



Challenges

- difficult access to offshore wind energy structures makes maintenance a sizeable effort and a huge cost
- maintenance costs in offshore protection systems are 75-100 times higher per m² than onshore thus putting the long-term economic viability of projects at risk.



Selection of the most cost-efficient long-term corrosion protection system

CorrWind is an Excel-based cost model that has been designed to help decision makers in the offshore wind energy industry to :

- calculate and compare life cycle costs for existing offshore corrosion protection systems
- select the most cost-efficient protection system for the offshore structures
- minimize costs for corrosion protection including initial costs of applying the protection system and maintenance over the entire 20+ year life of the offshore structure.
- secure the economic viability of the entire project
- provide data for more up-to-date industry standards

Calculating Life-Cycle Costs

CorrWind allows users to determine the sensitivity of total corrosion system costs over the expected lifetime of a wind energy structure by inputting factors in the Excel-based comparator software, including:

- exterior surface area above the mean water line
- the coating system to be evaluated
- the expected lifetime up to a maximum of 25 years
- materials and labour costs for the initial application of the corrosion protection system
- expected maintenance
- rates of inflation over the expected service life of the structure
- financial discount rate
- the relationship of initial and maintenance costs to the cost per kWh of the wind energy unit, including the capacity factor of typical wind power units.

Guidance default values are shown for a typical system which rely on recent studies on the performance and relative costs of suitable protection systems.

Comparing Costs

Paint-only System

Zinc Thermal Spray-plus Paint

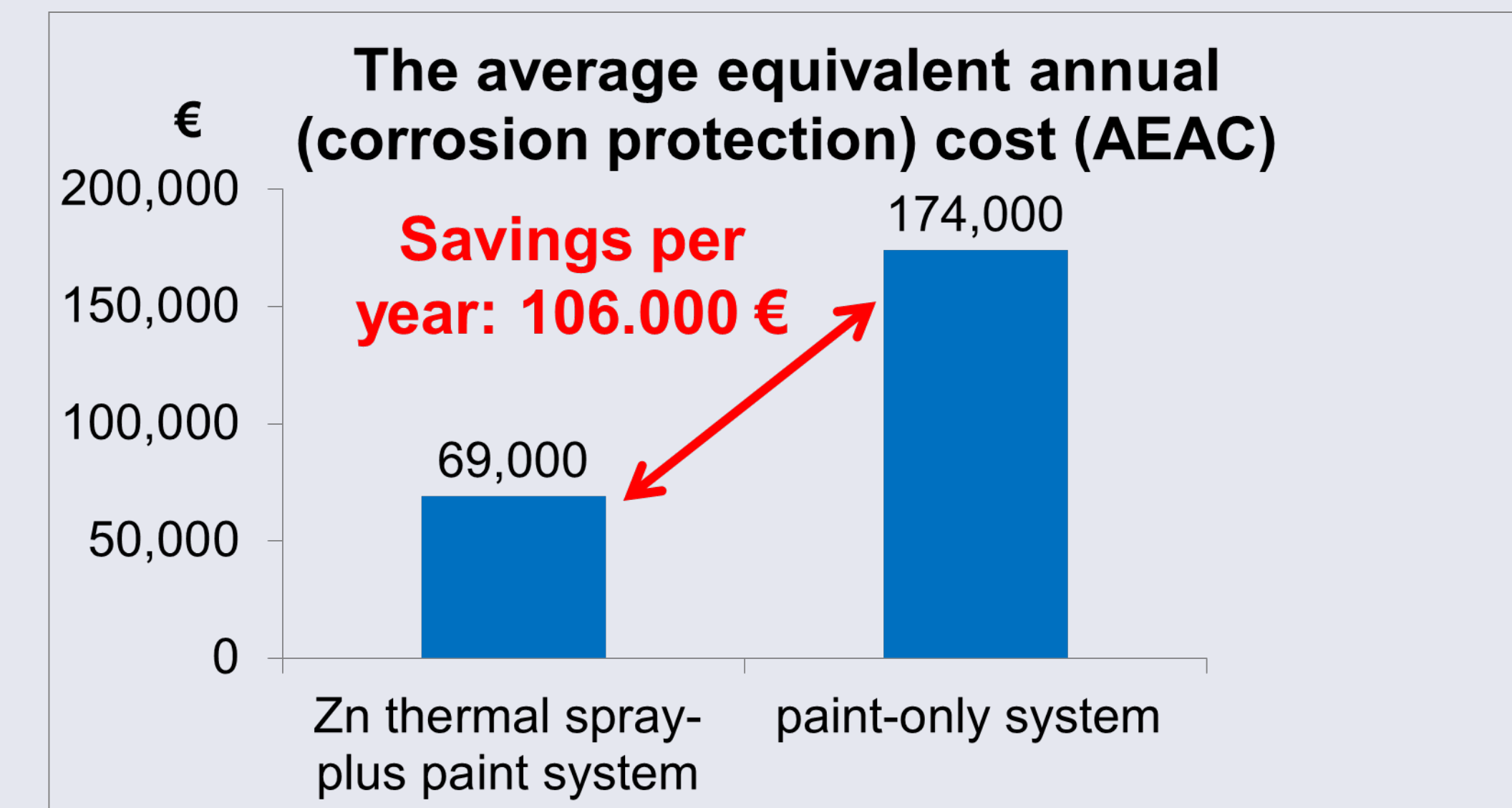
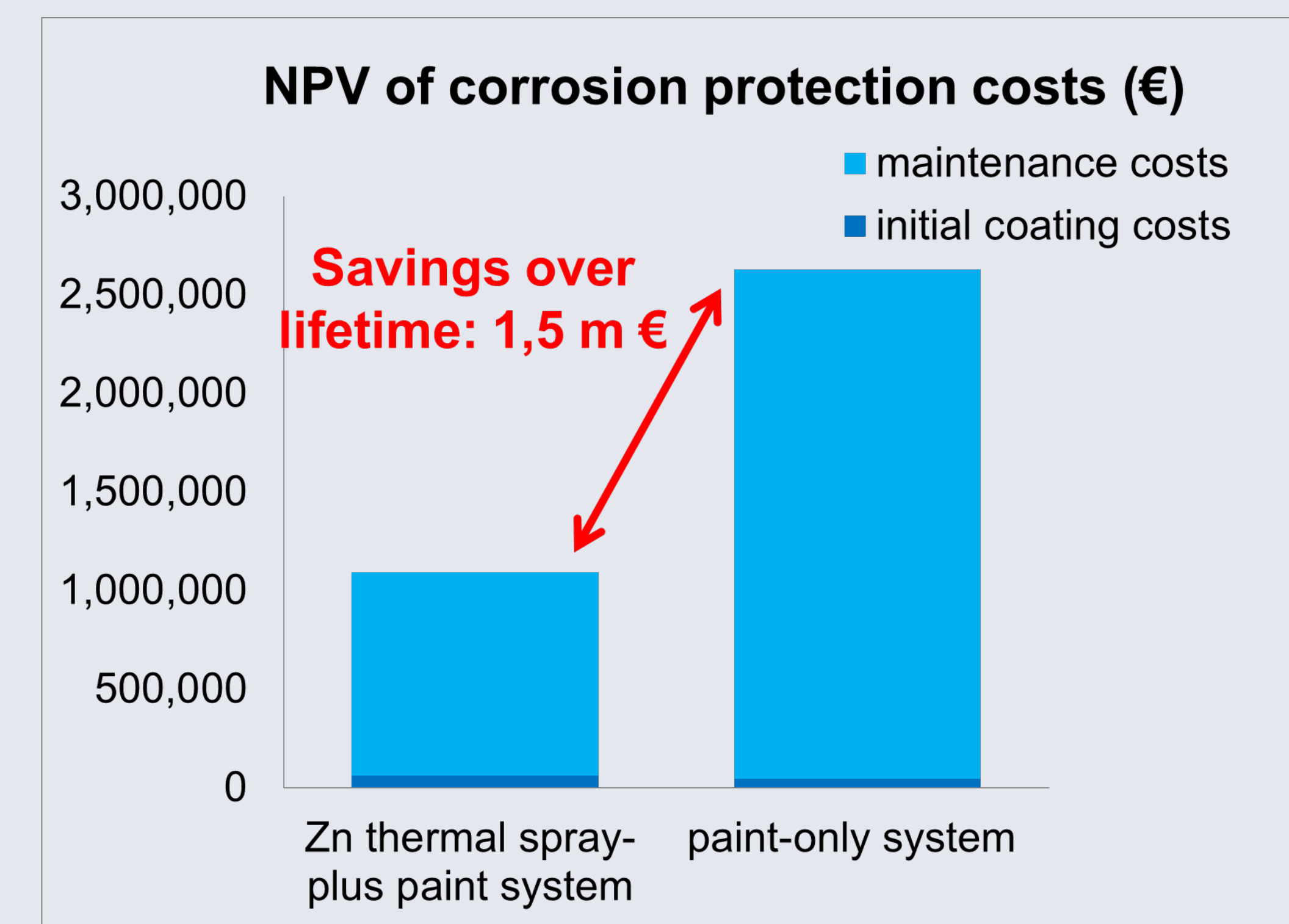
(Zn thermal spray-plus epoxy-polyurethane paints and a high performance epoxy-polyurethane paint system)

- Corrosion protection cost of a typical offshore wind energy tower for the outside surface above the waterline
- (Corrosion) costs comprise initial coating application costs and maintenance costs over the life of the structures
- Life cycle costs analysis for a 20 year lifetime of the structure

Results

0.8€ct/KWh*

achieved savings in maintenance costs for Zinc Thermal Spray + Paint



* The savings are 0.8 Euro cents per kWh for each kWh generated over the 20 year life of the structure for a 3.6 MW wind turbine with a capacity factor of 0.4

Conclusions

A zinc thermal spray coating system plus a high performance paint system achieves the highest savings in maintenance costs.

References

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2. A. Momber, "Maintenance Concepts for Corrosion Protection Systems of Wind Energy Tower Structures", VDI Wissensforum, Maintenance of Wind Turbines, May 8-9, 2012, Hamburg, Germany, VDI, Duesseldorf, Germany
3. A.R. Black P. K. Nielsen, "Corrosion Protection of Offshore Wind Farm Structures – Present Understanding and Future Challenges", Eurocorr 2011, Frankfurt-am-Main, Germany: DECHEMA, 2011