

Renewable energy consultants

GL Garrad Hassan



UK onshore wind – the true cost now & in the future

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Onshore wind current and future costs

- Funded by RenewableUK
 - Builds on similar approach for offshore wind in 2009
 - Extensive consultation with UK onshore developers: a unique study based on real cost data, in great detail
1. Historic trends
 2. Current costs
 3. Future costs

Which costs?

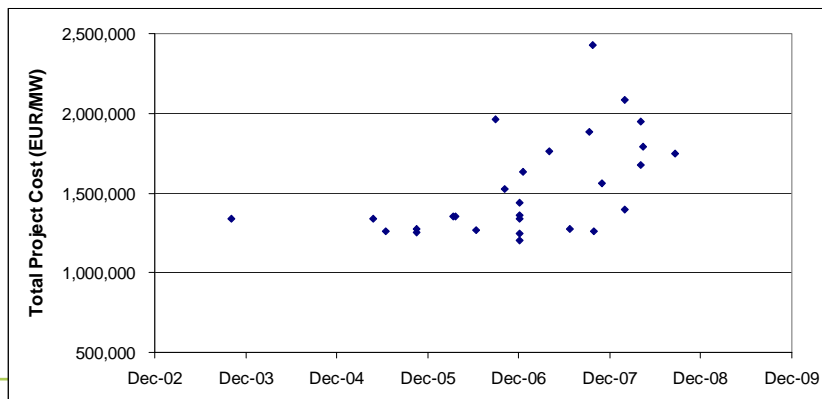
- Development costs (Devex)
- Capital costs (Capex)
- Operation and Maintenance costs (Opex)
- Financing costs

- Generally presented as costs per MW
- A lot of detail: only a summary can be presented here

1. Historic trends: wind farm costs

Data for 28 wind farms, W Europe (Devex and Capex). Variance explained by:

- increased turbine and BOP costs over time
- BOP costs affected by terrain, remoteness, forestry
- different connection voltages and costs
- different development and lending costs



2. Current costs: information from UK project developers

- Inputs from developers active in the UK, from those with 2-3 projects, up to utility-scale
- Detailed costs for recent projects (2009, 2010)
- Representing 45% of capacity installed in the period.
- All information treated anonymously

- Opinions on factors affecting differences in prices between projects

2. Current costs: project sizes

All costs calculated separately for four classes of project size:

- A: 2 to 5 MW
- B: 5 to 20 MW
- C: 20 to 50 MW
- D: 50 MW +

2. Current costs: Devex results

- Main cost items are EIA, planning, management.
- Savings on EIA and wind measurements result in lower costs for larger projects
- Big variations in EIA costs: most extensive scope is in England
- Planning costs capped at £11k in Northern Ireland, £15k - £25k in Scotland for 50 MW+ projects, £125k-£300k for IPC route in England and Wales
- Appeal, public enquiry or judicial review can add £100k - £1000k
- Management costs decreasing as developers gain skills

Group	A (2-5 MW)	B (5-20 MW)	C (20-50 MW)	D (50 MW+)
Devex [£k/MW]	78.6	73.6	46.0	38.8

2. Current costs: Capex results

- Key factor is reduction in turbine price with project size
- Also some reduction in connection cost with project size
- No trend for BOP costs
- Large variance in turbine price data
- Large variance in civil costs, due to site conditions
- Large variance in grid connection costs
- Possible future costs of £1M - £2M per project for radar mitigation measures?

Group	A (2-5 MW)	B (5-20 MW)	C (20-50 MW)	D (50 MW+)
Devex [£k/MW]	78.6	73.6	46.0	38.8
Capex [£k/MW]	1,507	1,502	1,304	1,162

2. Current costs: Opex results

- No trend with project size: lower management costs offset by higher network Use of System charges
- Dominant item is turbine maintenance (~30%)
- Large variance in turbine maintenance (expectations of developers over project lifetime)
- Large variance in business rates: £3k to £13k per MW per year
- Large variance in Use of System charges

Group	A (2-5 MW)	B (5-20 MW)	C (20-50 MW)	D (50 MW+)
Devex [£k/MW]	78.6	73.6	46.0	38.8
Capex [£k/MW]	1,507	1,502	1,304	1,162
Opex [£k/MW/y]	53.3	49.5	49.3	50.6

2. Current costs: range of required energy prices

- Using the cost data obtained, find the important drivers for required energy prices for UK onshore wind farms, for each group size
- Assumed 25% and 30% capacity factors: affects energy capture and Capex
- Consistent financial assumptions
- *Read with care!* Indicates only the relative importance of various factors. There are certainly projects that are economically feasible with lower energy prices.

Group	A (2-5 MW)	B (5-20 MW)	C (20-50 MW)	D (50 MW+)
Energy price, 30% CF	101.5 £/MWh	98.5 £/MWh	88.5 £/MWh	88.5 £/MWh
Energy price, 25% CF	110 £/MWh	109.5 £/MWh	97 £/MWh	90 £/MWh

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Thanks for your attention
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