A real options approach to analyse wind energy investments under different support schemes - DTU Orbit (31/12/2018)

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A real options model is developed to evaluate wind energy investments in a realistic and easily applicable way. Considering optimal investment timing and sizing (capacity choice), the model introduces a capacity constraint as part of the optimisation. Several correlated uncertainty factors are combined into a single stochastic process, which allows for analytical (closed-form) solutions. The approach is well suited for quantitative policy analysis, such as the comparison of different support schemes. A case study for offshore wind in the Baltic Sea quantifies differences in investment incentives under feed-in tariffs, feed-in premiums and tradable green certificates. Investors can under certificate schemes require up to 3% higher profit margins than under tariffs due to higher variance in profits. Feed-in tariffs may lead to 15% smaller project sizes. This trade-off between faster deployment of smaller projects and slower deployment of larger projects is neglected using traditional net present value approaches. In the analysis of such trade-off, previous real options studies did not consider a capacity constraint, which is here shown to decrease the significance of the effect. The impact on investment incentives also depends on correlations between the underlying stochastic factors. The results may help investors to make informed investment decisions and policy makers to strategically design renewable support and develop tailor-made incentive schemes.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, University of Copenhagen
Contributors: Kitzing, L., Juul, N., Drud, M. S. L., Boomsma, T. K.
Pages: 83-96
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Applied Energy
Volume: 188
ISSN (Print): 0306-2619
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 8.44 SJR 3.162 SNIP 2.765
Web of Science (2017): Impact factor 7.9
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 7.78 SJR 3.011 SNIP 2.61
Web of Science (2016): Impact factor 7.182
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 6.4 SJR 2.835 SNIP 2.593
Web of Science (2015): Impact factor 5.746
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 6.93 SJR 3.158 SNIP 3.218
Web of Science (2014): Impact factor 5.613
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 6.59 SJR 3.06 SNIP 3.346
Web of Science (2013): Impact factor 5.261
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 5.69 SJR 2.778 SNIP 3.076
Web of Science (2012): Impact factor 4.781
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes