How Close Is Onshore Wind To Zero-Subsidy?

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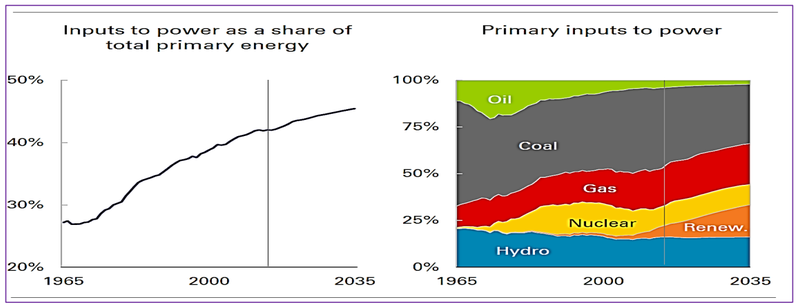
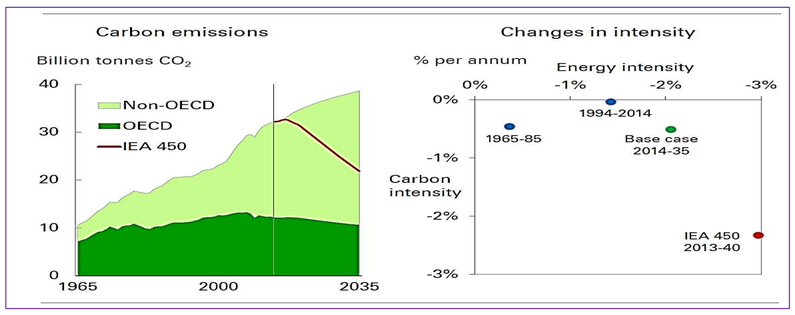
Motivation

Global energy consumption continues to rise as population and GDP rise. 80% of world's power is expected to be generated from fossil fuels by 2035.



- Effects: Excessive pollution on air and water by carbon and nitrogen dioxide emissions.
- Carbon emissions are expected to increase 20% by 2035.
- Renewable energy, the alternative to fossil fuels is expected to constitute 16% of world's energy generation.



- Renewable energy in UK was 19.1% of total electricity generation in 2014.
- Government support to the industry was about £800 million.
- On 8th October, 2015, DECC hinted at removing public subsidies.
- Quarterly FiTs published in April 2016 to March 2019 by OFGEM for onshore wind farms (below 5MW) sees gradual reductions every quarter.

Research Questions

- Are small scale onshore wind farms economically viable under a zero-subsidy regime?
- Can withdrawal of subsidy affect the deployment of onshore wind?

Methodology

A cost benefit analysis was modelled to evaluate profitability of different small scale onshore wind farms.

Category A*: 0.05MW or less.
Category B: between 0.05MW and 0.1MW.
Category C: between 0.1MW and 1.5MW.
Category D: exceeding 1.5MW.
Two scenarios: subsidy and zero-subsidy regimes.
Each category modelled under low and high load factors.

- Sensitivity analysis: decrease or increase in key variables by +/- 10%.
- Monte Carlo simulation: factored uncertainties such as load factor, electricity prices and generation tariffs.
- Investment decision tree: determines whether an investor should invest irrespective of the uncertainties.

Results

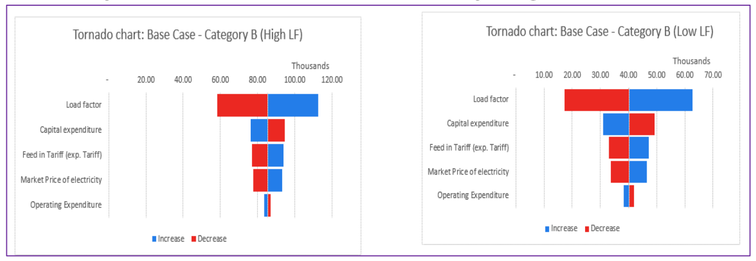
Subsidy (Base case)

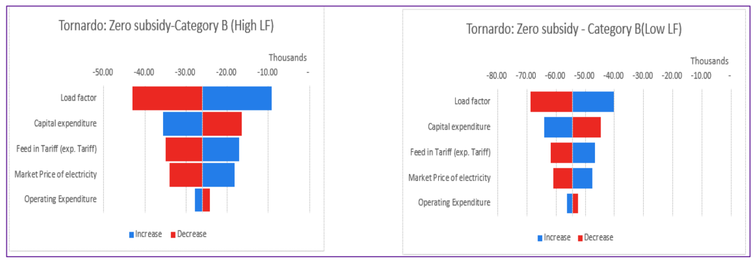
- Categories B and C have favourable economic indicators (NPV, IRR, PI ratio and Payback period).
- Category D is not favourable due to low FiTs. They are however profitable under renewable obligations.

Zero-subsidy

- Economic indicators are unfavourable for all categories.
- Producers require cost reductions between 75% and 85% which is unlikely. BP predicts cost reductions between 25% to 40% by 2035.
- Government can sustain investment by increasing export tariff between 73% and 31% for low and high load factor farms respectively.

Sensitivity analysis: Wind farms are profitable under subsidy but not under zero-subsidy regimes.





Monte Carlo: There's a 4% probability of making a loss under subsidy and 84% under zero-subsidy regimes.

Discussions and Recommendation.

- Onshore wind energy is far from zero-subsidy. Cannot be deployed under zero-subsidies.
- Developers are to create ancillary services to increase revenues which include storage and transmission.
- Although uncertainties exist, investors are better off 'investing' now than choosing 'not to invest'.
- Government is urged to treat the renewable energy sector as a legitimate, mainstream form of energy generation with a desire to provide clean energy.
- Industry needs continued support if reduction in net carbon account by 80% is to be realized by 2050.

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