NORCOWE RWF
– Main results until now

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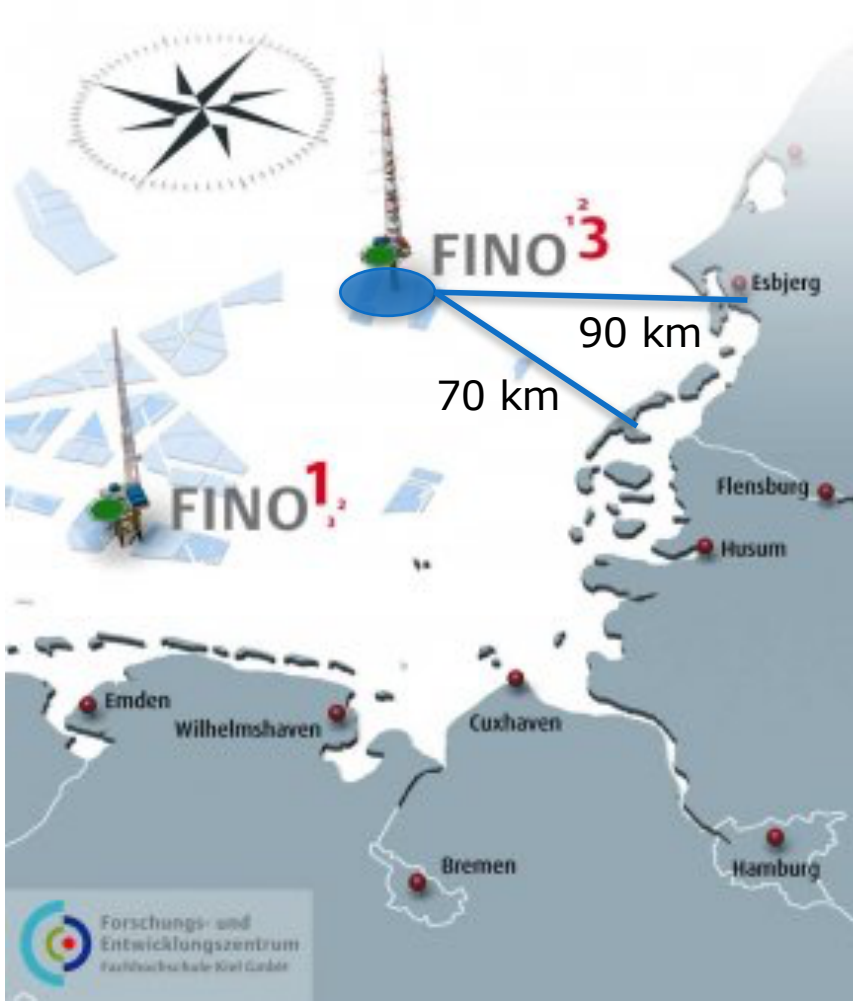
T. Bak, A. Graham, A. Sapronova, M. Florian, J.D. Sørensen, T. Knudsen, P. Hou, Z. Chen:
Baseline layout and design of a 0.8 GW reference wind farm in the North Sea.
Submitted for Wind Energy.

Overview

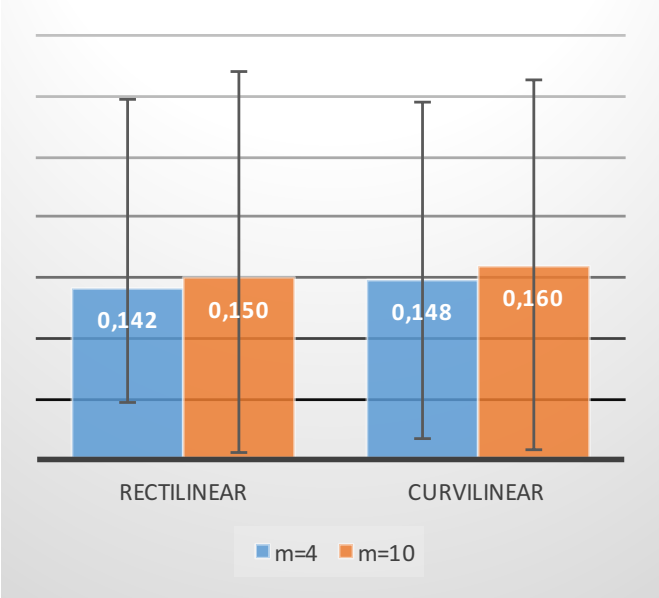
- A system-level model
- Large-scale offshore installation with multi-megawatt turbines
- Data and models required to represent a wind farm and determine the associated energy costs.



Turnkey cost

Average effective turbulence intensity

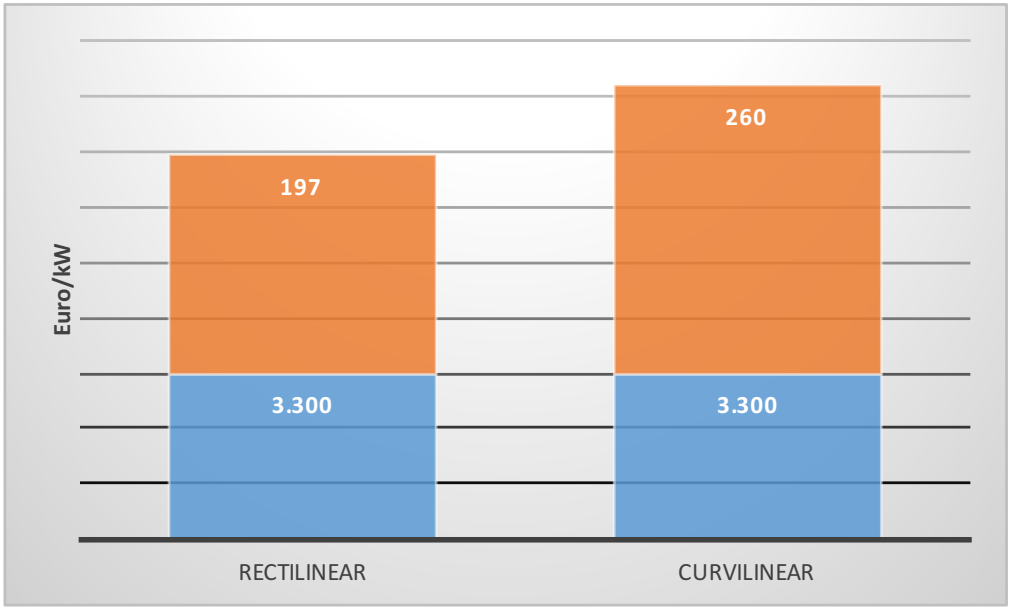
IEC-61400-1: Loading resulting from wake effects is accounted for by the use effective turbulence



Turnkey cost

Cost of turbine, substructure, installation and grid connection

- Soil conditions and water depth constant
- Effective turbulence adds to turnkey cost

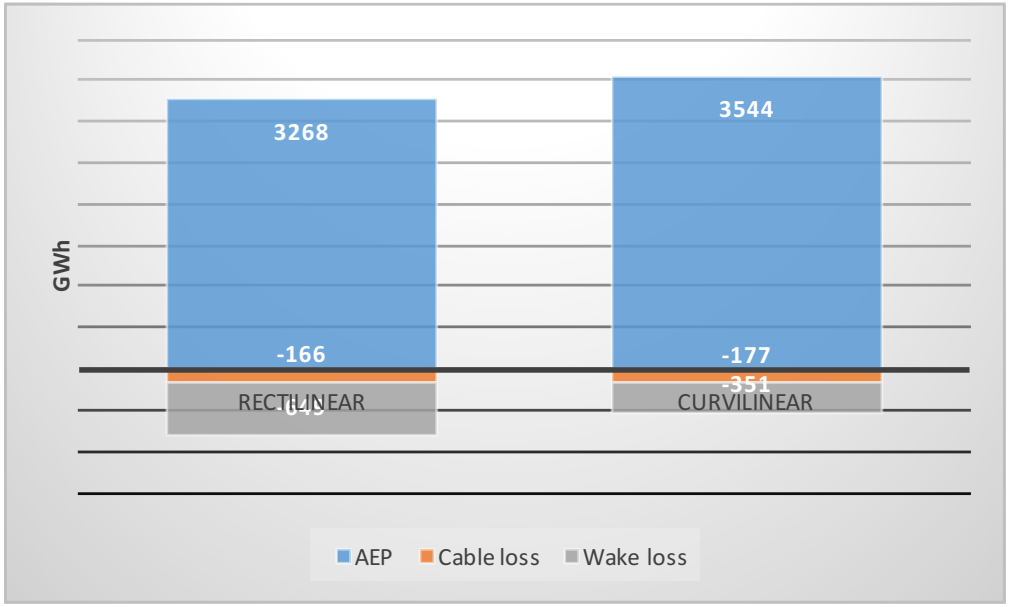


Electrical subsystem

AEP

Annual expected power production considering wind distribution at location, wake losses and 100% availability.

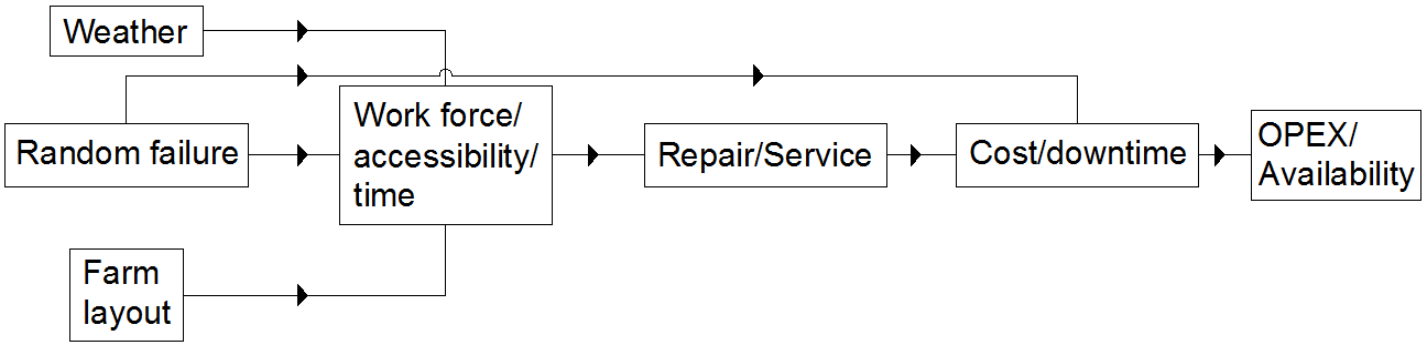
Averaged over 10 years. Matlab and WAsP.



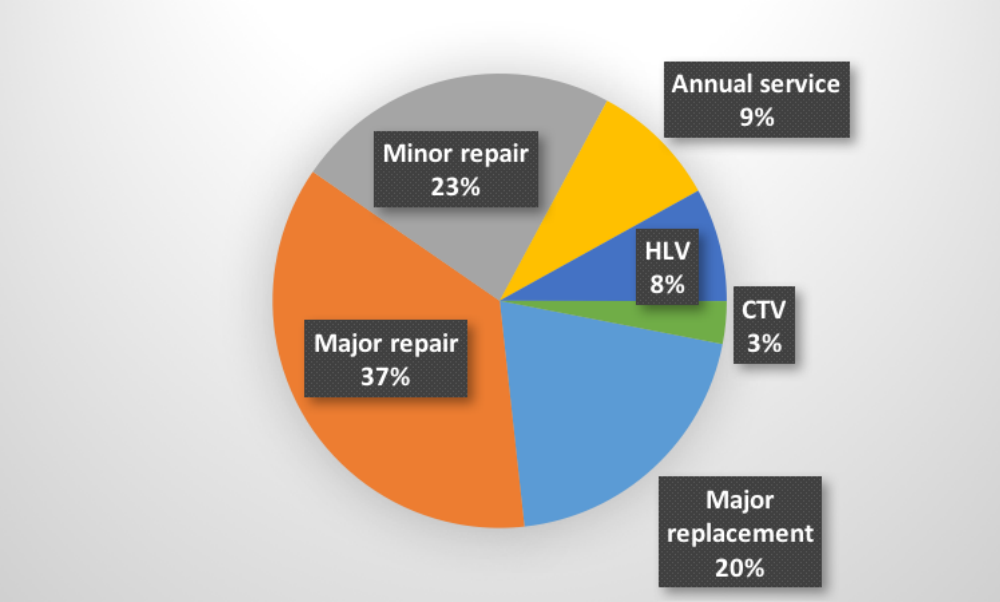
Operation & maintenance

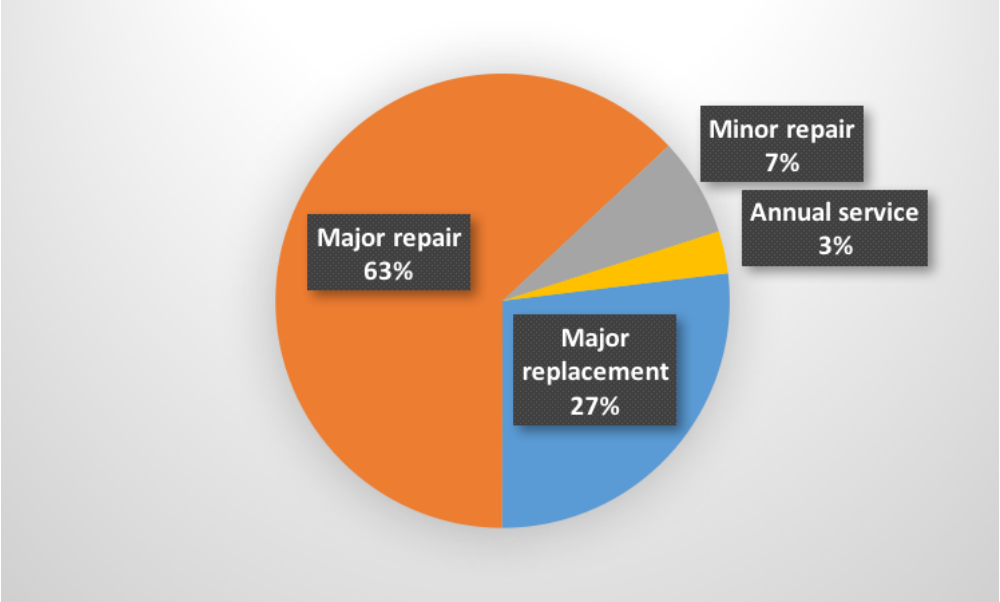
OPEX and availability

A discrete event life-cycle simulator model is built in MATLAB using generic O&M planning. Wave and wind 3h time series input.



Operation & maintenance

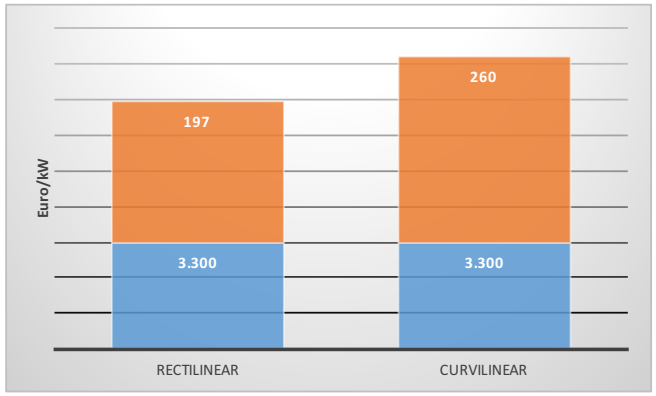




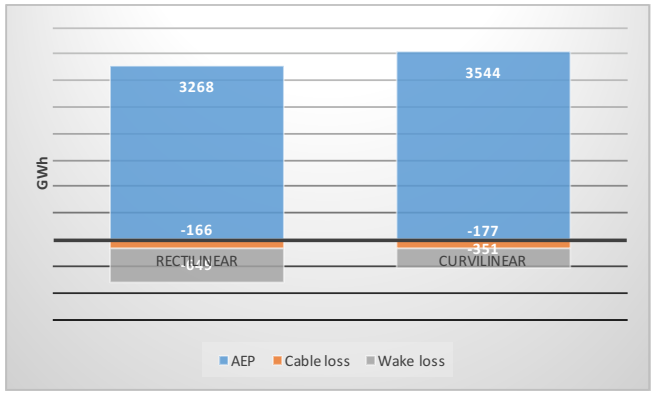
OPEX breakdown, 0.0168 Euro/kWh

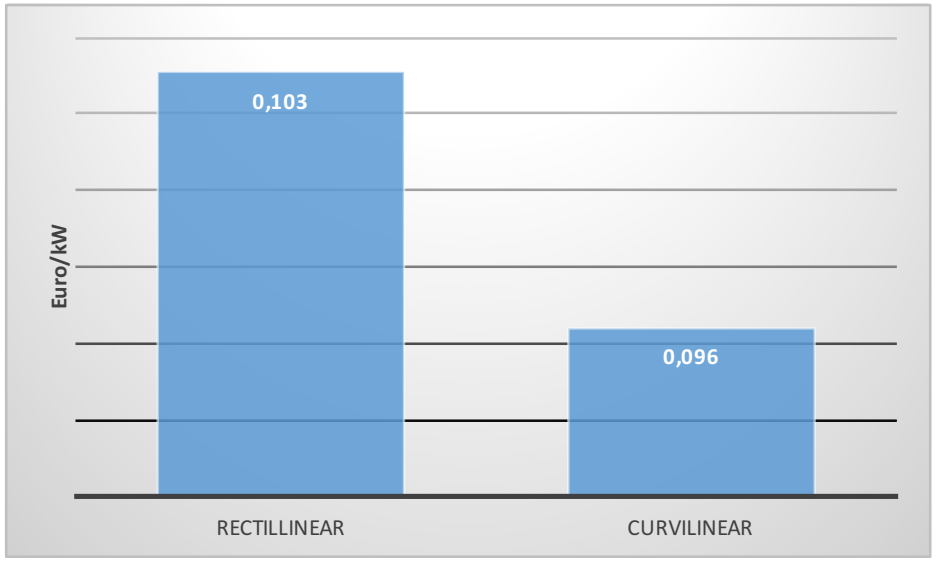
Un-Availability breakdown, availability: 81%

Levelized cost of energy



$$LCoE = \frac{Turnkey + \frac{1-(1+r_c)^{-T}}{r_c} OPEX}{\frac{1-(1+r_p)^{-T}}{r_p} AEP \cdot availability}$$





Questions?