

Designing electricity transmission auctions: an introduction to the relevant literature

EPRG Working Paper 1221

Cambridge Working Paper in Economics 1245

Thomas Greve and Michael G. Pollitt

The UK has ambitious plans for exploiting offshore wind for electricity production in order to meet its challenging target under the EU Renewable Energy Directive. This could involve investing up to £20bn in transmission assets to bring the electricity ashore. An investment of that size calls for an efficient mechanism for determining which projects get financed and ensuring that the selected projects are delivered at least cost to consumers.

The electricity regulator's ongoing tender auctions are likely to work well for point-to-point transmission and for networks already built. However, the competitive tender rounds do not involve licenses to build as well as own and operate the transmission links. Nor do the tender rounds allow for the possibility to bid on a group of projects (i.e. to submit a 'package' bid).

However, it is still unclear what kinds of models could be considered for complex meshed offshore (and onshore) networks where licences are granted not only to own and operate, but also to build a transmission network. This paper is the first paper in a series of two. This paper provides a thorough survey on the current theory and experience of auctions, the second paper provides design suggestions to solve common auction problems that might arise in Ofgem's auction process. The main objective of this paper is to discuss the design of auctions for transmission assets in which bidding for packages of transmission assets is a possibility. This discussion is used to build the auction models suggested in our second paper.

The main lessons from experience for securing a good auction design in offshore transmission are that it is possible and desirable to allow bidders to submit bids to design, build, own and operate transmission links. Experience from Argentina and Brazil shows this point. Their transmission auctions were regarded as a success.

However only one link was up for auction at a time and so there was no possibility for package bidding. Experience from telecom auctions and the sale of long-term repo operations shows that the package clock auction and the “Product-Mix Auction” can induce optimality and efficiency.

From the auction literature, the main lessons for securing a good auction design in offshore transmission are as follows. First, the auctioneer has to be clear in defining from the start of auctioning what lots are to be auctioned to give the bidders the optimal conditions to price and make package bids. If the objects for sale have complementarities, package auctions should be considered. Lots with strong complementarities and package bidding allow bidders to benefit from economies of scale. Second, a package clock auction can reduce collusion and predatory behaviour, encourage price discovery, attract entry, and induce efficiency. Third, the “Product-Mix Auction” gives the possibility for the bidders to submit bids for both the quantity and the price. Fourth, a second-price auction can secure truthful bidding and attract entry, though vulnerable to collusion. Moreover, the “Pay-your-bid” price rule can discourage entry but reduces regret on the part of auctioneer.

We conclude that the auction for offshore transmission could follow the idea from the package clock auction, where we define a package as a group of individual lots. The “Product-Mix Auction” is worthy of further investigation, because it does offer a way to bid different qualities of bids. The quality dimension could be in terms of the length of regulatory financing guarantee sought.

We think that the auction can benefit from having a mechanism which encourages new, or previously unsuccessful, bidders. In order to secure the highest possible efficiency, comply with economies of scale, and ensure that all bidders can get the package in which they benefit most, we think that limits should be placed on the minimum and maximum combined size of lots sold to one bidder should be considered. In order to secure entry and in accordance with theory and experience, reselling following the auction could be an option. Non-monetary factors should be part of the auction. In such a situation a two-phase multiple factor auction is best-suited for auctioning offshore transmission.

Contact	tg336@cam.ac.uk
Publication	October, 2012
Financial Support	EPSRC - Autonomic Power Grand Challenge