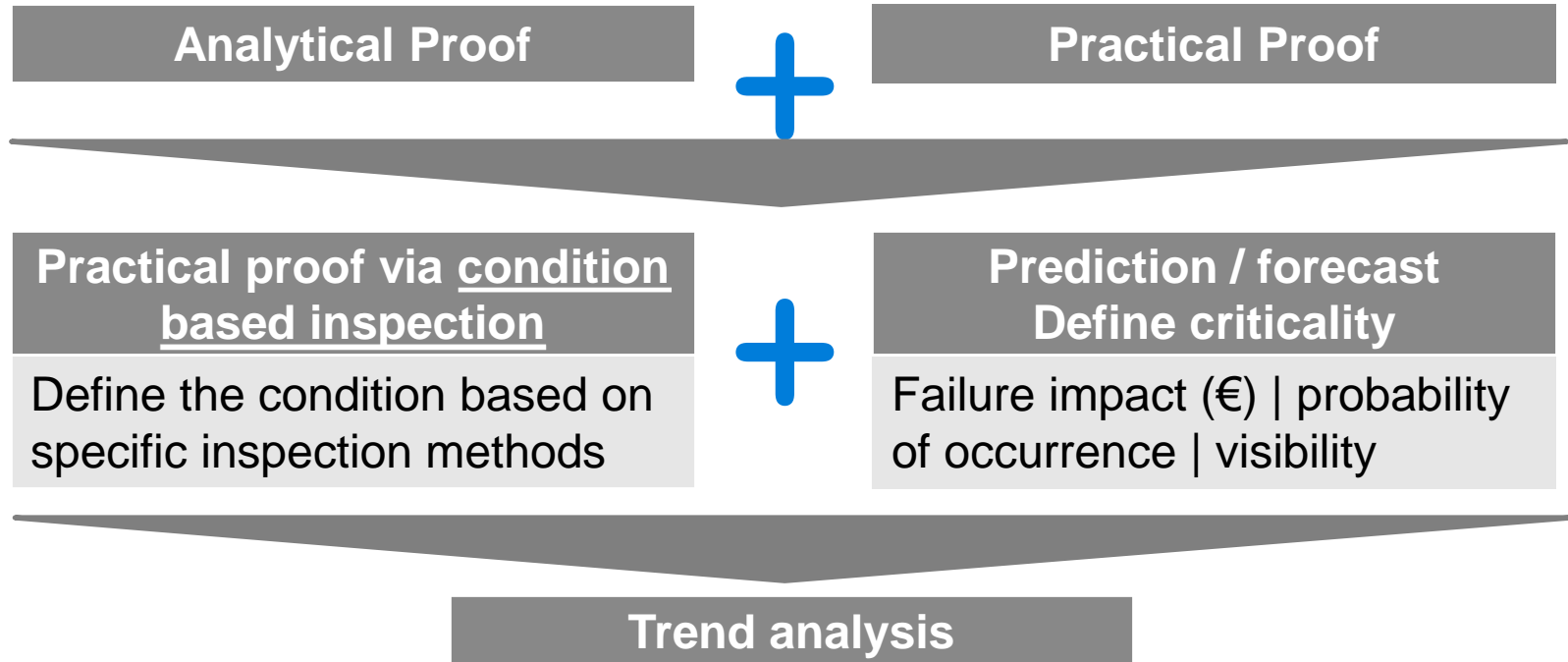
Influencing factors („data mining“)

- Average annual wind speed at hub height
- Wind profile
- Wind direction distribution (for the structure)
- Turbulence (natural and effective)
- Temporary shutdowns
- Maintenance (renewal of main components)
- Change in operating conditions
- Change in the load situation (extension, dismantling)

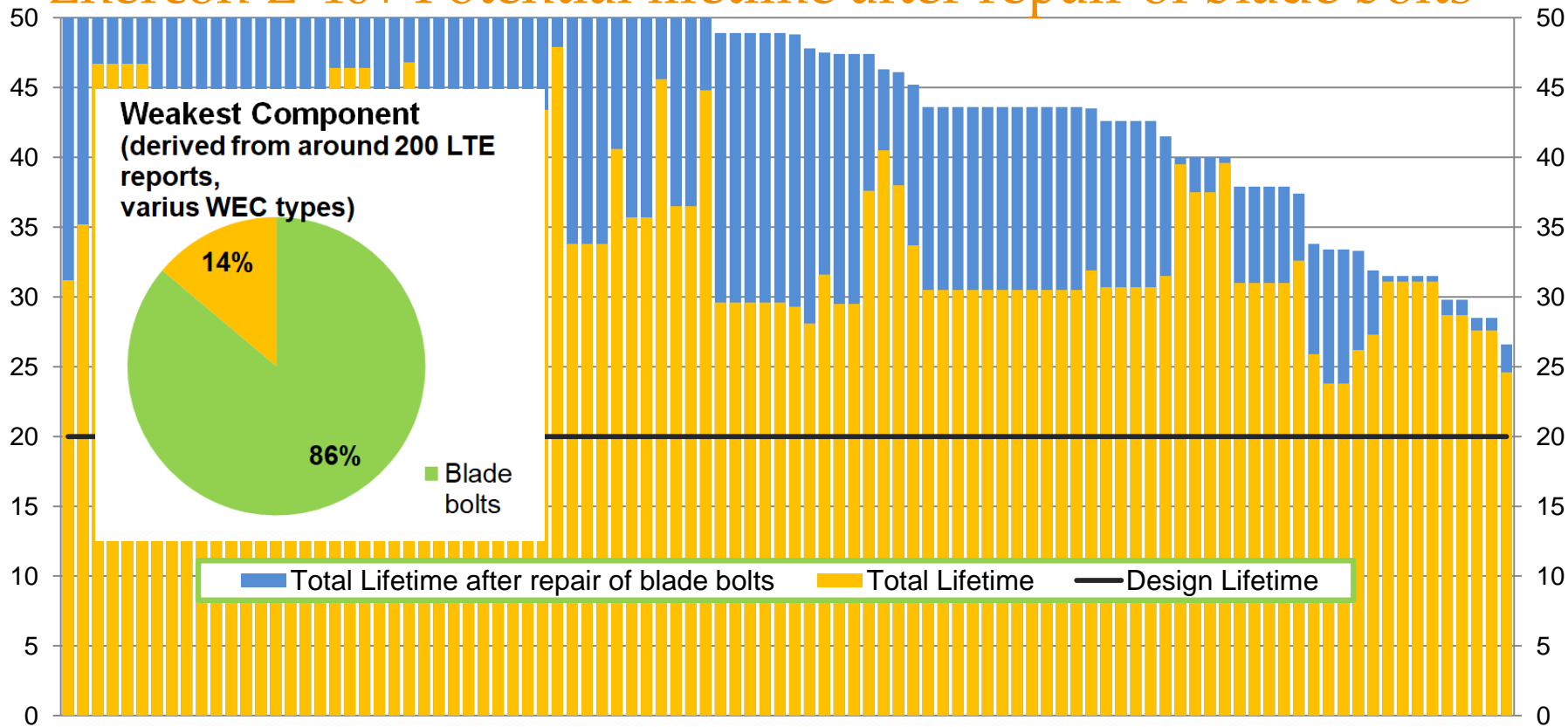
Result: LTE expert report

- This data is the core input for the aero elastic simulation (analytical part)
 - purely based on structural stability
 - including a weak point analysis
- ...more than just „for the local authority“
- Just a „small“ gap to a trend analysis

Trend analysis



Enercon E-40 | Potential lifetime after repair of blade bolts



Challenges

- Price drop for independent inspections (machine and especially rotor blades)
Seasonal products such as rotor blade inspections (operational planning)
- Unclear market price post incentive schemes → relying on the stock market
- New guidelines / laws ... / local authorities
- Services requiring explanation → Black box
- Diversity of market player which tackle LTE
- Missing standards → start on a European level?
- Not everything can be discovered during a visual inspection → uncertainty
- ...

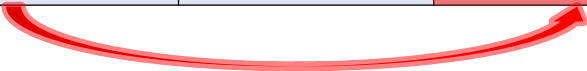


Fatigue
main shaft
(steel)

Impact of different operation modes

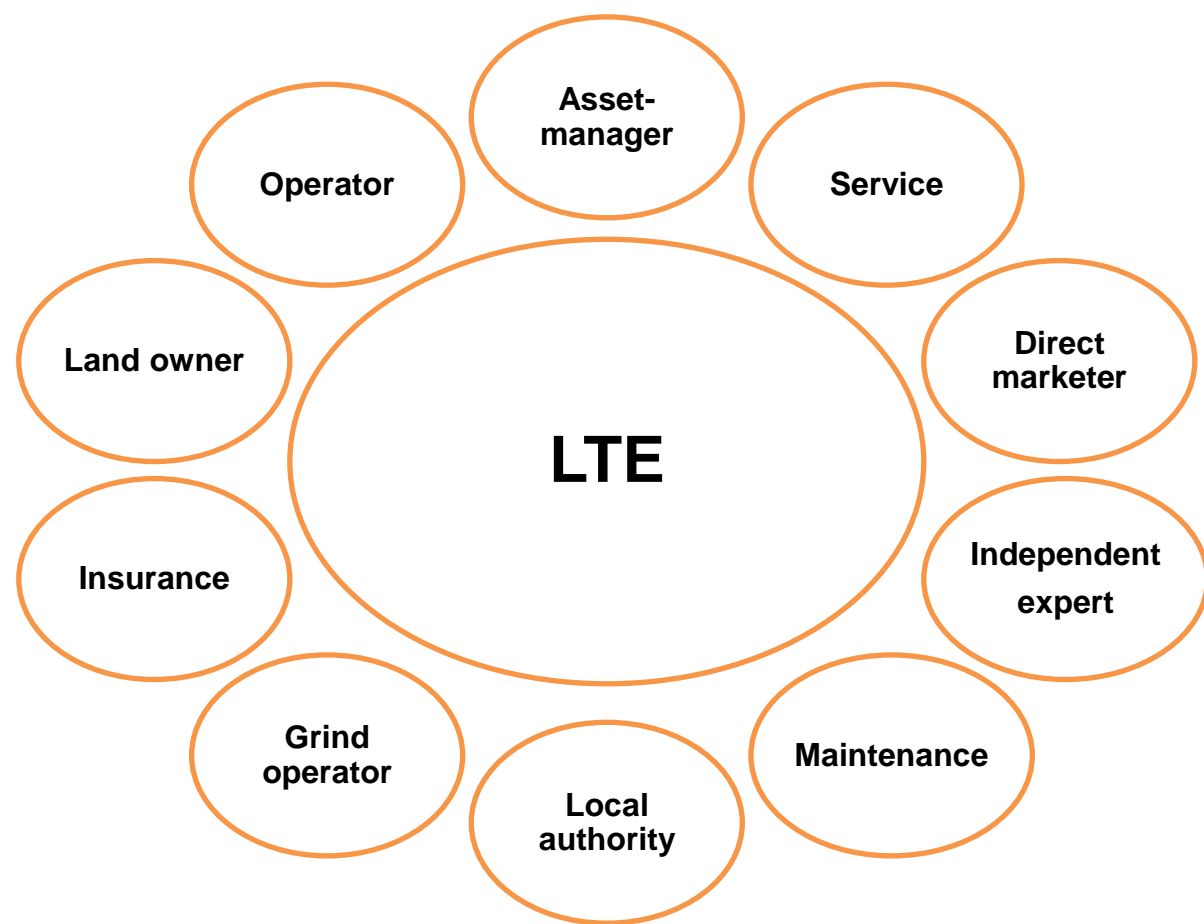
- LTE // wind farm with GE 1.5s on a 65m steel-tube tower
- System switch-off at wind speeds of >10

Component	Material	Gradient of the "Wöhler" curve	Overall lifetime of a GE1.5s located at xxx	Factor at 10m/s switch-off wind speed	Extended overall lifetime GE1.5s
Bolting of blade bearings	steel	4	32,5 years	1,25	40,6 years
Nacelle	cast	8	37,8 years	2,24	84,6 yeras



- Development of electricity prices...?

If continued operation is to be successful, joint action is required!



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