



Renewable Energy Auctions: Lessons from Germany, the UK, and the Netherlands

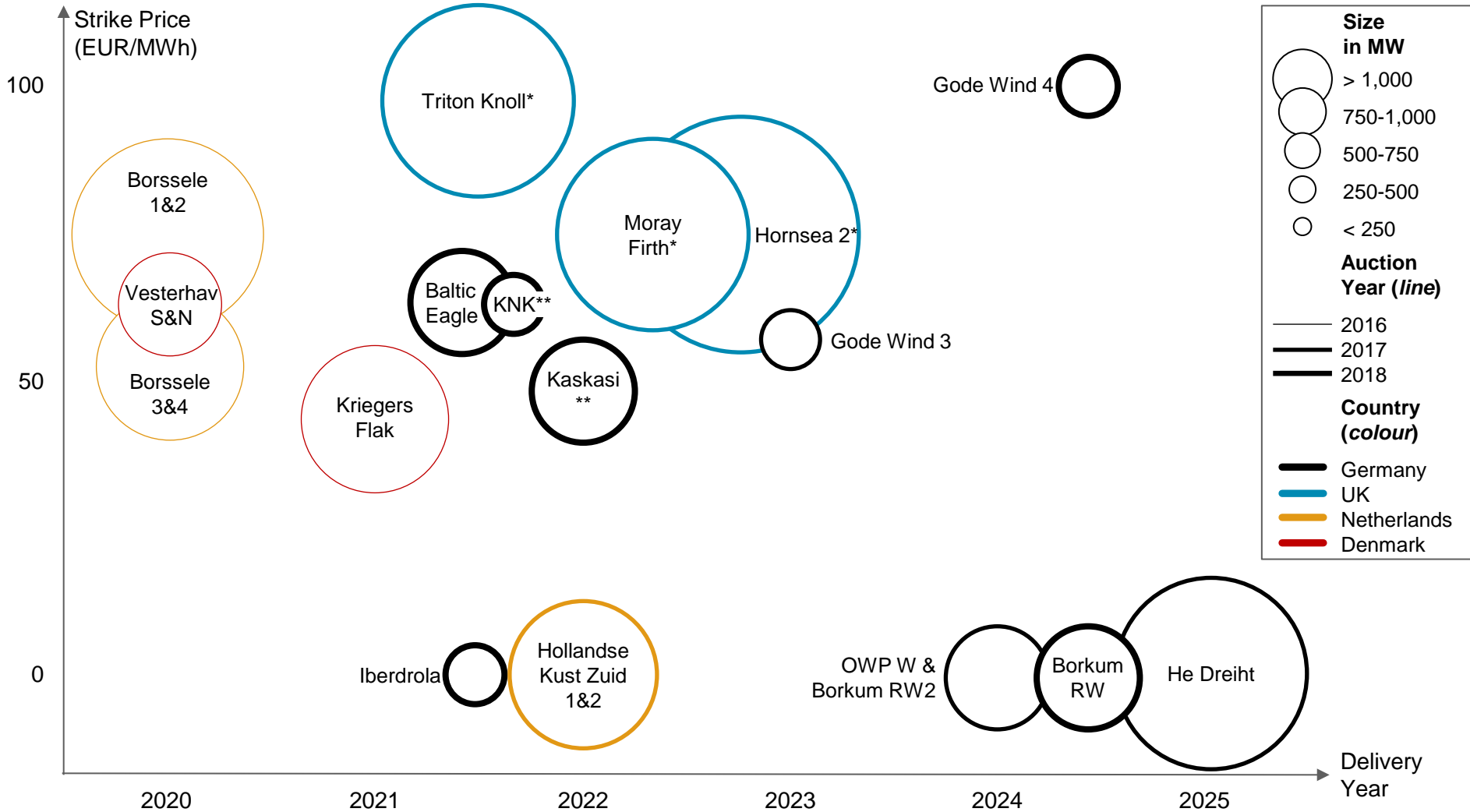
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Strommarkttreffen
Berlin, 4 May 2018

Insight in Economics™

Plenty of variation in recent offshore wind auction results

Delivery year, auction year and local specifics hold more explanatory power than size



Germany: Zero subsidy pioneer

2017 round had the first ever “zero bids” based on likely “real options” view of the auction



First round (2017)

- First of two auction rounds for “existing projects” to be delivered between 2021 and 2025; bids for guaranteed floor prices
- 1,380 out of 1,490 MW at “zero subsidy” (zero floor); Ørsted had 110 MW at 60 EUR/MWh
- Only projects in the North Sea were successful; most with delivery dates towards the end of the period
- Zero floor bids likely factor in significant technological progress and increasing wholesale prices
- Long lead times until realisation and (relatively) low penalties may mean bids are viewed as “real options” → how to ensure delivery?

Second round (2018)

- 1,610 MW awarded to 6 winning projects owned by Iberdrola, innogy, Ørsted, and a consortium of municipal utilities
 - Larger range of successful bids (0 to 98.30 EUR/MWh) and higher average price (46.60 EUR/MWh) than in 2017*
 - Co-location with prior projects seems to hold more explanatory power than lead time / size in this round
 - No bifurcation between Baltic Sea and North Sea projects despite Baltic Sea quota
- Under current rules for the future “central model” the reference price for future auctions is fixed at zero with only a random draw to break a tie

UK: The last of “ye olde worlde”



UK use of fixed price CfD and inclusion of the connection cost in the bid means zero bid equivalent is a bid below the wholesale price

Latest auction outcomes

- In April 2017, UK carried out a cross-technology auction covering offshore wind as well as biomass and energy from waste
- 3.2 GW of capacity awarded for three offshore wind projects:
 - Triton Knoll (860 MW, innogy): 94 EUR*/MWh for delivery in 2021/22
 - Hornsea 2 (1,386 MW, Ørsted), Moray Firth (950 MW, EDPR/ENGIE): both 72.30 EUR*/MWh for delivery in 2022/23
- The lowest bid was half the strike price of the previous auction in 2015 but...
- Bids look higher on a headline level than the German bids although significant differences between schemes need to be taken into account (see RHS)

Key take-aways

- Key features that differ from rest of Europe:
 - „Two-sided“ CfDs (fixed prices not floor prices) rule out zero bids
 - Cost of connection included in price
 - Earlier delivery dates than Germany, rd 1 but similar to rd 2
 - Contracts in the UK are inflation-indexed
 - Under a budget rather than a volume target lower prices allowed all eligible wind projects to “fit in”
- Penalty regime differs too (exclusion from future auctions for up to 24 months instead of financial penalties) but not clearly harsher
- Last country to retain auction format with different sites competing for a budget → bigger role for strategic bidding than elsewhere

The Netherlands: Fully embracing zero subsidy

After several auctions for subsidies, the Dutch government explores the option to auction site licences for off-shore wind parks



Past auction outcomes

- Prior to „zero subsidy“ NL led the reduction in offshore pricing with
 - Borssele 1&2 (Ørsted, 2020) at 72.70 EUR/MWh floor price; and
 - Borssele 3&4 (Shell-led Consortium, 2020) at 54.50 EUR/MWh floor price
- In 2017, Hollandse Kust Zuid 1&2 (700 MW; to be built by 2022) became the first explicitly “zero bid” auction
 - Vattenfall beat other zero bids from Statoil, innogy and Eneco-led consortium
 - Project was awarded the option to build the wind farm based on non-price criteria:
 - Cost-efficiency of the bid (*highest weight*)
 - Risk analysis (incl. PPA; *biggest differences*)
 - Four others

Key take-aways

- Significant interest in zero subsidy auctions even for 2022 delivery but some specifics to be borne in mind:
 - Cost of connection covered by the government
 - Availability of PPAs in NL
 - Size and co-location of sites
- Where next for auction formats?
 - Non-price criteria lose some of the efficiency; re-consider price-based rule
 - Continuing to auction two licenses adds complexity to format (aggregation risk)
 - Multi-round ascending bid auctions could support price discovery
- Is PPA market well enough developed to make bidders willing to pay for development rights?

What's next for Germany and beyond

A selection of key questions going forward

High level policy questions

- Coalition agreement (albeit not the draft EEG revision) envisages additional offshore wind auction → an option to re-include some of the projects shut out by the WindSeeG but need to consider ex post change to value of projects successful in first two rounds
- EEG 2017 limits pricing for “central model” to zero with ties to be broken by random draw → more efficient mechanism required

Longer-term questions

- General auction design (sizing, sealed bid vs. multi-round, pre-developed vs. multi-location, tech-specific vs. tech neutral)
- Trading off probability of delivery and ensuring low prices (lead times, 1-way/2-way CfD, bidding on the size of the penalty?, ...)
- Price-based (with connection included?) or other selection criteria (probability of delivery, regional criteria, sustainability, ...)
- Who offers PPAs (state via two-way CfD vs. market, size of corporate PPA market, political / counterparty risk insurance)
- Which players remain active (BigOil vs. pension funds will depend on availability of risk mitigation, benefits of co-location may limit future competition / potential for repeat in new markets)

About Us



Your speaker – Dominik Huebler

- Principal in the Energy, Environment, Communications & Infrastructure (EECI) Practice in Berlin
- 10 years of experience in consulting for infrastructure companies, investors, law firms and public institutions, e.g.,:
 - Regulatory and market due diligence for off-shore wind projects, cogeneration and regulated networks in Germany and Europe
 - Advice on economic questions regarding the German Renewable Energy Act (EEG) and Combined Heat and Power Act (KWK-G) for different clients
 - Economic consulting in legal, arbitration and regulatory proceedings, e.g., on WACC estimation, the German nuclear moratorium and gas storage contracts
 - Several publications in energy economics, e.g., on §24 Renewable Energy Act (reduction of the support in the case of negative prices), evaluation of incentive regulation, etc.
- Economist with a double master's degree from the Universities of Oxford and Cambridge



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- Main practice areas:
 - Energy economics
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- Core business in energy economics: renewable energy, electricity markets, network regulation, due diligence, economic consulting in legal and arbitration proceedings
- Worldwide team of experts on auction strategies and analyses
- Cooperation with leading German academics, e.g., Ulrich Schwalbe, Roman Inderst

Want to know more NERA experts have published widely on the topic of renewable energies and auctions

NERA ECONOMIC CONSULTING

Mar 2017

Hart am Wind: Einsichten aus der Optionsbewertung zu den Ergebnissen der ersten deutschen Offshore-Wind-Ausschreibung und ihren Auswirkungen

Kernpunkte

Die Nutzung von Ausschreibungen zur Vergabe von Subventionen für erneuerbare Energieträger war in den vergangenen Jahren vielfach Gegenstand wissenschaftlicher und politischer Diskussionen. Die Ausschreibungsergebnisse, die die Bundesregierung am 13. April 2017 verkündete, dürften diese Diskussionen weiter anheizen.

Die vier beschriebenen Offshore-Projekte haben Substanzwerte von 0 € bis 1,1 € (im Folgenden „Hürden“) abgegeben, da eine Markt-suffizienz-Voraussetzung des erzeugten Stroms am Markt bedarf. Der Ertragsstrom (Df) der sich mehrheitlich in den Nordsee-Regionen befindet, scheint sich die Bewerber für alle Projekte in der Nordsee mit einer Gesamtkapazität von 600 MW, davon 480 MW in zwei „Hürden“ zu je 240 MW. Sind die beschriebenen die Bundesregierung am 13. April 2017 ebenfalls mehrheitlich in staatlicher Hand befindlichen Stromerzeugungs-fähig in der Nordsee mit einer geplanten Erzeugungskapazität von 900 MW.

Auf den ersten Blick spricht die Tatsache, dass beide diese Projekte ohne explizite Subvention zu realisieren, dafür (Hürden) erbracht, die sich gerade diesem haben. Sollten die Projekte alle realisiert werden, Offshore-Windenergie in Deutschland und würde die bei der Errichtung der landestypischen erneuerbare Energie.

NERA ECONOMIC CONSULTING Imperial College London

UK Renewable Subsidies and Whole System Costs

The Case for Allowing Biomass Conversion to Compete for a CfD

Prepared for Drax

16 February 2016

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Gale Force Competition? Auctions and Bidding Strategy for Offshore Wind

Introduction

Many governments worldwide are rolling out auctions as their preferred method for allocating subsidies to renewable energy projects. Well-designed auctions can harness the power of competition to deliver renewables more cost-effectively than when government officials set support levels. Auctions, however, introduce allocation risks – the risk that a project will not be allocated support. Bidders need to understand auction dynamics and must be able to identify which bidding strategy is most likely to result in a favourable outcome. Ideally, bidders seek a winning bid at an price that does not leave them regretting their

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Modelling the GB Renewable Electricity CfD Auctions – the cost of excluding onshore wind and maintaining separate pots

A project for Citizens Advice – Final Report

Project Team
Rachel Baxton
Alex Gammell
Kamil Borkowski
Sara Peacock
Dr Clemens Koenig

October 2015

NERA ECONOMIC CONSULTING

Economic Risk Assessment for Offshore Wind Investments in Germany – An Initial Assessment

Prepared for

3 April 2014

Auctions in Europe

relatively expensive form of renewable shore wind industry have undertaken concerted in early June 2016, energy ministers from mechanism of understanding to reduce offshore companies issued a letter confirming their belief megawatt hour (MWh) by 2025. The industry (and several countries) have made clear that go ahead without significant cost reductions.

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Changes in Hurdle Rates for Low Carbon Generation Technologies due to the Shift from the UK Renewables Obligation to a Contracts for Difference Regime

Department of Energy and Climate Change

9 December 2013

NOMOSKOMMENTAR

Spieth | Lutz-Bachmann (Hrsg.)

Offshore-Windenergie recht

WindSeeG | EEG | EnWG

Handkommentar

Nomos

QUOTIDIANO ENERGIA
www.quotidianoenergia.it

FOCUS SUI MERCATI INTERNAZIONALI ROMA 13 DICEMBRE 2016

Aste Fer: le esperienze di UK e Germania

Meccanismi utili per contenere i costi ma attenzione a non complicare le procedure e all'effettivo completamento dei progetti. Uno sguardo oltreoceano in attesa delle graduatorie Gse

di M. Schioborn*, D. Ravev*, A. Carme* e D. Hübler*

La chiusura delle aste previste dal DM 23 giugno 2016 a fine novembre ha segnalato un notevole interesse (da parte degli investitori) con una domanda (circa 2.000 MW) più che doppia rispetto alla potenza disponibile in offerta (circa 1.000 MW). Il meccanismo delle aste per l'assegnazione alle rinnovabili è stato introdotto in Italia nel 2012 (DM 6 luglio 2012) ed è ormai utilizzato da numerose altre Paesi europei poiché promuove lo sviluppo di energie rinnovabili assicurando, al contempo, la minimizzazione dei costi attraverso la concorrenza fra operatori.

Dato il successo di questo strumento di incentivazione, è quindi interessante dare uno sguardo alle esperienze di Regno Unito e Germania e le lezioni che vi si possono trarre in attesa della pubblicazione (da parte del Gse della graduatoria delle aste) prevista entro il 20 dicembre 2016.

Il sistema ad aste per i sussidi alle rinnovabili fu introdotto nel Regno Unito nel 2014 con una delle aste più grandi e più "tecnologicamente neutre" della Ue. Oltre 2 GW di progetti hanno ricevuto ricentrate per un valore annuale di oltre 300 milioni di sterline (circa 350 mln di euro) nel 2020. Secondo il regime britannico, le aste stabiliscono l'ammontare degli incentivi riconosciuti agli impianti rinnovabili di grandi dimensioni allocando ai migliori offerenti un contratto per differenza ("Contract for Difference", CfD) e garantendo una remunerazione prefissata pari al cosiddetto "strike price" (il prezzo di esercizio) per una durata di 15 anni. Laddove il prezzo all'ingrosso dell'energia elettrica è inferiore allo strike price, l'impianto riceve un'integrazione pari alla differenza tra il prezzo di mercato e lo strike price, se è superiore, l'impianto deve invece restituire la differenza. Le aste permettono a tecnologie diverse di competere l'una contro l'altra, ma viene fatta una distinzione tra aste dedicate a tecnologie "tradizionali" (tra cui soprattutto fotovoltaico) e aste a tecnologia





Thank you for your attention!

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