Cost of energy of offshore wind in the US

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Problem Statement

Rising carbon-dioxide concentrations threaten catastrophic climate change and ocean acidification. Carbon-free energy sources such as offshore wind power are plentiful and cheap, but their higher commercial cost relative to conventional carbon-emitting sources provokes debate. In order to better understand and participate in these debates, it is valuable to understand the factors determine the cost of offshore wind energy, as well as the range of expected values for that cost.

Offshore operations can be costly

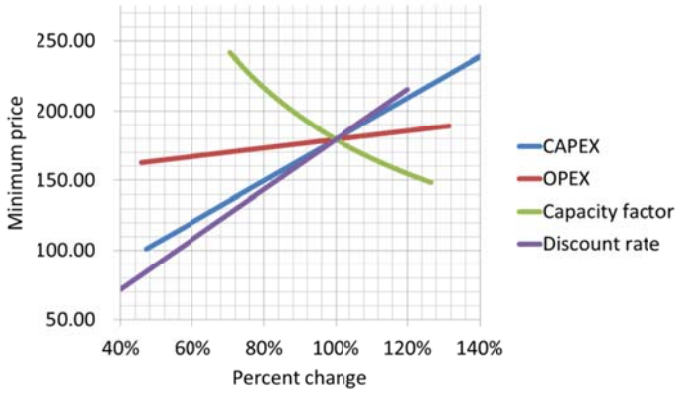
Objectives

The ultimate policy objective of this work is to contribute to the timely and efficient abatement of carbon emissions. This research forms part of a more general policy decision already made by many coastal governments to commit to the implementation of offshore wind as part of a strategy for, among other things, carbon-abatement. By creating and publishing a credible cost of energy model tailored to offshore wind, we expect to inform the design of government policies directed at the encouragement of offshore wind, as well as to educate other stakeholders to minimize costs.

Method

A cost of energy model will be adapted from the literature. Reasonable ranges of values for parameters in that model will be investigated and justified. Results will be calculated as sensitivity analyses, with a series of contour curves giving a representation of the dependence of energy cost on the three most sensitive variables. Finance cases will be collected from existing power plant projects representing subsidization of those parameters and the impact on energy costs. These cases will serve to direct calculation of a single cost data point, as well as to evince the feasibility and peculiarities of such subsidies.

Preliminary results



Calculations indicate that capital expenditures (CAPEX), capacity factor, and the risk-sensitive discount rate used to compare cash flows at different times are key drivers of cost. Further investigation will focus on cases where subsidies have been provided for each of these: capital, production, and risk.

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