LANTAU INDIA

Summary of Deliberations in Roundtable on

India's Electricity Markets Development

Summary Note

21 June 2024

This document aims to summarise the deliberations held in the event in order to capture the gist of views expressed by the speakers, panelists and the participants and identify the potential action areas.

The Roundtable was addressed in the inaugural session by Chairperson CERC, Chairperson CEA and Additional Secretary, Ministry of Power. The speakers emphasised on the need to ensure Resource Adequacy, modify the design of long-term contracts, introduce new types of short-term contracts, and redesign policy instruments to address the implications of integrating the projected huge quantities of VRE with the grid, with the objectives of mobilising necessary investments for meeting the ever increasing demand and decarbonisation targets, and improving reliability and cost efficiency.

Three presentations were made by the experts from TLG. The presentation on Capacity Remuneration Mechanisms(CRM) by Rajat Sarawat explained the need for CRMs and the key aspects for designing the capacity markets. The presentation on Contract for Difference (CFD) by Akhilesh Awasthy touched upon the evolution of these instruments, key design aspects, regulatory and policy areas to be addressed for introducing CFDs in India, and the various options to handle the financial burden of counterparties. The presentation by Mike Thomas explained the evolution of electricity sector markets globally over last several decades, noting how an important evolution in market design involves shifting away from physical contracts to financial contracts. Physical contracts may impose constraints that interfere with the optimal operation of the power system, leading to higher overall system costs. Financial contracts allow the physical power system to be operated at overall least cost whilst enabling costs, value, and risk to be allocated to stakeholders more closely in line with their preferences and abilities to handle risk. Another international insight is that local power system conditions must always be kept in view when designing markets, and pursuing objectives of economic efficiency, reliability and viability of the investments.

The panel discussion elicited the view points from the perspective of utilities in states, lending institutions, national/state power sector regulation, RE developers, global best practices, central power sector planning, and electricity exchanges. Roundtable also had the benefit of interventions from CMD, Grid Controller of India, and from ReNew Group after the panel discussion.

As identified in the issue note, the deliberations in the Roundtable mainly revolved around four areas, i.e. Resource Adequacy, Capacity Mechanism, Contract for Difference, and related Policy areas.

Resource Adequacy (RA)

There was a unanimous view that Resource Adequacy is a critical requirement both for ensuring reliability of supply and for well-functioning electricity markets. CEA has undertaken comprehensive exercises to prepare RA plans for the states. The process is supported by provisions in the Grid Code notified by CERC and the RA guidelines issued by Ministry of Power.

Resource adequacy has several dimensions, beginning with efforts to identify and map the key attributes of what makes a secure, reliable, and adequate power system, including efficient sources of energy (MWhs), adequate and reliable capacity (MWs), and a sufficiently responsive and agile ability to use MWs and MWhs to maintain system security. A key thrust and learning from global energy, capacity, and ancillary services market design experience is that if you design the elements well and enable appropriate market signals and mechanisms, greater efficiency is possible whilst meeting or exceeding relevant standards for adequacy, reliability, and security. The details matter.

Some aspects are designed to make planning and responsiveness easier. For example, it was felt that better weather forecasts can enhance the accuracy of demand forecasting, thus enabling more efficient system operation. A desirable feature of market-based systems is to simplify the process by which investors and customers are able to develop and contract for new sources of supply. Plans need to be adaptive in response to market developments. Ideally, plans inform stakeholders of opportunities whilst providing time for fulfilment of such opportunities through market activity, as supported by a capacity mechanism. Failing sufficient market activity, for any reason, backstop or supplemental processes can be utilised. It is more difficult for markets to function efficiently if centralised plans are treated as "action plans", as too much intervention quickly crowds-out possible innovative market-based resource development.

Though Rules exist for periodic preparation of RA plans, the associated processes can be better integrated by SERCs with the MYT petition process. The provisions in the draft DSM regulations proposed by CERC to levy the computed charges on the load serving entities, which have a shortfall between their contracted capacity and contribution to national peak, was appreciated as a right measure to ensure compliance with RA guidelines. There was a suggestion that although the states will be undertaking long term procurement at their level in accordance with RA plans, there was a need for optimisation of short-term capacity procurement at RLDC/NLDC level in order to reap the benefits of diversity of demand across the country. RA assumes special importance in the context of increasing demand on account of electrification of energy services, and frequent occurrence of extreme weather events. A recent example of a state in western India was quoted which met its peak demand during summer on the basis of centrally arranged gas-based generation, but without itself contracting adequate capacity.

Potential Action Areas:

1. Refine the process of preparing RA plans to keep it effective for increasing RE penetration scenarios. Maintain flexibility in RA planning so as to be able to accommodate changes and new developments with reasonable agility and flexibility.
2. Quick operationalisation of effective regulatory mechanisms (by CERC and SERCs) to ensure compliance by utilities with RA requirements.
3. Implementation of optimisation framework for RA requirements in the short term at NLDC level.
4. More robust weather forecasts be made available to load serving entities/discoms, though recognising that markets must work no matter how good the forecasts are. That said, it is always better to forecast more accurately if it is possible to do so at a reasonable cost. Robust forecasts would also impact the requirement of reserves.

Capacity Remuneration Mechanisms (CRMs)

As opposed to 'missing money problems' in most markets, in India the present system of rigid long term PPAs is leading to the perverse situation of an 'assured' money problem which is reflected in the reported reluctance on the part of generators to bring un-requisitioned power to the spot market.

Utilities are likely to face larger stranded costs in future if this aspect is not addressed. Many speakers emphasised the need to modify the structure of long term PPAs to align the generators with market-based dispatch. There was a dominant view that India needed a short-term capacity market immediately, which could be followed by a medium term capacity market in due course as and when there is greater visibility of markets. A short term capacity market could provide for auctions at national level, maybe quarterly or even more frequently, for capacities to be made available after a few days/months to three years, in which utilities

will be asked to participate for meeting the need as per RA plans. This market will facilitate trading of capacities tied up on long-term bases and also incentivise development of new merchant capacities. Such a market should hold auctions for separate categories (based on corresponding attributes) of eligible capacities as required for reliable and secure operation of the grid.

Effective markets promote the confidence of investors that market arrangements can deliver sufficient value to support the investments required to maintain a secure and reliable system. Whilst investors look for the comfort of 'assured' money, market design aims to reduce 'assurance' (which can be very costly) whilst nevertheless avoiding creating a 'missing' money problem through unintended incompleteness or inconsistency in the market design itself. If market designs do not remunerate optimal combinations of capacity, energy, and ancillary services sufficiently, then investors will likely underinvest or poorly perform over time, necessitating potentially more expensive interventions.

The tenor of a capacity market (how far out to contract and when to use auctions or other mechanisms) can be considered by reflecting on observed forecast accuracy. The more variability in forecasts one, two, three, and four years 'out into the future', the more important it is to build flexibility into an RA process, else the risk increases that the RA mechanism will be forced to lock in more capacity under worst-case scenarios. Where possible, adjusting mechanisms such as interim top up or adjustment auctions one or two years out, can alleviate such risk, whilst longer-term auctions set 4 or 5 years ahead can cater for the bulk of need. Running a capacity mechanism annually as well as running supplemental or backstop processes at any time there is a foreseeable shortage, is important to establishing stakeholder expectations and building market confidence. Through monthly/quarterly capacity markets, participants can deal with their seasonal deficits and surpluses thereby impacting the overall cost of contracting capacities. Short-term processes build confidence and enhance efficiency of longer-term behaviours only when short-term processes are rigorously predictable. Using short-term signals to influence long-term behaviours is a crucial aspect of modern energy markets, especially when there is often growing reluctance to use potentially expensive and inflexible long-term PPAs for every type of new resource investment.

Potential Action Areas:

1. Work on a template for a modified PPA structure which obligates the generator to participate in market-based dispatch of energy as decided by the off takers.
2. Prepare the contract designs and regulatory framework for launching national short term capacity markets for multiple type of capacities.
3. Examine the modalities for amending the legacy PPAs to align these with market-based framework which could be then implemented through suitable legislative mandates while protecting the interest of investors and the off takers.

Contract for Difference (CfD)

It was informed in the discussions that conversion of auction awards for RE capacities into PPAs was slow. Further, even though there was appreciation that Firm Dispatchable Renewable Energy (FDRE) contract auctions have resulted in competitive tariffs, some speakers expressed doubt as to whether these are an optimal solution. FDREs transfer the demand and price risks fully to the off takers. International experience indicates that RE penetration beyond 20% requires market-based integration of RE. Arrangements akin to CFD have been successfully tried in India in the BESS pilot and in procurement of gas-based generation centrally in supply crunch periods. In view of these deliberations, there was a consensus that India should go for CFD-based RE procurement for meeting the challenges of energy transition and also for management of risks at utility level. These could be introduced while FDREs auctions also continue for some time.

It emerged from the deliberations that lenders as well as RE developers are prepared to support CFD-based projects if the counterparty has good financial strength, like financially sound corporates and discoms with good ratings. Few merchant RE power plants have already been taken up by the private sector with 35-40% equity with the flexibility for entering into PPAs as and when opportunity arises in future. There was a suggestion that around 15% of the RE auctions by central agencies in a year could be offered through CFD mode, by aggregating demand from utilities based on their RA plans. C&I consumers are also likely to adopt this route if RPO fulfilment criteria are modified to include RE procurement through CFD route.

CFDs are flexible instruments that are designed to hedge exposure to spot market risk, allowing contracting parties to optimise the contract to meet their respective needs. CFDs can be very long term, or even very short. CFDs are financial contracts that do not compel that specific units be dispatched in particular ways to cover the obligations that the CFDs impose on the contracting stakeholders. The CFD determines who pays what to whom. The underlying actual sourcing of electrons from the physical 'market' is entirely separate. If the CFD price is high and the market price is very low, the seller of power may find it attractive to not generate but to buy from the market to meet the contractual obligation. The hedging strategy for RE-based assets will be to have a co-located storage so that the power is locally stored and injected into the grid at an opportune time, but in this case the difference of CFD and the market price must be compared with the cycle efficiency. Likewise, if a CFD price is low and a market price is high, the end user to the CFD may still have flexibility to not actually use the electricity but instead could enter a separate demand response arrangement and reduce demand and "sell" the excess power at an attractive price. The flexibility of CFDs means that the optimal operation of the physical electricity system can be the focus of electricity market design and operation and dispatch, whilst the commercial contracts are settled separately and reflect risk preferences and opportunities seen by market participants. CFDs are often very different from PPAs because PPAs are often expected to determine the physical operation of specific generation units – the expectation being that a particular generating unit or power station is to be used to service the contract. That can be very inefficient if the underlying units are not the optimal units to be dispatched. With increasing renewables integration, the predictability of "dispatch" of specific units is often changing, making CFDs much more appropriate for the energy transition.

It was suggested that CERC and SERCs should be fully involved in the regulation of CFDs for the power sector, while SEBI will have the regulatory jurisdiction. CEA is working for (i) developing procurement guidelines for CFD route and (ii) for suggesting ways to generate funds required by central counter parties through market processes. CEA is not in favour of putting this burden on discoms. It is also planning a 500 MW pilot RE procurement through CFD. Speakers suggested that CFD auctions should be held for plain vanilla solar and wind sources together. Newer sources like off-shore wind may be taken up separately.

Regarding design aspects of the CFD, it was suggested that duration of contract should be for the whole project life to take care of end-of-contract risk for the developers. While one view was to go for two-way design with no averaging, another view was to consider one-way design (with full upside with developer) in order to obtain lower strike prices and consequently lower fund requirements for the counter party. The design should also address the concerns regarding perverse incentives for the developers by suitable measures like stoppage of payouts during negative prices. Only limited financial support may be provided from central mechanisms for the initial few auctions until markets for CFD mature. Discoms should be asked to share the remaining part otherwise there would be huge demand for central support. Funds required for the limited central support could be mobilised through renewable cess on inter-state transmission charges.

Potential Action Areas:

1. Quickly develop Standard Bidding Guidelines for CFD-based RE procurement, including the permissible design options.
2. Tweak the RPO mechanism to permit fulfilment of obligation through CFD based procurement.
3. Launch a national programme indicating the capacities to be auctioned within the next three years, and the extent of central support proposed through centrally collected regulatory cess/charges for the CFD-based RE procurement by discoms.

Related Areas for Policy Interventions

During the deliberations, certain interventions by the Government and Regulators were suggested in order to facilitate the desired development of electricity markets. These are being briefly mentioned here:

1. Review of the 'must run' mandate for RE as India is going to see larger penetration of RE in its generation mix. Many markets include 'priority dispatch' for renewables, but when it is ultimately essential to protect system security, renewable energy resources must be curtailed. It is better to promote RE investors becoming more sensitive to the system risks they may impose by investing in certain locations vs others. 'Must run' as an RE entitlement can shift too much risk and costs to others.
2. Spot markets are seeing growth in volumes even during solar hours as a result of the various measures taken for demand shift, and it is not likely that India will see negative prices. CERC has taken several steps to increase probity in bidding behaviour and market surveillance. It also needs to review the large number of products being offered presently with the objective to reduce fragmentation of the spot market. A reasonably predictable framework for emergency measures like price caps would also be desirable. Medium term objectives should be to have a single spot market with adequate liquidity, say around 15% share of total electricity generated. Adequately liquid markets are a pre-requisite for necessary visibility to RE developers for quoting their strike prices.
3. Larger data disclosures by the system operator and power exchanges should be mandated by the regulators in order to enhance visibility of the market for the stakeholders.
4. Adequate redundancy in transmission expansion is needed for larger certainty to developers regarding connectivity to new RE projects.
5. Financial institutions may be asked to provide credit enhancement products like guarantees.
6. Stricter compliance with RPOs was recommended.

It was a pleasure to have such widespread and insightful participation from invited attendees. We look forward to an opportunity to follow up on similarly important issues in future Roundtable sessions.