

South Asia Regional Energy Integration (SARI/EI):
South Asian Regional Power Exchange
(SARPEX) Mock Exercise

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Background

Abstracts from TOR of TF-3

- A regional energy trading market in the South Asia region is a key developmental challenge for advancing energy integration.
- Many analysts have recognized the value of **development of power exchange and related market mechanism** to enhance Cross border Electricity Trade (CBET) among the South Asian Nations.
- A power exchange must provide for a “fair, neutral and robust” market mechanism and price discovery process.
- A power exchange will lead to the creation of an orderly marketplace for all buyers and sellers in South Asia.



Background

Abstracts from Roadmap of TF-3

- Suggest the most suitable structure for a South Asia regional power market.
- Evaluation of options like a dedicated power exchanges for the South Asian nation or extension of any existing power exchanges in case of short term trades.”
- The recommended set of draft market rules and design for the power exchange(pilot power exchange) to be prepared.
- Based on the market rules and agreed pilot market design, the pilot market will be set up.
- Setting up and running of pilot market is to be carried out by a suitable agency.

Pilot market Objectives

1

Prepare a detailed report on the feasibility and desirability of a South Asian Regional Power Exchange (SARPEX). This will include bringing out the benefit to each nation in case SARPEX is established.

2

Development of draft Market Rules and Design for SARPEX.

3

Capacity building of the nominated teams from the concerned South Asian Nations covering all aspects of the pilot market and also for participation in a subsequent actual power exchange.



Some Terminology relevant to the exercise

Certain terms which to be relevant for understanding of the exercise

- **Day ahead market:** Bidding in the market is done on day n , for trades which are effective on day $n+1$.
- **Unconstrained Market Price and volume (UMP & UMV) :** The discovered market price and volume which do not take into account transmission constrains.
- **Constrained Market Price and volume (CMP & CMV) :** The discovered market price and volume discovered after taking into account the transmission constrains
- **Modes of operation of pilot market :-**
 - ❖ **Residual Mode** - The pilot market shall be run such that the Indian domestic exchanges are not in any manner influenced by the operation of the pilot market. The un-cleared bids of Indian Domestic exchanges shall be matched against the bids of the other nations in the pilot market platform.
 - ❖ **Unified Mode** - The pilot market shall be run such that all the bids including the bids in the Indian exchanges are cleared simultaneously the pilot market platform



Core Team and Nodal Officer

A core team headed by a nodal officer shall be nominated by all participating Nations except India

- **Requirement of core team:** The core team will be involved in all activities related to the Mock Exercise. The core team will be headed by a nodal officer.
- **Nomination of core team:** The nomination request letter shall be issued shortly. The nomination request shall be addressed to Secretary / Joint Secretary level officers of the concerned ministry.
- **Selection of the participating Nation:** Bangladesh, Bhutan, Nepal and India have been selected as the participating nations. Grid connecting was the key criterion for selection of these members.
- **Attributes of the core team members:** The core team members are expected to be well conversant with one or more of the systems and procedures related to power procurement/trading, load despatch centre, generation and distribution tariffs, etc. in their nation.

Mock Exercise on SARPEX- The Process



- The pilot market shall cover a period of one year to including 60 days of actual bidding.
- Sixty day of actual bidding shall be selected from a period of one year based on factors like seasons, weekdays, weekends etc.
- A core team headed by nodal officer shall be nominated from Bangladesh, Bhutan and Nepal which are the countries having grid connectivity with other South Asian Nations.



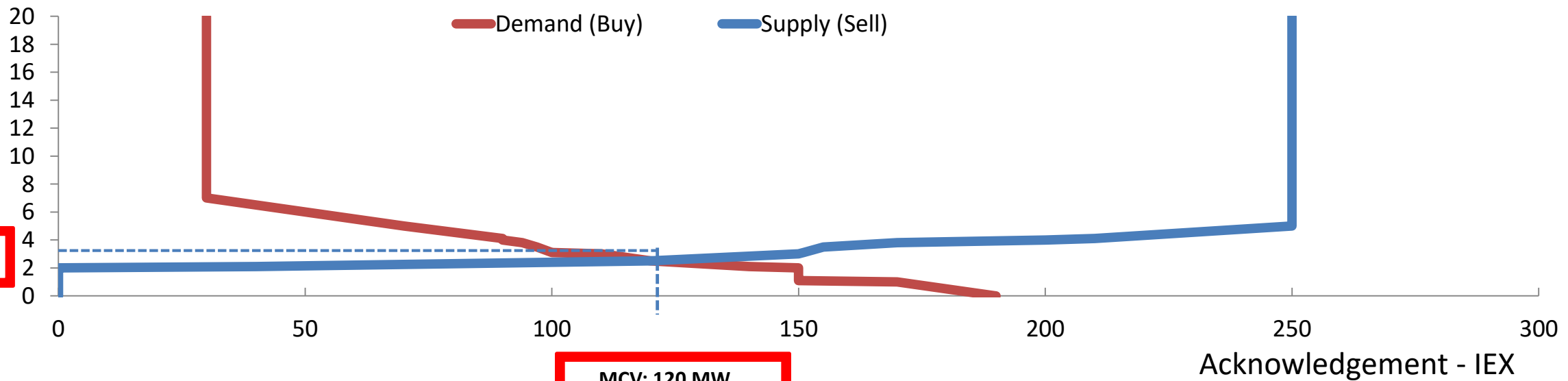
- Bids of India shall be ascertained from data available in public domain while the bids from Bangladesh, Bhutan and Nepal shall be determined by the core team of the Nation.
- The bids shall be cleared by the matching engine to generate the results for selected the sixty days.
- The results of the balance period will be arrived at based on the sixty day result.



- The process will be detailed and it will be ensured that all the participating Nations are treated equally as far as the process is concerned.
- The core team be trained to ensure capacity building not only for participating in the mock exercise but also in any actual power exchange.
- The benefits to each nation will be quantified based on bids and not on study. This will greatly push our aim of establishing a regional market.

Matching: Model Price Calculation algorithm (Example for a sample dispatch period)

Price Tick	0	1	1.1	2	2.1	2.5	3	3.1	3.5	3.8	4	4.1	5	7	9	12	14	17	19	20
Portfolio A	20	20	20	20	20	20	20	10	7	4	0	0	0	0	0	0	0	0	0	0
Portfolio B	60	60	60	60	50	40	40	40	40	40	40	40	20	20	20	20	20	20	20	20
Portfolio C	70	70	70	70	70	60	50	50	50	50	50	50	50	10	10	10	10	10	10	10
Portfolio D	40	20	0	0	-40	-60	-80	-81	-85	-100	-120	-120	-120	-120	-120	-120	-120	-120	-120	-120
Portfolio E	0	0	0	0	0	-40	-50	-50	-50	-50	-60	-60	-90	-90	-90	-90	-90	-90	-90	-90
Portfolio F	0	0	0	0	0	-20	-20	-20	-20	-20	-20	-30	-40	-40	-40	-40	-40	-40	-40	-40
Total Buy, MW	190	170	150	150	140	120	110	100	97	94	90	90	70	30	30	30	30	30	30	30
Total Sell, MW	0	0	0	0	-40	-120	-150	-151	-155	-170	-200	-210	-250	-250	-250	-250	-250	-250	-250	-250
Net Transaction, MW	190	170	150	150	100	0	-40	-51	-58	-76	-110	-120	-180	-220	-220	-220	-220	-220	-220	-220





The Deliverables

The Deliverables have been detailed in the Scope of Work. Below is a list of the final deliverable of the project.

1) A draft report will be prepared covering the following:-

- Report on feasibility and desirability of a South Asian Regional Power Exchange (SARPEX) based on the analysis of the pilot market data.
- Nation specific report bringing out the benefit to each participating nation if SARPEX is made operational.
- Comparison of Unified and residual mode of operation of power exchange. This will be a useful input for the actual establishment of the SARPEX along with other factors like Government policies etc.
- Draft market rules and design for the proposed SARPEX.
- Report on capacity building activities undertaken as a part of this project.

2) The draft report shall go through a stakeholder consultation . Final report shall be submitted based on the feedback and suggestions received from the stakeholders.

3) The study is expected to be completed within eight months.

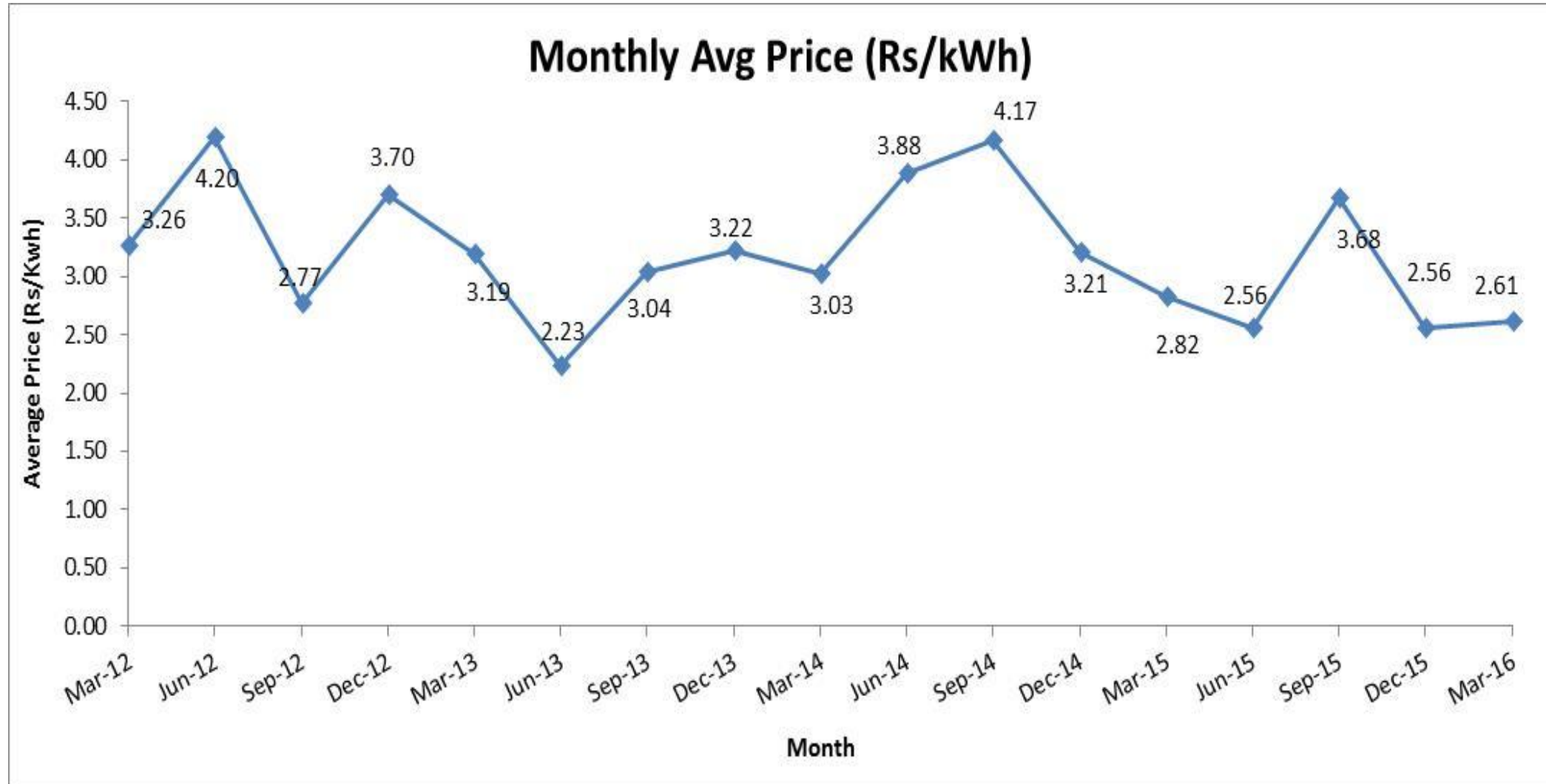


Detailing of Key Deliverables

Report on feasibility and desirability of a South Asian Regional Power Exchange (SARPEX)

- **Value Addition** - Any exchange is feasible and desirable if it leads to a certain amount of value addition to the participants.
- **Missing link** - We have long term and medium term cross border trades in the South Asian Region today also. What is really missing is an exchange.
- This exchange shall provide for the participants to arrange for the next day purchase/sales which cannot be done through long term, medium term or even short term PPAs.
- **Benefit to Buyer** - The exchange allows the participant to buy cheaper power, sometime even justifying not scheduling a power source whose tariff is rigid as per the PPA. Thus it may lead to savings to the buyers.
- **Benefit to seller**- The exchange allows the participant to sell surplus power, which it is compelled to buy from other sources as per the PPA signed. Thus it may lead to profit to the sellers or at least minimizing the cost of power.
- **Transparency**- The exchange discovered price is a market price which reflects the prevailing conditions in the market. Since the pricing process is transparent and do not involve negotiations, it is really not questionable or challengeable.

IEX monthly Average MCP in DAM





Detailing of Key Deliverables

A. Report on capacity building activities.

- Acquiring the of knowledge of how to bid on the exchange platform.
- To understand the principles on which the bid volume and price are determined.
- To develop internal systems and procedure related to participation in a power exchange.
- To understand the various reports generated by the exchange.
- To refine the internal bid determination process based on the various data available in the public domain, the entity's requirements and results of the earlier bids.
- To develop an overall understanding of power exchange including issues related to settlement procedure, the product, nature of bids, matching algorithm etc.
- To be able to consider financial or commercial aspects and technical aspects to ensure maximization of the gain to the entity by using the power exchange.
- To be able to train others in all above activities.



Formation of Market Advisory Committee (MAC)

Functions of the Market Advisory Committee (MAC).

- Advice on the design of the pilot market.
- Advice on the draft set of market rules for the pilot market.
- Monitoring of the pilot market activities and give suggestion as and when required.
- To facilitate stakeholder consultation and advocacy of the Mock exercise in the respective Nation.
- To give guidance to the core team in the respective Nation.

Proposed Market Advisory Committee (MAC). – It is proposed that all the Task Force – 3 members be a part of the MAC. Additional members may be taken based on the recommendation of TF-3. These additional members may be involved on specific matters or as full fledged members.

The reason for the same is :-

- TF-3 is the task force entrusted with the “Establishment of South Asian Regional Electricity Market”.
- TF-3 members represent various organisation like national regulator, power exchange, cross border power trader etc. Thus all related organisations/sectors are included in the task force.
- TF-3 members have significantly contributed to this pilot market activity and as such the activity is a part of the road map approved by TF-3 earlier.
- Provision of additional member will give the flexibility to the MAC for taking in suitable experts into the forum in the interest of the success.

Acknowledgements and Recommendations



Along with the from contributions from the TF-3 members various officials, suggestions and feedbacks were also received from various organisations USAID, IEX, PXIL, POSOCO etc. Individuals like Mr Padmanabhan also contributed greatly in this activity.



TF-3 Members recommends the setting up and running of the pilot market on the basis of the shared Scope of Work of the same .



TF-3 Members recommends the formation of the Market Advisory Committee(MAC) for the pilot market.



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