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Competitive Bidding for Wind Sector

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Background

CSTEP organised a stakeholder consultation workshop on the wind energy sector at the request of the Ministry of New and Renewable Energy (MNRE) recently. The main objectives of this workshop were to discuss the results of the national wind potential reassessment study conducted by CSTEP, use geo-spatial analysis to locate high potential wind zones for further development, and discuss mechanisms to ease the problems currently plaguing the sector, such as inadequate site allotments, inefficient power purchase agreements, pricing of renewable energy etc.

As an outcome, a particular zone was identified to serve as a "pilot" for site-specific renewable energy potential assessment and economic validation. This would be followed by a trial of a price discovery mechanism using expressions of interest from industry applicants for sites in the identified zone.

In the above context, this working paper presents a summary of international experiences from auction mechanisms for wind energy, concerns and barriers to implementation of reverse bidding, and the way forward for successful bidding in Indian conditions.

Introduction to Competitive Bidding/Auctions

In the global context, competitive bidding as a mechanism for allocating renewable energy capacity is increasingly being implemented with varying degrees of success. Some developing countries that have conducted auctions for Renewable Energy (RE) include Brazil, China, Morocco, Peru and South Africa. As a procurement mechanism, reverse auctions are specifically considered to be effective in increasing cost efficiency and discovering the least price for generating electricity from a particular technology, due to their competitive nature.

In India, competitive means of procuring electricity generated from RE has been mandated in the Electricity Act of 2003 for appropriate state commissions. The main objective for doing so is to reduce the overall cost of procurement of power for the distribution licensees and ultimately the consumer. In addition, the Central Electricity Regulatory Commission (CERC) released regulations in the form of draft '*Terms and Conditions for tariff determination from Renewable Energy Sources*' in 2009. These guidelines cover grid-connected RE sources excluding wind power. Specific objectives of the guidelines are to:

- Promote competitive procurement of electricity from RE sources by distribution licensees
- Introduce transparency and fairness in project allocation processes
- Reduce information asymmetry for bidders
- Protect consumer interests
- Increase standardisation and reduce the gestation period for projects
- Provide flexibility for sellers on internal operations while ensuring a minimum level of certainty on availability of power for buyers.

Procurement of electricity through competitive means is also recommended in various policies such as the National Electricity Policy, National Tariff Policy, and the National Action Plan on Climate Change.

In terms of the implementation of the above mentioned guidelines and mandates, the reverse bidding mechanism has been used to successfully lower the price of electricity generation from solar technologies under the Jawaharlal Nehru National Solar Mission (JNNSM). While there are issues still prevalent in the actual completion of projects, it has proved to be effective for lowering price. The reverse bidding scheme resulted in reductions of 39% and 50% in Batch 1 and Batch 2 of JNNSM respectively, from the starting tariffs benchmarked by CERC[1].

Reverse Bidding for Wind Energy

In the wind sector, India has progressed significantly in the past decade, with the installed capacity having nearly doubled between 2008 and 2014 (Central Electricity Authority (CEA)). The growth so far has largely been attributed to two central policy instruments which have supplemented the Feed in Tariffs (FiTs) set by the states: Accelerated Depreciation (AD), a tax-saving benefit, and Generation Based Incentive (GBI), which results in increased revenues for wind projects.

However, fixed tariffs can have certain disadvantages. First, state-level tariffs are determined on a cost-plus basis which may result in inefficient cost of generation, due to asymmetric information on market and technology conditions. This can result in difficulty in realistically benchmarking input assumptions such as Capacity Utilization Factor (CUF), thus resulting in a higher price to be paid by the consumer and inefficient utilisation of the finite resource. Second, improvements in technology, such as benefits accruing from installing taller turbines with larger rotor diameters, are not captured in the actual performance or indexing parameters that are used to calculate the costs. Finally, it can also lead to a situation of creating windfall profits for developers when tariffs are set too high, or limit the entry of players in the market when set too low.

Given the above mentioned concerns and proven success of the reverse bidding mechanism in JNNSM, some states (such as Karnataka, Rajasthan, and Madhya Pradesh) have attempted to discover the least price for wind generation through reverse bidding and bid bonds, and the use of fixed tariffs to inform the bidding process. However, they have been met with limited success. For instance, Karnataka was the first state to initiate an auction for the process of wind energy project allocation. However, it was stayed due to a petition filed by a number of stakeholders, on the grounds that the Appellate Tribunal for Electricity (APTEL) does not have the legal competence required to direct state regulatory commissions to issue guidelines for competitive bidding for the procurement of energy from renewable sources[2]. It was decided that states could proceed with conducting auctions only after the Centre issued guidelines as per the Electricity Act of 2003. The Ministry of New and Renewable Energy (MNRE) has issued guidelines and standard bidding documents for the procurement of RE. However, these do not apply to the case of wind energy at present[3].

[1] http://eprints.exchange.isb.edu/305/1/1.pdf
[2] http://www.rerc.rajasthan.gov.in/Orders/Order140.pdf
[3] http://mnre.gov.in/file-manager/UserFiles/guidelines_tariff_gridconnected_powerproject_re.htm

Types and Design of Auctions

Internationally, recently conducted auctions fall into the three categories mentioned below[4]:

1. Sealed Bid Auctions

This is the most commonly used type of auction where eligible bidders simultaneously submit their bids with an undisclosed offer of the price per unit of electricity and the Mega Watt (MW) capacity to be allotted. Received bids are ranked and the project capacity incrementally allotted to bidders till the targeted capacity is reached. Provided below are a few examples of sealed bid auctions conducted recently in developing countries:

a. The first-price sealed bid auction which aims for the allocation of a single project to one developer – e.g. 160 MW of CSP for Ouarzazate I project, Morocco, 2011
b. Pay-as-bid auction which aims to allocate multiple units of one project with different prices to more than one developer – e.g. 3, 725 MW, South Africa, 2010. The advantage of this type of auction is that it diversifies the risk of incompletion of project by spreading the capacity across a variety of developers.

A sealed bid auction can be conducted in two phases, wherein the first phase is used as a pre-qualifying round for selecting eligible bidders. This may help screen bidders on the basis of certain desired criteria like financial capability to execute the projects. A two-phase sealed bid auction was conducted for the CSP project in Morocco, which consisted of a pre-qualifier phase and an evaluation phase. Since the technology was nascent and there was limited experience in auctioning it, detailed discussions were carried out with individuals to investigate the technical and financial capability of each bidder. This helped to select only those bidders that had the capability to successfully execute the project.

The main advantages of sealed bid auctions are as follows:

- Perceived as straightforward by bidders, hence lowers the cost of participation
- Simple and easy to implement
- Undisclosed bids prevent bidders from forming cartels[5]

2. Descending Clock Auctions

This type of auction is conducted in multiple rounds, where the first bid starts with a high price and progressively reduces until the capacity offered matches the capacity to be procured. This is a more dynamic process where bids are disclosed between participants. Some advantages of this type of auctions are as follows:

- Allows for a fast price discovery, thereby introducing a high level of efficiency
- High level of transparency of the process
- Since winning bidders do not have to disclose the lowest price they are willing to bid, it encourages participation

[4] https://www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_energy_auctions_in_developing_countries.pdf
[5] Maurer and Barroso, 2011

3. Hybrid Auctions

This can be combination of a descending clock and sealed bid auction, where for instance the price discovered through a descending clock can be used as a ceiling price that is set to conduct a sealed bid auction to further lower the price. Brazil has implemented a hybrid auction, and it has been found to be effective in setting the ceiling price for the sealed-bid round and preventing collusion between participants.

Auctions can also vary in terms of design, i.e., the parameters on which they are based on. In terms of technology specification, they can be of the following types:

1. Technology-specific auctions: The main advantages of these auctions are that they promote new technologies in the market, industry development and create economic value. Brazil has conducted technology-specific biomass auctions in 2008, and wind only auctions in 2009 (with 60% domestic content requirement). This has led to market development, rise of local manufacturing, and lowering of prices of these technologies.

2. Site-specific auctions: China and Morocco have conducted site-specific auctions for offshore wind. While conducting them requires more effort from the government, they have the advantage of reducing certain risks for developers such as obtaining land and environmental clearances, carrying out resource assessments and access to the transmission network.

3. Technology-neutral auctions: Given a fixed capacity, this type of auction helps to identify the cheapest technology that can provide for it. In order to be effective, individual technologies need to be adequately developed. For instance, prior to 2010, RE auctions in Brazil were technology-specific. These helped to make the respective RE technologies mature and compete in the market. By 2011, they became cost-competitive with conventional technologies like natural gas in technology-neutral auctions.

4. Price ceiling: The government can set a ceiling price for the auction, above which bids are not considered. This price is not to be disclosed to the bidders to avoid the risk of participants bidding close to it and hence not lowering the price.

Case Studies:

South Africa's experience: In auctions conducted in South Africa in 2011, the ceiling price was set based on previous FiTs. In the first round, prices did not come down as the ceiling price was disclosed, which was rectified in the second round. In both rounds, no projects were allocated to some technologies, which indicate that their ceiling price may have been set too low.

Peru's experience: Price ceiling in auctions in two rounds in 2009 and 2011 were based on the project capital and operating costs over a certain lifetime, for a desired rate of return for the project. It was revealed only if it was exceeded by at least one bid received in the case where the total capacity was not allocated in a complete round[6]. They were successful in bringing prices down for small hydro, wind and solar PV technologies. However, target capacities were not fully met for biomass and small hydro, indicating that the ceiling may have been set too low.

[6] Maurer and Barroso, 2011

Risks and Concerns

Some of the main risks associated with auctions, and mechanisms to ensure minimising them, are summarised below[7]:

Auction-specific Risks:

1. Faulty auction design: Flawed tariff design, such as setting a very low ceiling price for bids, or conducting technology-neutral auctions before the individual technologies are mature can discourage participation from bidders. It can be minimised by use of well-designed schemes such as pay-as-bid type of tariff determination, which allows developers to commission projects at tariffs that they determine if they win a project.

2. Underbidding and cartelisation: In this case, non-serious bidders who are not capable of executing the project can quote non-realistic bids or collude with other bidders in order to win the contract and gain from benefits such as tax evasion, thus defeating the purpose of promoting deployment through auctions. Aggressive bidding can be countered by enforcement of penalties on non-completion of projects after bidding.

Project-specific Risks:

1. Completion risk: Here, the completion of the project can get stalled or run into unforeseen delays from hurdles faced in obtaining land for development, delayed environmental and regulatory clearances, and lack of ready transmission connections. This can be avoided through appropriate supportive measures such as completing resource assessments and ensuring that adequate transmission capacity is available before project development, as well as making the bidding process site-specific.

2. Financial risk and non-payment by off-takers: This is the inability of the project to secure adequate funding or achieve financial closure due to defaulted payments by buyers like distribution companies which are not financially healthy. Payment guarantee mechanisms can mitigate this risk and make the projects more bankable, as well as adequate research on the part of the government in screening applications to ensure that they have adequate financial capability to carry out the project.

Way Forward for Successful Bidding

Competitive bidding can be adopted as one of the alternatives to procuring wind power. In line with the objectives of the Electricity Act of 2003, the Government of India can transition to a competitive bidding framework for wind power procurement within a year. Based on the knowledge available on existing areas with high wind potential, 1000-2000 MW can be procured by competitive bidding once the following pre-requisites are addressed:

1. Availability of investment-grade wind resource assessments
2. Pre-identified land zones for development of projects

7 Shrimali et al, Reaching India's RE Targets: Effective Project Allocation Mechanisms, 2015

3. Transmission layout planning for evacuation, with proposed interconnections in the inter-state transmission system to ensure off-take of power among resource-rich and resource-deficit states
4. Clearances and approvals for pre-identified zones
5. Necessary conditions in PPAs with procuring entities such as payment guarantee – incentives could be linked to pre-identified clauses.

A two-stage competitive bidding process is possible for project development. The first bid/stage can be aimed towards allocating land/resource to wind developers and the second stage for tying up power sales to different off-takers, especially the utilities. This bidding can be on the basis of the most competitive tariff offered by the developer.

Single-stage bidding may be carried out, where a state electricity procurement agency or a specifically created Special Purpose Vehicle (SPV) can execute the bidding process to allocate a predefined capacity of wind power, and the required infrastructure is made available through the wind investment zone.

The table below provides the basic categories that apply to a project developer and the possible options that they can choose from to make their optimal business models for achieving the capacity deployment targets.

A. Resource Assessment	**B. Procuring wind turbines**	**C. Land Ownership (MLU)**	**D. Project Allocation**	**E. Incentive**	**D. Power Procurement**
NIWE + Research Agencies	100% indigenous products	Public	Single Source (SNA/ UVNL)	AD / GBI for the next 3 years for onshore and 8 years for off-shore wind power	Feed-in-Tariff
					REC markets
PPP Model for investment grade resource assessment	Import products (Raw materials/ finished products) up to 50%	Private	Competitive Bidding	Revised market discovered tariff	Competitive bidding – utility based (Case 1)
					Open access
	Import products (Raw materials/ finished products) over 50%	Part private part public			Bilateral Agreement

In conclusion,

- Competitive bidding has the potential to address issues like grid connectivity and dispatch, and provide the impetus required for increasing India's domestic manufacturing capability, if designed with appropriate supportive policies.

- While Case 1 bidding can be started faster considering more developers have land banks with them, Case 2 bidding would put all players on a level playing field and benefit the growth of the sector in the long term.

- Risks to both, the government and developer can be overcome with careful design of the bidding process and addressing the pre-requisites of transparent availability of investment-grade resource information, and zones that are identified as ready for development.