Comments/Suggestions on the MNRE's "Draft Scheme for Supply of Round-The-Clock (RTC) Power from RE Power Projects, complemented with Power from Thermal Power Projects", by Prayas (Energy Group), Pune.

The current proposal to provide RTC power by bundling power from RE and thermal projects will not address the issues with grid integration before the sector. Without establishing the need for RTC, long term power in states and without providing DISCOMs with flexibility in procurement, such a scheme could result in resource lock-ins, increase in unutilized or backed down thermal capacity, high burden of contractual payments for stranded assets with DISCOMs. These would in turn severely affect DISCOM finances and the viability of the renewable energy sector. It is crucial that any scheme to address the issues of grid integration considers alternative options to provide flexibility in power procurement to DISCOMs in an optimal and cost-effective manner. Our detailed comments on some aspects of the draft policy are noted below.

1 Need for reverse bundling to address grid integration issues not tenable

The draft policy lists various rationale, objectives and benefits of the proposal, some of which are quoted below.

'2.1. The developments in renewable energy sector and the necessity to address the issues of intermittency, limited hours of supply and low capacity utilization of transmission infrastructure ***make case for "reverse bundling"*** *(emphasis added), wherein high cost thermal power is allowed to be bundled with cheaper renewable energy, and is provided round-the-clock to the DISCOM.*

2.2. Such bundling of RE power with thermal power can help in:

a) ***bringing down the overall cost of power supplied to buying utilities*** (emphasis added);
b) *further penetration of renewable energy;*
c) ***overcome the intermittency issues of RE power*** *(emphasis added),*
d) Meet the round-the-clock requirement of DISCOMS.

3. The main objectives of the scheme are as follows:

3.1. To provide RTC power to the DISCOMs through bundling of RE power with thermal power
3.2. To scale up renewable capacity additions and achieve economies of scale.
3.3. To facilitate fulfilment of RPO requirement of the obligated entities.

4. Benefits of the Scheme
4.3. DISCOMS will not have to undertake operations to integrate RE power into the grid since the responsibility of giving firm power will be with the Generator.
4.4. DISCOMs may further save due to optimum scheduling of power among the sources.'

While the issue of reliable and cost-effective grid integration of renewables, especially with the increasing share of RE is certainly a critical issue before the power sector, intermittency, low CUF and

low utilisation of the transmission network do not automatically translate in making a case for "reverse bundling". It must be noted that the original case of bundling solar and coal up to a limited capacity was a case of financial engineering to absorb the higher cost of solar with the incentive of lower cost power from depreciated thermal plants and had no implications for system operation.

The issue of renewable grid integration has two dimensions, namely medium to long-term capacity planning and short-term reliable system operation. Each state has a unique existing resource mix, existing load profile and likely growth pattern, depending on which, the type of future capacity (base load, peak/off-peak etc.) and the duration for which that capacity is needed (long term, short term, seasonal, weekend only etc.) will be decided. The ability of consumers to pay for such capacity, their reliability requirements and the risk that procurers will assign to especially long term contracts will also decide what capacity gets procured in the end. To address long term capacity planning, policy makers, regulators and DISCOMs need to ensure that a detailed Integrated Resource Planning (IRP) exercise is conducted using advanced power sector modelling tools which are easily available today. Based on such an exercise the DISCOMs will be able to determine the type of future capacity required. Using existing platforms and instruments, DISCOMs can procure such power already. Further innovations could also help such procurement. For example, IEX planning a term-ahead trading platform for wind and solar power could help procurement in the medium term[1].

With regard to short term reliable grid operation, CERC has already notified regulations for the introduction of Real Time Markets from April 2020. Further, the central commission is also working on broadening the scope and efficiency of the ancillary services by the introduction of a market based framework for the same. Such efforts will further allow DISCOMs in better achieving load-generation balance before reaching the stage of DSM penalties.

Further, several DISCOMs already have significant surplus in their baseload serving coal thermal power plants or are moving towards the same with capacity in the pipeline. Many states are even requesting for surrender of CGS power. Further, states like Gujarat, Maharashtra, Uttar Pradesh and Chattisgarh have also committed to not adding additional coal capacity in the medium-term. Clearly, several states in India have had significant base-load capacity addition in the past and may not be in need of RTC power. The real need maybe increased flexibility in demand and generation sources. Sales migration due to open access and captive options, rising cost of supply and consequent non-competitive tariffs adds another dimension of uncertainty in estimating future demand and planning supply options to meet it.

2 Treatment of availability related requirements unclear

As per Para 5.1.of the draft scheme:

The Generator shall supply RE Power complemented with Thermal Power, in Round-The-Clock manner, keeping at least 80% availability on annual basis.

It is unclear whether this requirement is applicable only for the coal plant, or only the RE plant or for both. It is not clear how RTC power will be supplied if the availability of both these sources do not complement or if coal is not available for many critical periods when RE generation is low, but still

[1] https://www.thehindubusinessline.com/markets/commodities/iex-platform-for-renewable-power-soon/article30299737.ece

satisfies the annual 80% availability requirement. The condition as well as the mechanism to monitor availability needs to be clarified. This is especially necessary given the issues with coal and water availability being faced by thermal generators which makes their availability uncertain.

3 Increased complexity in tariff determination and operations

With bundling, many of the benefits of contracting renewable power may also not be realised by the procurers. Further financial and operational functions would become unnecessarily complex for plants under the scheme. The suggested financial bundling results in making the proposed tariff structure even more complicated and reduces the financial benefit of flat, levelised, inflation-free RE tariffs over the life of the plant. Further regulating shortfall in generation, curtailments, availability, and adherence to MoD etc. would become increasingly challenging.

4 Need for long term contracts and use of coal-based capacity unclear

As per Para 7.1 of the draft scheme:

'The "Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees" issued by Ministry of Power, Government of India, has estimated the expected life of projects to be 15 years for gas/liquid fuel based projects, 25 years for coal based projects and 35 years for hydro projects. Since Solar/Wind plants are expected to have an estimated life of 25 years, and the PPAs are signed accordingly, the power from coal-based thermal power plants meets the requirement of bundling with RE power.'

Further, as per Para 7.4 of the draft scheme:

'In view of matching PPA periods and the requirement of single indexation, it is appropriate that the complemented power from non-RE sources is coal based thermal power.'

Paras 7.1 and 7.4 state that since coal and solar/wind have similar operational lives, complementing RE with coal is appropriate. Reliable grid integration of renewables needs enhanced flexibility in the power system and hence the focus should be on the flexibility of the complementing resource if at all. This would mean the complementing resource should necessarily have fast ramp rates, low technical minimums, appropriate start and shut down times, low minimum down time once shut, high part load efficiency etc. This information on potential complementary resources coupled with the IRP and production cost simulations will determine what particular types of resources are needed by each state.

Imposing long term 25 year PPA with coal may not solve the critical issue of grid integration. What is needed are innovative and flexible options which can allow reliable integration and maximum absorption of low cost renewables which will assist in reducing the cost of supply for DISCOMs.

Section 63 guidelines under the EA, 2003 already allow for short, medium and long-term non-RTC power (peak/off-peak etc.) procurement which could be used to complement high RE shares. In compliance with the guidelines, even today, DISCOMs can purchase short, medium and long-term power directly or from traders from a combination of sources which is suited for their particular profile and for the duration they deem appropriate. Hence it is unclear what additional benefits or flexibility the draft scheme would bring in.

The need for flexibility is partly recognised even by SECI. The recent SECI '*Expression of Interest for Purchasing & Blending of Battery, Conventional and Hydro Power with Renewable Energy from different sources in India*' allows for multiple resources for blending (coal, gas, battery, hydro etc.) and further allows PPAs for 1-25 years. Though it too only allows for delivery of RTC power which is restrictive.

MNRE's National Wind-Solar Hybrid Policy's states that:

'main objective of the Policy is to provide a framework for promotion of large grid connected wind-solar PV hybrid system for optimal and efficient utilization of transmission infrastructure and land, reducing the variability in renewable power generation and achieving better grid stability.'

The policy has been in place since May 2018. Further Para 5.4 of the policy allows for completing renewables with storage to overcome some of the limitations of RE.

Battery storage may be added to the hybrid project

(i) to reduce the variability of output power from wind solar hybrid plant;
(ii) providing higher energy output for a given capacity (bid/ sanctioned capacity) at delivery point, by installing additional capacity of wind and solar power in a wind solar hybrid plant; and
(iii) ensuring availability of firm power for a particular period. Bidding factors for wind solar hybrid plants with battery storage may include minimum firm power output throughout the day or for defined hours during the day, extent of variability allowed in output power, unit price of electricity, etc.

Hence, rather than insisting only on long-term coal and RE bundled PPAs, we suggest:

4.1 Ensuring the possibility of various bid orders and specifications on DEEP

Currently, the DEEP platform only allows for specification of the quantum and duration of power required by the procurer. This provides no indication of the power available with generations for various durations as generators only respond to the call for capacity specified by the procurer. If generators are also allowed to place bids for various capacities, DISCOMs can participate in multiple bid offers and manage 'bundling power' based on its requirement. Providing such a flexibility with additional functions for buyers and sellers to filter bids and bid offers based on their requirements would greatly increase the options before the DISCOM to ensure optimal power procurement need for grid integration.

4.2 Ensuring robust market platforms and instruments for transparent trading for RE power

MNRE could consider ensuring newer platforms for procuring renewables for different contract durations. As an extension of the DEEP (Discovery of Efficient Electricity Price) e-Bidding & e-Reverse Auction portal, a portal for procurement and sale of RE power called DEEP-RE can be launched. The DEEP-RE portal can also have a section exclusively for non-DISCOM entities to buy and sell RE power. More details on this suggestion are in Annexure 1.

4.3 Issuing guidelines to inter-state and intra-state trading licensees to introduce RE complementary products

Many trading licensees may not currently view offering grid integration services to procurers as a significant part of their current business operations. This is because such demand might currently present itself as need for short-term power over the year. MNRE could issue guidelines to traders such they can identify such requirements with DISCOMs and offer products which suit the load shape and requirements of the DISCOM. These products could be a combination of multiple sources for durations best suited for the licensees' requirement. Part of this can be based on an analysis of transactions of their current customers or could also take place via a more in depth study of DISCOM demand patterns. The guidelines can also specify practices which can be adopted by traders in contracting generators to cater to the aggregate demand its customers require. The guidelines can also be developed in conjunction with ten trading licensees with the largest volume of transactions in the market to take advantage of relevant expertise. The guidelines could also be shared with DISCOMs (who by default have a license to trade) to improve their power procurement practices.

5 Production cost simulation as part of the way forward

It appears that the draft policy is restrictive (only allowing blending with coal and with long term 25 year PPAs) and actually may not deliver the intended objective of reliable grid integration of RE but rather open up several avenues for unintended consequences. RE Grid integration is best handled at the system level, with larger area systems delivering more optimal cost integration opportunities. Reliable grid integration by combining two sources of power and delivering RTC power is certainly a sub-optimal approach and hence should not be pursued. States should be mandated and incentivised to do rigorous power sector modelling exercises (capacity addition and production cost simulations) to first determine the unique requirements of each state. As an example, Prayas (Energy Group) did a production cost simulation of the MSEDCL system for 2030 which involved granular (15 min block) system simulation using the PLEXOS platform which showed that 50 % of electricity demand can be met by RE sources without any adverse economic or reliability implications. For more details on this exercise please see Annexure 2.

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Annexure 1: DEEP-RE: An online marketplace for renewable energy power procurement

With the commitment towards increased renewable energy uptake many commercial and industrial consumers would require to increase renewable energy consumption to meet their renewable purchase obligations or to ensure they meet their larger commitment to renewable energy. However, given the fragmented nature of the power sector markets today, such purchase, especially for smaller consumers is challenging. Power exchanges only offer instruments for purchase for up to 1 week and consumers cannot opt for specific renewable energy options. Trade is possible with bilateral traders or non-regulated aggregators/facilitators. However, these trades are non-transparent and fragmented giving consumer's limited options to choose from. As it involves substantial information asymmetry, it could result in non-optimal and expensive procurement as well.

The DEEP-RE portal can ensure efficient discovery of price for a wide variety of contracts in a streamlined manner.

To operationalise the portal potential buyers and sellers should register on the portal by paying the requisite fees. Potential buyers and sellers should be able to invite bids advertising their requirements for purchase and availability for sale as the case may be. Buyers and sellers should be allowed to participate in each other's events and sign contracts accordingly. The bidding process itself (especially with respect to the earnest money deposit, letter of credit etc.,) may be different depending on whether the bid was invited by a buyer or a seller but in both, the outcome would be an agreement to transact power at a mutually agreed price based on a standardised contract. In order to operationalise this, the e-bidding platform could also provide functionalities (similar to e-commerce websites) for buyers and sellers to search and filter through bid invitations to meet their requirement in an efficient manner.

Annexure 2: Insights from Dispatch Modelling of The Maharashtra System For 2030 - A Production Cost Simulation Exercise

Competitive solar and wind prices offer significant opportunity to optimise supply cost and reduce socio-environmental impacts of power sector. The variable nature of renewable (RE) generation necessitates the use of advanced modelling tools to understand optimum level of RE generation that can be integrated without compromising reliability and in a cost effective manner. Prayas (Energy Group) recently concluded the first of its kind exercise to study the implications of high RE shares for the Maharashtra system in 2030. This exercise involved granular (15 min block) system simulation using the PLEXOS platform and shows that 50 % of electricity demand can be met by RE sources without any adverse economic or reliability implications.

In this production cost simulation exercise, we compare the differences between a business-as-usual case and a couple of high RE scenarios with respect to parameters such as reliability, system operation in stress hours/months, thermal fleet operation, RE curtailment and total costs. We find that it is possible to reliably meet demand in 2030 with 50% energy contribution from RE, without any net addition to the coal fleet and with the coal fleet operating within close to current technical limits. This requires the regulatory institution and utilities to be more agile in terms of demand estimation, exploring more flexible and innovative power procurement strategies including but not limited to opportunistically adding battery storage capacity, undertaking rigorous transmission planning exercises and experimenting with new retail tariff design frameworks.

For more details on this exercise, please see a recording of a webinar on this topic, along with the slide-deck, where in insights from this detailed modelling exercise for Maharashtra were shared.

http://prayaspune.org/peg/webinar/insights-from-dispatch-modelling-of-the-msedcl-system-for-2030-a-production-cost-simulation-exercise.html

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