

### Motivation

The growth in wind turbine capacities is making wind turbine availability an increasingly important aspect of their operation.

Lead times on spare parts for failed wind turbine components can significantly impact availability and represent a cost to operators that can be mitigated.

A spare parts inventory sharing policy is considered as a policy to mitigate lead times and maintain wind turbine availability.

### Research Objectives

- Define a suitable spare parts inventory policy and a counterpart lead time policy
- Create a framework under which the policies can be examined for a range of wind turbine operators
- Analyse the optimal policy choice for a given number of operators participating in each policy
- Characterise the attitudes of market participants towards lead times in the UK onshore wind turbine industry

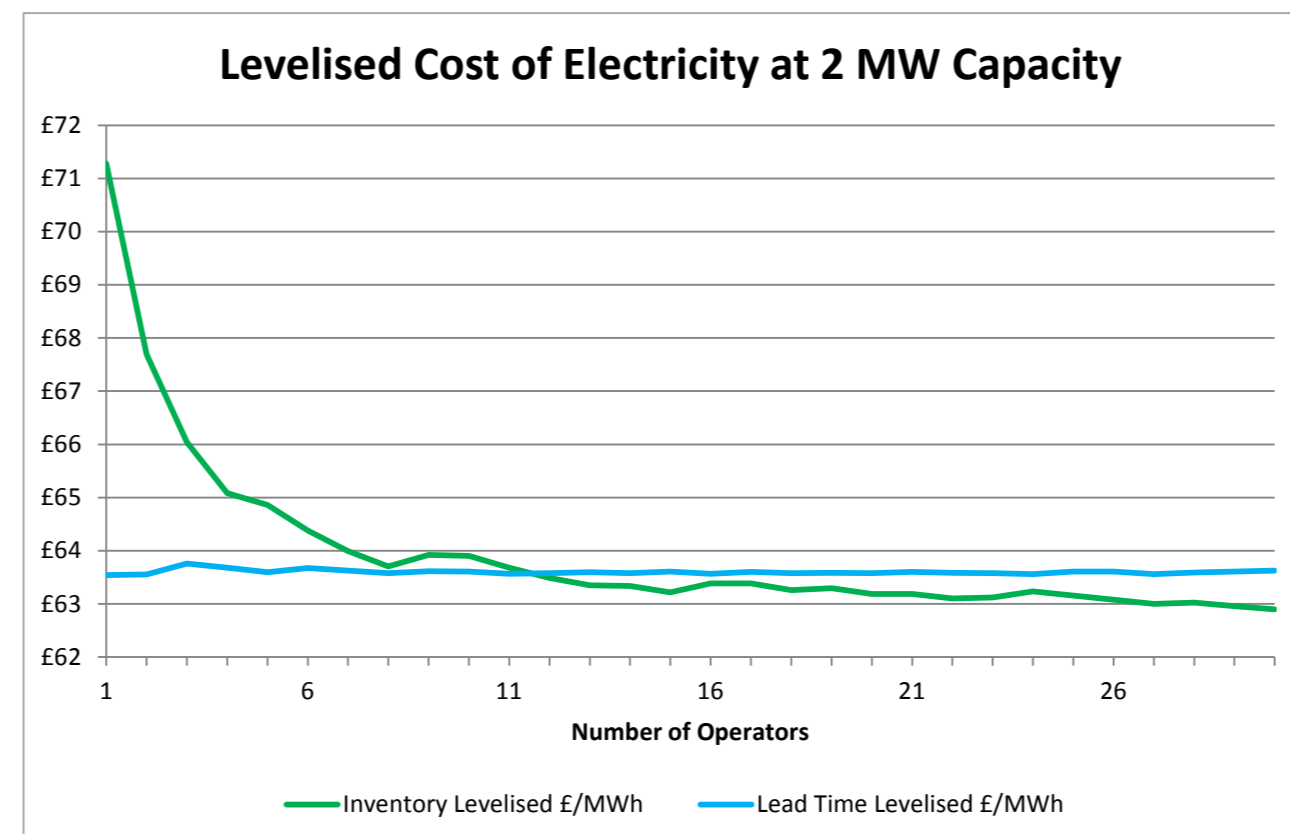
### Methodology

A stochastic point process model of wind turbine component failures provides a scenario for the analysis of the inventory sharing policy and the lead time policy.

A semi-structured interview is used to judge the plausibility of inventory sharing policies under market participants' attitudes towards lead times.

### Results

A Monte Carlo simulation on the number of participating operators reveals that the cost effectiveness of an inventory policy exceeds that of a lead time policy with the participation of 11 one-wind-turbine operators under the inputs of the model.



The semi-structured interviews revealed that spare part inventory policies are primarily of interest to manufacturers and wind turbines owners, however they may be apprehensive to adopt inventory policies due to their high initial capital outlay requirements.

### Conclusion

The analysis of the results demonstrates that the cost of the lead time policy is highly sensitive to the generating capacity of wind turbines. This suggests that as wind turbines continue to increase in size, the effects of lead time on replacement parts will become of increasing significance and inventory policies will become more attractive. Market participants may however be apprehensive to adopt inventory policies due to their high initial capital outlay requirements.

