

Designing electricity transmission auctions: Applications to UK Round 3 Offshore Wind projects

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Auctions everywhere...

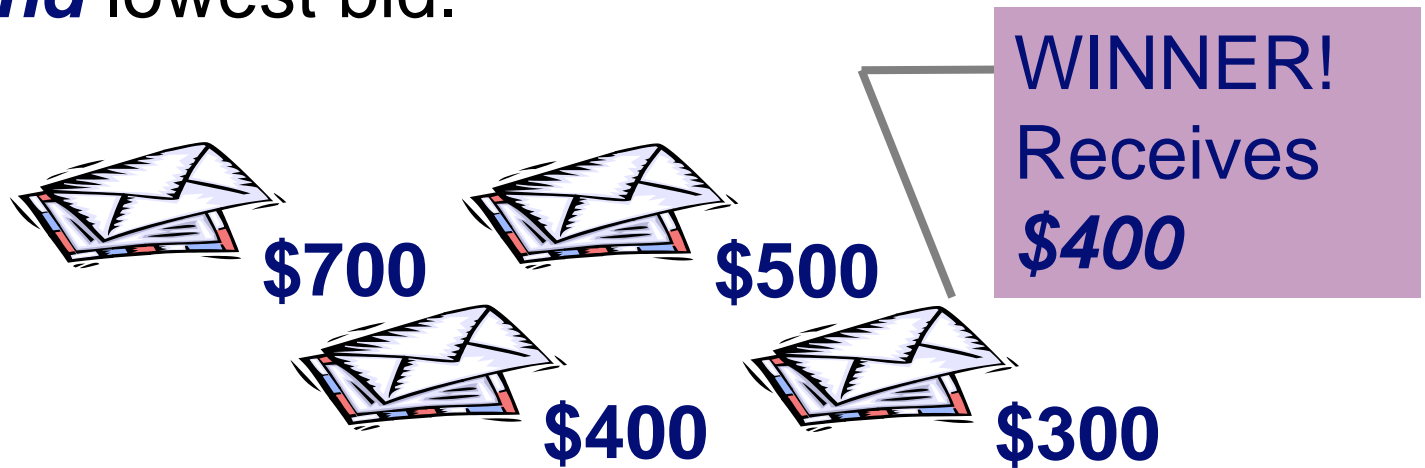
- Auctions are commonly used to sell (and buy) goods that are idiosyncratic or hard to price.
 - Real estate
 - Art, antiques, estates
 - Collectibles (eBay)
 - Used cars, equipment
 - Emissions permits
 - Natural resources: timber, gas, oil, radio spectrum...
 - Financial assets: treasury bills, corporate debt.
 - Bankruptcy auctions
 - Sale of companies: privatization, IPOs, takeovers, etc.
 - Procurement: highways, construction, defense.

Procurement Auction Theory

- Basic types of procurement auction:
 - The English auction or the descending price auction
 - The Dutch auction or the ascending price auction
 - The first-price sealed-bid auction
 - The **second-price sealed-bid auction**
- Multi-unit procurement auctions

Second-price sealed-bid auction

- All buyers submit bids.
- Buyer submitting the lowest bid wins and receives the **second** lowest bid.



- Bidding strategy is easy
 - Bidding one's true valuation is a **dominant strategy**.
- **Intuition:**
 - The amount a bidder receives is not dependent on her bid.

Rationale for studying the second-price auction

Theory

- We get the true costs. We know this and we can react on these!
- If the item belongs to the person who values it most = welfare optimum.
- Add a proxy agent and you get an exact representation of one of the most used and acceptable auction design used in real life, the English auction.

Real life

- True costs can end up being the lowest costs.
- Ethics - incentivizing people to tell the true can have an effect on future auctions and/or negotiations.
- Used - Ebay and English auctions (paintings, Estate, cars).

What is a good auction?

- Truthful bidding = efficiency
- Optimality = revenue maximisation / cost minimisation in procurement auction
- Attract entry
- Prevent collusion
- Enhance substitution
- Encourage price discovery

Source: Ausubel and Cramton (2011); Klemperer (2002)

Our research and contribution

What we do:

- Look at public procurement processes
- Look at offshore and onshore wind, but our mechanism can be applied to any large infrastructure investment
- Auctions
- Optimal network designs
- Optimal length-of-contracts from builder and financier

What we use:

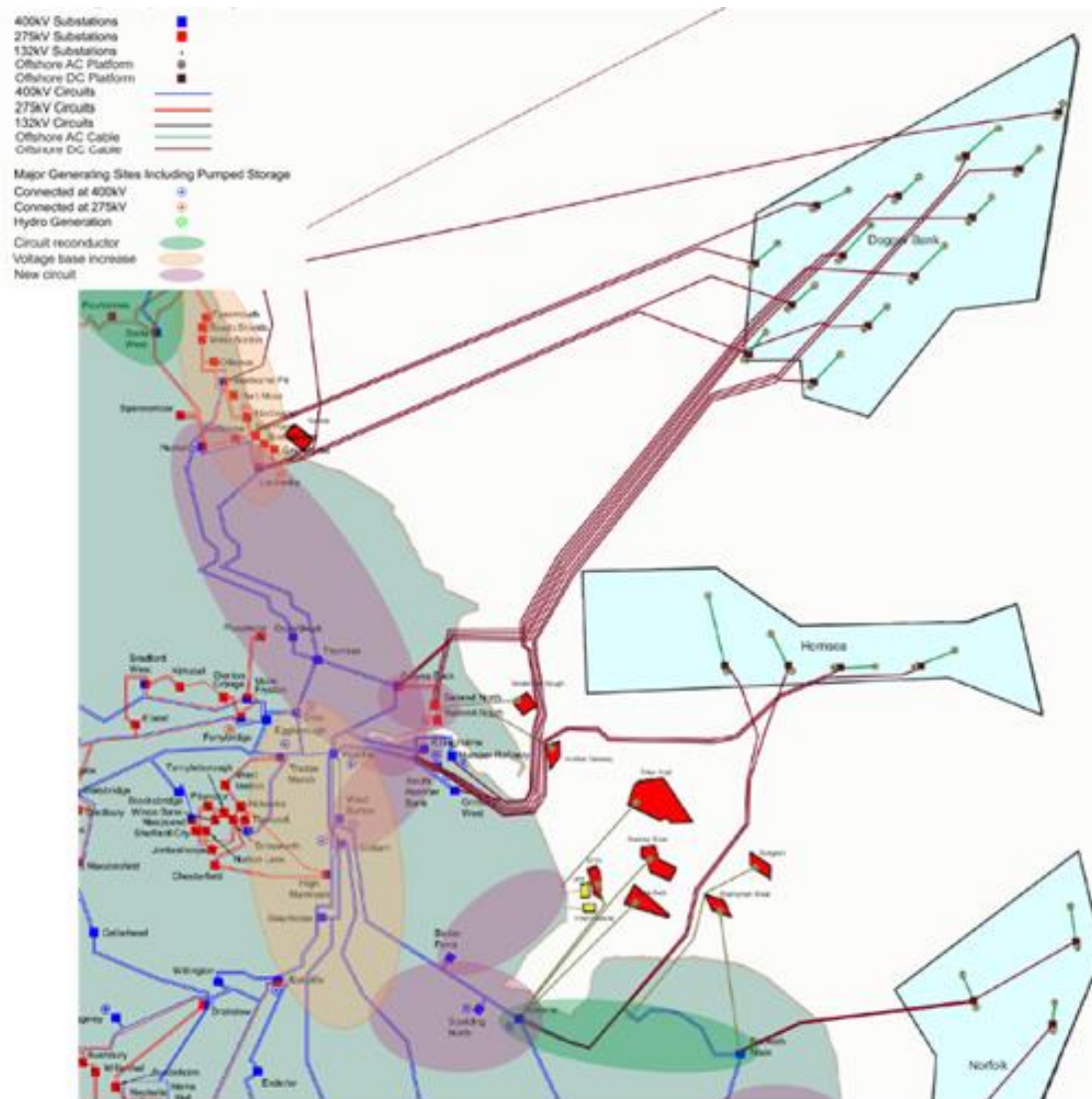
- The second-price rule
- Package bidding
- Objective evaluation – the auction determines the outcomes
- Mechanism to attract entry and prevent collusion
- Enhance substitution
- Encourage price discovery

Offshore Transmission

Background

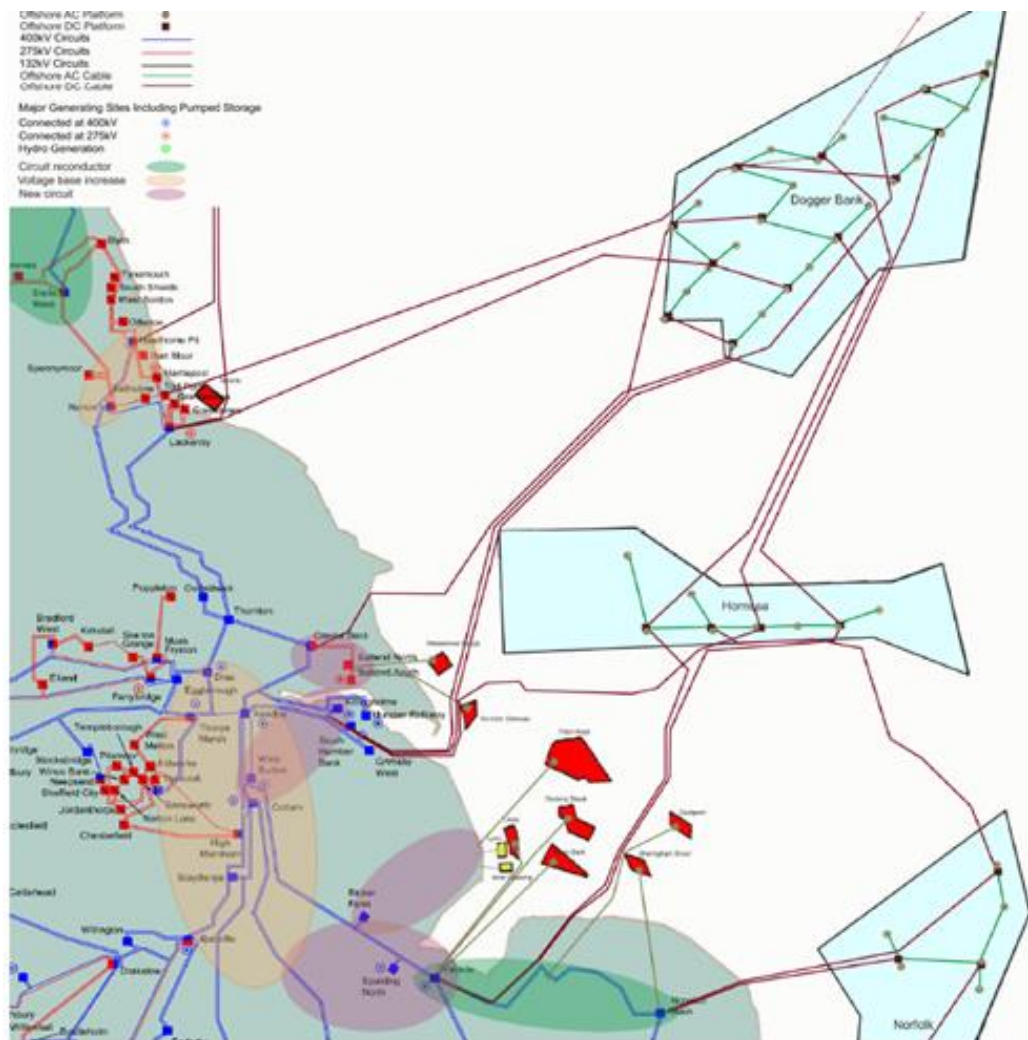
- The DECC and Ofgem (the regulator) have worked since 2005 to establish a competitive regulatory regime which facilitates the growth of the offshore sector.
- In March 2007, the government decided on the overall framework for offshore transmission. The decision included an approach to launch a competitive tender process to secure licences to build, own and operate offshore transmission assets.
- In July 2009, Ofgem launched the first round of competitive tenders for offshore electricity transmission owners (OFTO) to own and operate links that have been, or are currently being, constructed by the developers of the relevant offshore wind generation projects.
- Bidders submit bids against each other in terms of a 20-year revenue stream (20-year contract) that they would require to buy the assets (at a fixed transfer value), and to operate them. This is called a TRS value.

Our focus region: Point-to-Point Design



Source: National Grid (ODIS), 2011

Our focus region: Co-ordinated Strategy Design



Source: ODIS, 2011

Critique

- Subjective evaluations (in the questionnaire stage)
- First-price sealed-bid auction
- Predefined networks
- Not possible to submit bids on a group of network links.
- The optimal length of contract?

Contribution

Question:

- Is it possible to design an auction where bidders might propose and build own suggested/different offshore (and associated onshore) network configurations and where bidding for packages transmission assets is a possibility?

What we do:

- We contribute to the literature on auctions by highlighting the motivations and consequences of providing freedom to design own networks and package bidding in the market for offshore transmission.

Insight:

- We want to secure that: (1) opportunity to propose different network configurations, (2) submit bids on packages (gain from synergies), (3) have a reserve configurations, (4) have a maximum costs (TRS value).

Ideas for auctioning transmission links

- We transfer the Telecom model/package clock auction to auction transmission links - How?
 - We divide the whole area in the Co-ordinated Strategy Design into zones and blocks.
 - Each DC and AC link and onshore converter station is divided into blocks of the same size.
 - There is a reserve TRS value for each block.
 - Like the spectrum band, there is a maximum number of blocks for sale.
 - There is a maximum number of bids on each block.

Possible bidding strategies

- One link with one connection point
- Two links and one connection point
- All connection points
- All links
- Three links as one whole link
- The whole “figure”, for example, the all links and connection points

Results

- Gives the freedom to design networks
- Package bidding allows synergies to be exploited
- Obtain at least the Co-ordinated Strategy Design, with bidding for single parts still possible, allows testing of claim of synergies from co-ordination.
- Secures a maximum TRS value per block
- Second-price rule secures truthful bidding
- We get the optimal network design
- Can be tested on part of network

Current and future work

Current work

- (1) Length-of-Contract Auction
- (2) Mixed Model - general policy paper with options
different auction processes
- (3) Micro auctions for distributed generation with
flexible zones

Future work

- (1) Energy storage

Thank you

References

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