

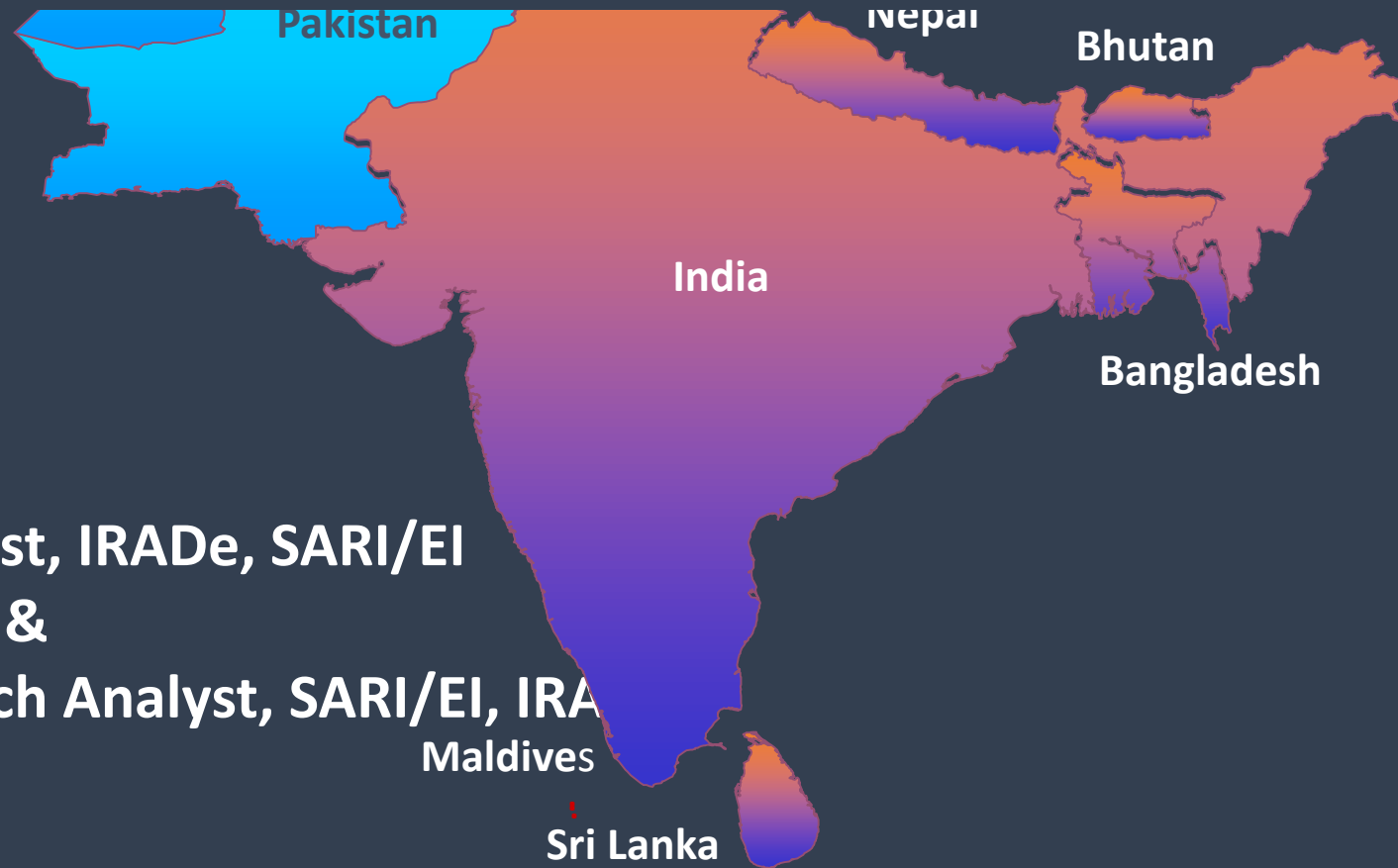


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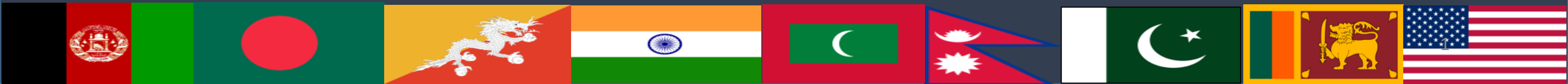


Integrated Research and  
**IRADe** Action for Development

# South Asian Regional Power Exchange- Mock Exercise (SARPEX)



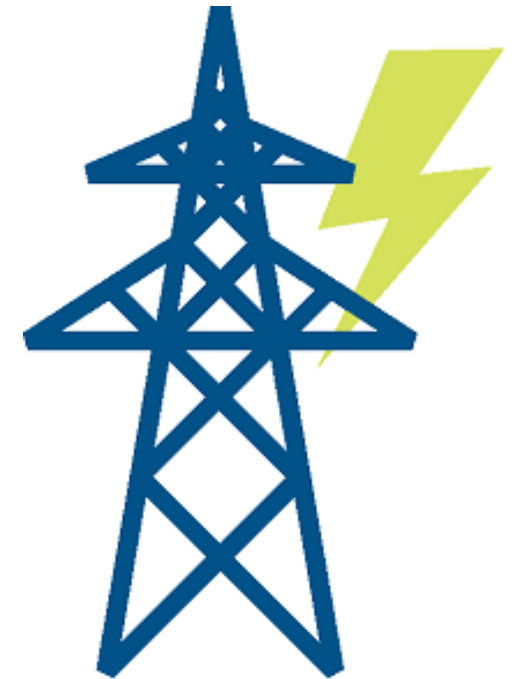
S. K. Ray, Technical Specialist, IRADe, SARI/EI  
&  
Gaurav Jain, Senior Research Analyst, SARI/EI, IRADe



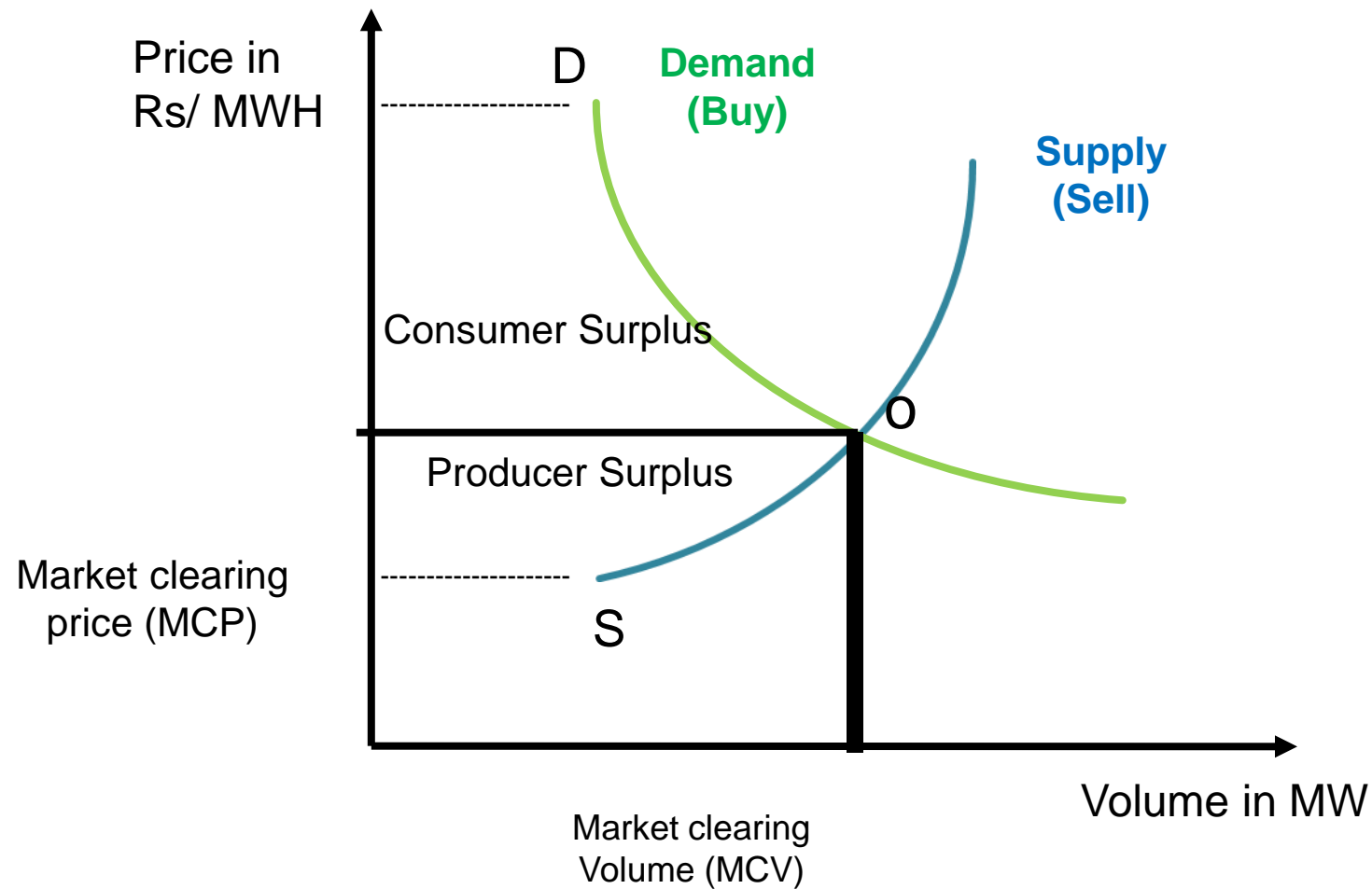
## Objectives of SARPEX Mock Exercise

### Objective :

- **To ascertain the feasibility of the South Asian Regional Power Exchange (SARPEX) with Bangladesh, Bhutan, India and Nepal (BBIN) as the participants. ( These are presently interconnected and other neighboring countries will be added as and when grid connectivity happens)**
- **To build capacity of concerned stakeholders in all participating nations**
- **To develop the draft set of Market Rules and Design.**



## Concept of Consumer Surplus and Producer surplus



- 1) Consumer Surplus. All the buyers whose bids were higher than MCP have been cleared. However they will get power at a price lesser than their bid price. Thus they get power at a price lesser than that they were willing to pay. This gain is called the consumer surplus and benefits all buyers on the curve OD.
- 2) Producer Surplus. All the sellers whose bids were lower than MCP have been cleared. However they will get power at a price higher than their bid price. Thus they get to sell their power at a price higher than that they were willing to accept. This gain is called the producer surplus and benefits all sellers on the curve OS.

## Key Consideration for SARPEX Mock Exercise

*The implementation of a Day Ahead Market (DAM) is crucial to the electricity trade development in the SAR and more immediately in the neighbouring countries of BBIN*

**Social Welfare Maximization (SWM) and Efficiency are the two objective functions of price discovery and delivery for most of the Power Exchanges across the globe. SWM and efficiency are inter-related objectives, since one cannot exist without the other.**

**Efficiency aims to maximize total surplus, the sum of consumer surplus and producer surplus. Efficiency requires the output to be:**

- 1. Produced at the lowest marginal cost in the right quantity &**
- 2. consumed by those most willing to pay**

**Social welfare on the other hand is the difference between the willingness to pay of the bidders minus the cost of the offers.**

## Some Terminology relevant to 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:-
  - A. Sequential Mode or 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.
  - B. Unified Mode - The pilot market shall be run such that all the bids including the bids from Indian participants are cleared simultaneously the pilot market platform

**“THE GRID CONSTRAINTS & TRANSMISSION CAPACITY ALLOCATION PROCEDURES DON’T APPLY TO PILOT MARKET “**

## Brief about SARPEX Mock Exercise

- The exercise covers the period from April'2015 to March'2016.
- 71 days were selected in this one year period to cover all kind of demand situation and various other crucial factors as per the approved Sampling methodology.
- Core teams were nominated by Bangladesh, Bhutan and Nepal who will bid for all the dispatch periods of all these 71 days.
- Indian bids for these 71 days were extracted from information available in public domain.
- The mock trading platform was run to generate results for all these 71 days.
- The mock trading platform was run in two modes of operation, “Unified mode” and “Sequential or Residual Mode” as explained further in this presentation.
- The market rules and design for running of the mock exercise were approved in the last TF-3 meeting for both the modes of operation.

## Brief about SARPEX Mock Exercise .. Continued

- The transmission losses and charges have been factored in as in case of a regular day ahead market.
- The figures of transmission losses and charges used for Bangladesh, Bhutan and Nepal are mentioned further in this presentation.
- The result of the matching engine yields the unconstrained solution.
- The result for the 71 days were extrapolated to get the result for the entire year for both the modes of operation.
- The consumer and producer surplus, quantum of power sold/bought, sale/buy price etc. for each participating Nations and the entire region was worked out in both the modes .
- The impact of the regional trading platform on the domestic market was analyzed.
- Based on the above, a particular set of market rules and design is being recommended for SARPEX.

## Selected Days for Pilot Market Exercise

*A total of 71 days were selected as the sample for Mock Exercise*

Selection of the days was based on the following criterion:

Average to Peak Load condition in all nations, Unconstrained Market-clearing Price and Volume on Indian Exchange(s), Day and Month Effect and Public holidays/Special days observed in all the nations

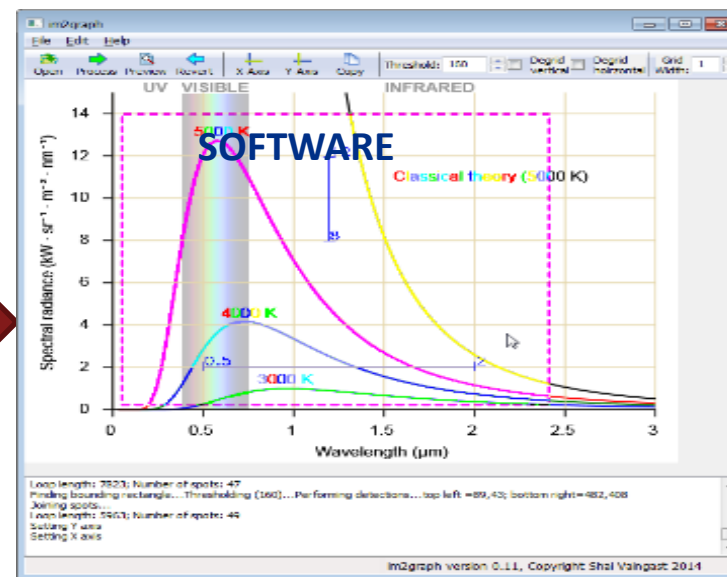
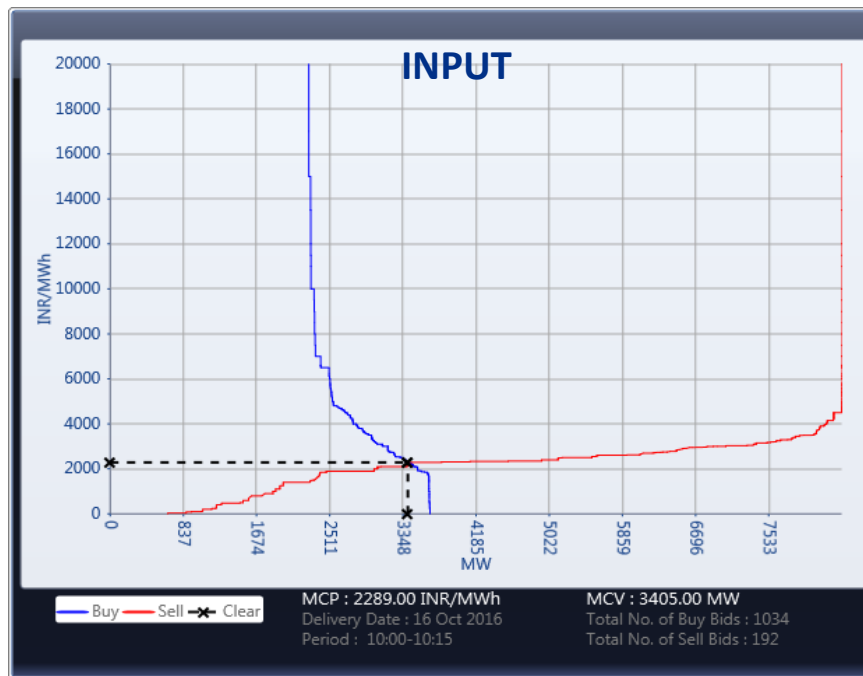
APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Sunday, April 5, 2015	Wednesday, May 13, 2015	Thursday, June 11, 2015	Thursday, July 2, 2015	Saturday, August 8, 2015	Sunday, September 13, 2015
Saturday, April 11, 2015	Friday, May 15, 2015	Sunday, June 14, 2015	Saturday, July 11, 2015	Sunday, August 9, 2015	Sunday, September 20, 2015
Monday, April 13, 2015	Saturday, May 16, 2015	Monday, June 15, 2015	Monday, July 13, 2015	Tuesday, August 11, 2015	Tuesday, September 22, 2015
Sunday, April 19, 2015	Tuesday, May 19, 2015	Sunday, June 21, 2015	Thursday, July 16, 2015	Wednesday, August 19, 2015	Wednesday, September 23, 2015
Wednesday, April 29, 2015		Friday, June 26, 2015	Sunday, July 26, 2015	Thursday, August 20, 2015	Monday, September 28, 2015
		Saturday, June 27, 2015	Monday, July 27, 2015	Saturday, August 22, 2015	
		Tuesday, June 30, 2015		Sunday, August 23, 2015	
				Wednesday, August 26, 2015	
				Sunday, August 30, 2015	
OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
Tuesday, October 13, 2015	Friday, November 27, 2015	Thursday, December 10, 2015	Wednesday, January 6, 2016	Sunday, February 7, 2016	Saturday, March 5, 2016
Wednesday, October 14, 2015		Monday, December 14, 2015	Friday, January 8, 2016	Monday, February 8, 2016	Tuesday, March 8, 2016
Saturday, October 17, 2015		Tuesday, December 15, 2015	Saturday, January 9, 2016	Thursday, February 11, 2016	Monday, March 14, 2016
Thursday, October 22, 2015		Sunday, December 20, 2015	Monday, January 11, 2016	Sunday, February 14, 2016	Saturday, March 19, 2016
		Wednesday, December 23, 2015	Thursday, January 14, 2016	Wednesday, February 24, 2016	Monday, March 21, 2016
		Thursday, December 24, 2015	Tuesday, January 19, 2016		Monday, March 28, 2016
		Tuesday, December 29, 2015	Wednesday, January 20, 2016		Tuesday, March 29, 2016
		Wednesday, December 30, 2015	Thursday, January 21, 2016		Thursday, March 31, 2015
			Friday, January 29, 2016		



## Extraction of Indian Bids from Aggregate Demand Supply Bids

- The bids of the Indian participants are extracted from the images of the aggregate demand-supply curves available on IEX website using an “image-processing software” called “im2graph”
- The charts are fed into the software and the range for X-Y coordinates is specified, the software then identifies the scanned images (pixels) and converts them into discrete data-points

### Process of Image Scanning and Data Extraction



### OUTPUT

Buy		Sell	
X, Y_0		X, Y_0	
2237.49	17529.8	670.754	29.9401
2253.3	13303.6	686.536	29.9401
2269.11	10803.6	702.319	29.9401
2300.74	9077.38	718.101	29.9401
2316.55	7529.76	733.884	29.9401
2332.36	7053.57	749.666	29.9401
2348.17	7053.57	765.448	29.9401
2363.99	7053.57	781.231	29.9401
2379.8	6875	797.013	29.9401
2395.61	6517.86	812.796	29.9401
2411.42	6517.86	828.578	29.9401
2427.24	6517.86	844.361	29.9401
2443.05	6517.86	860.143	29.9401
2458.86	6517.86	875.926	89.8204
2474.67	6398.81	891.708	89.8204
2490.49	5982.14	907.49	89.8204
2506.3	5208.33	923.273	89.8204
2522.11	5029.76	939.055	89.8204
2569.55	4791.67	954.838	89.8204
2585.36	4732.14	970.62	89.8204

## Key Assumptions for SARPEX Mock Exercise

1

### Determination of Unconstrained Market Clearing Price and Volume

The impact of transmission constraints in cross border lines as well as in the countries own national grid are not considered in the mock exercise because:

- Difficulty of ensuring coordination with the related load dispatch centres of various nations
- Unconstrained Solution will give an indication of the indication of the direction and quantum of power flows between India and the neighbouring countries

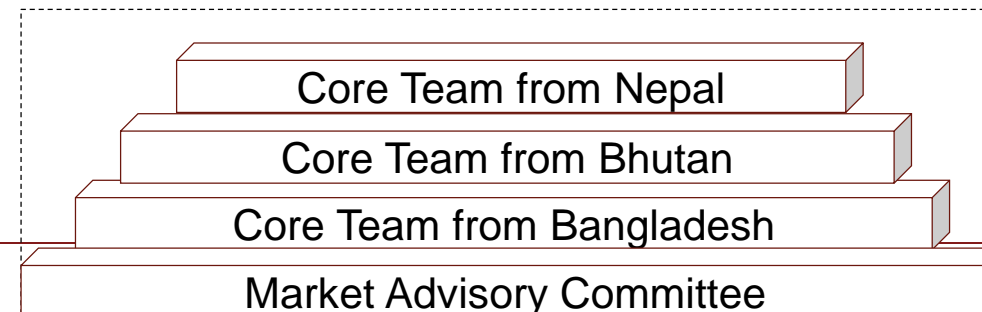
2

### Quantification of Transmission Charges and Losses

The transmission charges and losses as currently applicable under the bilateral trade with BBN were adjusted in the bids submitted by BBN to account for the true cost of power procurement/sale.

The transmission charges and losses component was already incorporated by the Indian Participants while submitting their purchase and sell bids on Indian Exchange(s)

### Key Participants



## Average Transmission Charges and Losses Figures for BBN

#	Country	Transmission Charges	Transmission Losses	Comments
		(Rs/kWh)	(%)	
1	Bangladesh	0.117	0.3%	The cross-border transmission network for India-Bangladesh has been included in the POC charges and transmission Withdrawal Charges and Losses are published for Bangladesh
2	Nepal	0.301	4.1%	The cross-border transmission network for India-Nepal has not been included in POC and therefore the transmission charges of Bihar and Cross-border line are assumed for Nepal
	Bihar Withdrawal Muzzafarpur Dhalkebar Line	0.257	1.6%	
		0.044	2.5%	
3	Bhutan	0.089	1.1%	The cross-border transmission network for India-Bhutan has been included in the POC charges and transmission Injection Charges are published by NLDC for Bhutan

The bids submitted by BBN were adjusted by the above transmission charges and losses to reflect the true cost of power purchased or sold on the Exchange

# Approach and Methodology – UNIFIED MODE

## SELECTION OF SAMPLE DAYS

A total of 71 days were selected from the period Apr'15 to Mar'16 basis:

- Average to Peak Load condition in all nations
- Unconstrained Market-clearing Price and Volume on Indian Exchange(s)
- Day and Month
- Effect and Public holidays/Special days observed in all the nations

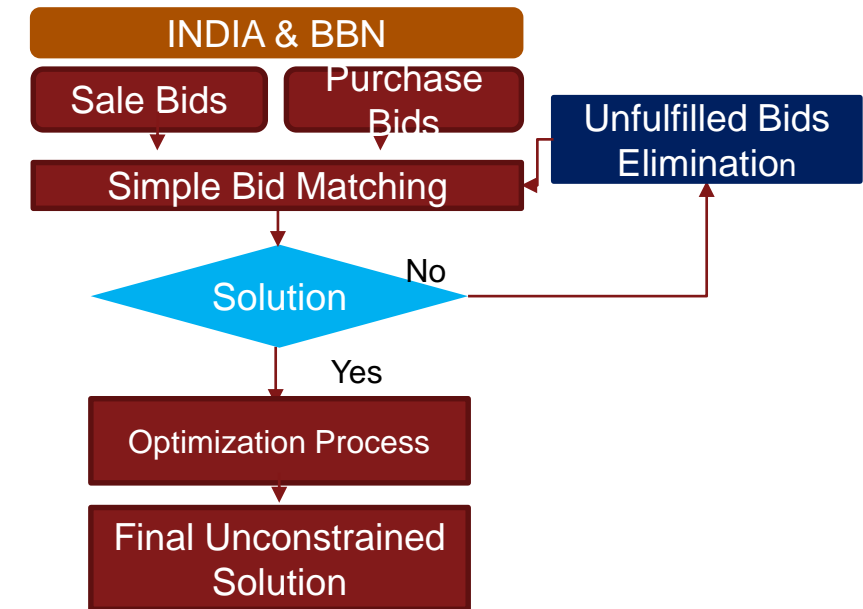
## BIDDING

The 15-minute block level purchase/sale bids are submitted by Bhutan, Nepal and Bangladesh for all the selected days

The bids of Indian participants (both buyers and sellers) are extracted from the aggregate demand supply curves available publicly on the Indian Power Exchange(s)

## MARKET CLEARING ALGORITHM IN UNIFIED MODE

### UNIFIED MODE – 15 MINUTE DAM INTERVAL



# Approach and Methodology – SEQUENTIAL/Sequential MODE

## SELECTION OF SAMPLE DAYS

## BIDDING

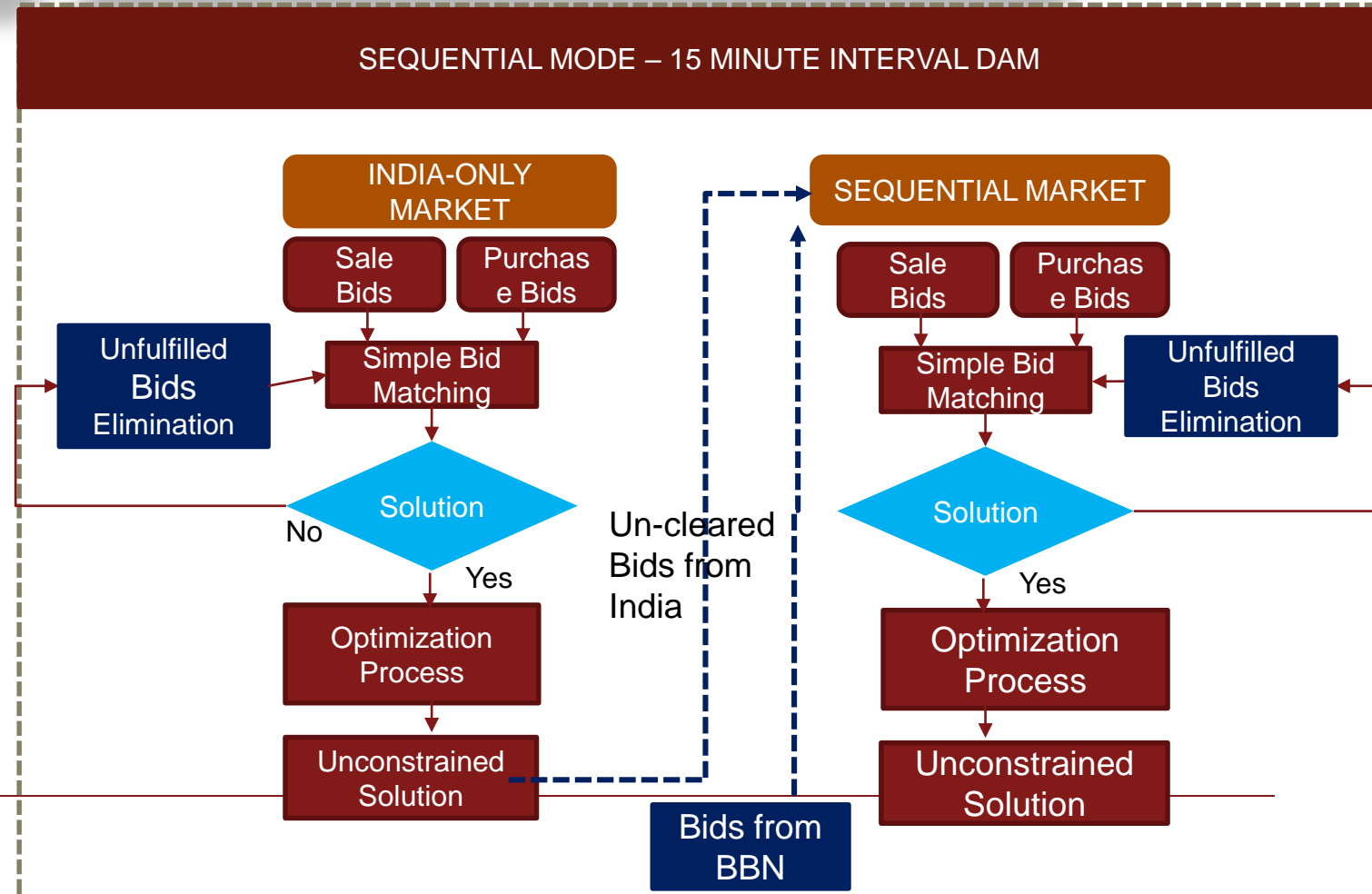
## MARKET CLEARING ALGORITHM IN Sequential MODE

A total of 71 days were selected from the period Apr'15 to Mar'16 basis:

- Average to Peak Load condition in all nations
- Unconstrained Market-clearing Price and Volume on Indian Exchange(s)
- Day and Month
- Effect and Public holidays/Special days observed in all the nations

The 15-minute block level purchase/sale bids are submitted by Bhutan, Nepal and Bangladesh for all the selected days

The bids of Indian participants (both buyers and sellers) are extracted from the aggregate demand supply curves available publicly on the Indian Power Exchange(s)

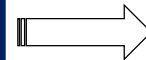


## OPERATING TIMELINES FOR SARPEX

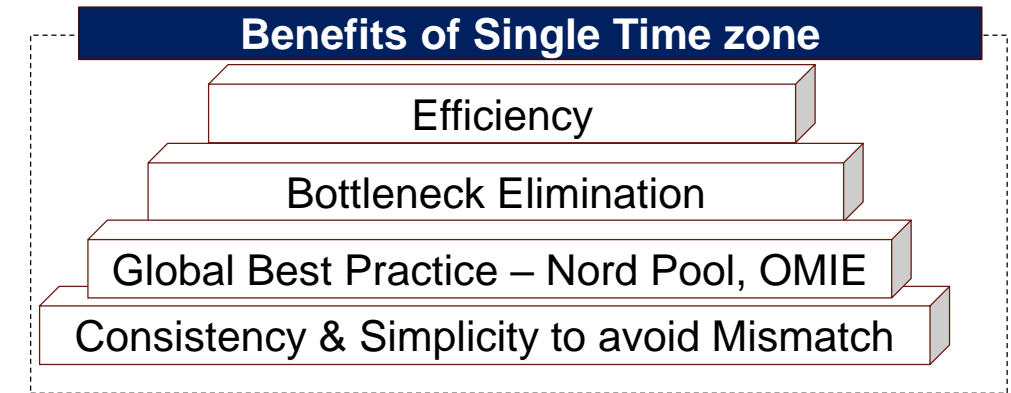
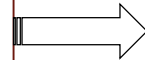
The choice between single and multi time zones needs to be made in keeping with the impact on Operating Timelines

### Time zones observed in BBIN relative to UTC

Country	Time zone (In Hours)	IST Deviation (In Minutes)
India	UTC + 5:30	-
Bhutan	UTC + 6:00	+30 minutes
Bangladesh	UTC + 6:00	+30 minutes
Nepal	UTC + 5:45	+15 minutes



Mismatches in time-zones has implications on coordination of DAM operational activities.



A single reference time zone and operating timeline assumed for SARPEX mock exercise is IST

## OPERATIONAL CHALLENGES DUE TO MULTIPLE TIME ZONES IN SARPEX

Electricity Dispatch at the “day boundary” for three consecutive days D-2, D-1 and D

Slots	41	48	49	71	95	96	1	2	41	49	95	96	1	2	41	49	95	96
India	10:00	11:45	12:00	17:30	23:30	23:45	00:00	00:15	10:00	12:00	23:30	23:45	00:00	00:15	10:00	12:00	23:30	23:45
Nepal	10:15	12:00	12:15	17:45	23:45	00:00	00:15	00:30	10:15	12:15	23:45	00:00	00:15	00:30	10:15	12:15	23:45	00:00
Bhutan	10:30	12:15	12:30	18:00	00:00	00:15	00:30	00:45	10:30	12:30	00:00	00:15	00:30	00:45	10:30	12:30	00:00	00:15
Bangladesh	10:30	12:15	12:30	18:00	00:00	00:15	00:30	00:45	10:30	12:30	00:00	00:15	00:30	00:45	10:30	12:30	00:00	00:15

Coordination Issues

Day D-2
  Day D-1
  Day D

Dispatch periods at the “day boundary” i.e. Slot 95 and Slot 96 may lead to coordination issues. While these slots belong to Day “D-1” in India, they belong to Day “D” i.e. the next day in Bhutan, Bangladesh and Nepal

## Web portal for SARPEX Mock Exercise Link

<http://mocksarpep.eu.ai>

Web Portal has, among other the following :-

- All documents related to SARPEX mock Exercise.
- Provision for submission of bids and viewing of results
- The access to the above is password protected.
- FAQ
- Various presentations related to SARPEX Mock Exercise
- Details of Stakeholder Consultations.
- Details of past and planned events
- Contact details.
- A link for submission of queries.



# Bangladesh Core Team Home Page

**SARPEX : MOCK EXERCISE** [HOME](#) [RESULTS](#) [REPORTS](#) [CONTACT](#) [ABOUT SARPEX](#) [LOGOUT](#)

## SOUTH ASIAN REGIONAL POWER EXCHANGE - MOCK EXERCISE

Hello, representatives of **BANGLADESH** , Welcome to **SARPEX** - South Asian Regional Power Exchange Mock Exercise Portal!



[Bids Submission - Click Here!](#)

Submit your Bids in Excel format following this link.

[View Reports - Click Here!](#)

See previous bid submission results and bids uploaded by you.

# Bids submission webpage



## BIDS SUBMISSION - SARPEX

Submit your bids on this page in predefined excel formats provided by the administrator.

[View previously bid dates - Click here!](#)

### Submit Bids Here!

**Step1:** Choose Date, Month and Year you want to submit the bid file for.

**Step2:** Upload the Bids file in xlsx format.

**Step3:** Confirm the bids submission and wait for success message.

Select day:

Select month:

Select year:

**\*\* UPLOAD EXCEL FILE CONTAINING BIDS \*\***

No file chosen

\* Please ensure that data is entered properly in the excel template before submission!

# Results of the bids submitted

## CHOOSE A DATE TO VIEW RESULTS

Select day:  Select month:  Select year:  [SHOW RESULTS](#)

Showing bids submission results for date: 13-04-2015

**UNIFIED MODE** **RESIDUAL MODE**

### RESIDUAL MODE RESULTS

TIME-BLOCK	INDIA-BUY	INDIA-SELL	BANGLADESH-BUY	BANGLADESH-SELL	BHUTAN-BUY	BHUTAN-SELL	NEPAL-BUY	NEPAL-SELL	MCP
0000-0015	0.00	-237.00	250.00	0.00	0.00	-13.00	0.00	0.00	3024.00
0015-0030	0.00	-237.00	250.00	0.00	0.00	-13.00	0.00	0.00	3056.00
0030-0045	0.00	-238.00	250.00	0.00	0.00	-12.00	0.00	0.00	3075.00
0045-0100	0.00	-242.00	250.00	0.00	0.00	-8.00	0.00	0.00	2896.00

# Document Centre



## **SARPEX : MOCK EXERCISE - DOCUMENT CENTER**

### **SARPEX PILOT MARKET | DOCUMENT CENTER**

[Inside Nord Pool - IRADe](#)

[Agenda of the Capacity Building Program](#)

[Roadmap for South Asian Regional Power Exchange](#)

[Why South Asian Regional Power Exchange by Gaurav Jain](#)

[Basics of Power Exchange and the Activities of SARPEX: Mock Exercise by Mr. Ray and Mr. Anish De](#)

# Frequently Asked Questions homepage

## **SARPEX : MOCK EXERCISE - FAQS**

### **SARPEX PILOT MARKET | FREQUENTLY ASKED QUESTIONS**

1. What is the concept behind SARPEX?

2. Why is SARPEX Mock exercise being conducted?

The SARPEX mock exercise is being conducted to demonstrate the feasibility and desirability of a Regional Power Exchange in the South Asian Region. The mock exercise will take place in a Day Ahead Market (DAM) format. The Mock exercise will also prove to be beneficial to Nepal, Bangladesh and Bhutan from a skill and capacity building perspective. In particular the core team will be trained to participate on a Power Exchange, analyse data to determine their bids, place the bids and interpret the results.

3. What are the two modes of operation of the mock exercise?

4. Why the mock exercise is being conducted in two modes of operation?

## Activities by Core Team Members from BBN

- The data on load and availability for all the selected 71 days was submitted by core team members from Bangladesh, Nepal and Bhutan
- The strategy for bid formation and the process of uploading of bids was demonstrated to the core team members in the capacity building workshop held in Delhi
- The bids for all the 71 days have been submitted by the core team members of Nepal and Bhutan.
- The bids for Bangladesh have been computed by the engagement team on the basis of the demand and generation data received from Bangladesh Core team for all the 71 days.
- The core team members have also played a key role in the Stakeholder consultations and dissemination activities in their respective nations.

## Core Team Members

S.No	Name	Country	Designation	Organization
1	Mr. Mohammad Hossain,	Bangladesh	Director General	Power Cell
2	Mr. Shiekh Faezul Amin -	Bangladesh	JS (Dev)	Power Division
3	Mr. Golam Kibria	Bangladesh	Director IPP 1	Bangladesh Power Development Board (BPDB)
4	Md. Nuruzzaman	Bangladesh	SE (Plg)	Power Grid Corporation of Bangladesh (PGCB)
5	Mr. Karma Namgyel	Bhutan	Chief Engineer, DHPS	Ministry of Economic Affairs
6	Mr. Denkar	Bhutan	Engineer, DHPS	Ministry of Economic Affairs
7	Mr. Ugyen Chopel	Bhutan	Engineer, DHPS	Ministry of Economic Affairs
8	Mr. Nima Tshering	Bhutan	Bhutan Power System Operator (BPSO)	Bhutan Power Coporation (BPC)
9	Mr. Anil Rajbhandary	Nepal	Director	Nepal Electricity Authority (NEA)
10	Mr. Nutan Prakash Sharma	Nepal	Senior Divisional Engineer	Department of Electricity Development, NEA
11	Mr. Tej Krishna Shrestha	Nepal	Asst. Manager, Power Trade Department	NEA
12	Mr. Narendra Shrestha	Nepal	Assistant Manager	Load Dispatch Centre, NEA

## Market Advisory Committee

### Role Of Market Advisory Committee.

- Advice on the design of the pilot market.
- Advice on the draft set of market rules for the pilot market.
- Reviewing 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 implementation team and the core team.

S. No	Name	Country	Designation	Organization
1	Mr. Anil Razdan	India	Ex- Secretary Gol	Earlier from Ministry of Power
2	Mr. Hans-Arild Bredesen	Norway	CEO	Nord Pool Consulting
3	Mr. Peter Jogersen	Denmark	Vice President	Energinet
4	Mr. Musara Beta	South Africa	Chief Market Analyst	South African Power Pool



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## Capacity Building Program for Core Team Members

The core teams from the participating nations were trained on the various skills required for placing a bid on the Pilot Exchange through a detailed 3-day workshop(s) held in Delhi in Feb'2017.

In brief the following topics were covered : -

- Fundamentals of Electricity Markets
- Information required for placing of a bid on the Pilot Exchange
- Transmission Pricing Mechanism in India at the central and state level
- Data requirements for forming the bids corresponding to the selected 71 days
- Training on bid formulation
- Familiarization with the web portal
- Uploading of bids and reviewing results
- Hands-On Training on all activities related to pilot market

A second capacity building program was held October'2017 in which the bids placed by the core team was validated. Additionally, sessions were held covering certain issues in details . Speakers from IEX, POSOCO along with the implementation team joined the program.

Further details are available in the web portal.

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## Nepal Stakeholder Consultation

- The Stakeholder Consultation on SARPEX Mock Exercise for covering various aspects of SARPEX exercise objective, mode of operations, power exchange operation and participation in the context of the SARPEX mock exercise was held on 11<sup>th</sup> and 12<sup>th</sup> April 2017.
- Mr. Dinesh Kumar Ghimire, Joint Secretary, Ministry of Energy, Nepal delivered the key note address and mentioned about the Nepal's long term plan for mitigating energy deficit.
- Dr. Kirit Parikh, Chairman, IRADe has given special address and mentioned the SARPEX objective and relevance in the cross border electricity trade.
- More than 30 participants from various organization has participated in the Workshop.
- The one to one meeting has been conducted in Ministry of Energy, Nepal Electricity Authority (NEA) and Load Dispatch Centre etc. to discuss the concept of SARPEX and its relevance for Nepal.



## Bhutan Stakeholder Consultation

- The stakeholder consultation on SARPEX Mock Exercise for Bhutan Stakeholders covering various aspects of SARPEX exercise objective, mode of operations, power exchange operation and participation in the context of the SARPEX mock exercise was held on 29th-30th July 2017.
- Keynote address has been delivered by Mr. Sonam P Wangdi Director General, DHPS, MoEA Bhutan and more than 20 participants from different organization has participated in the Workshop.
- The one to one meeting has been conducted in the Ministry of Economic Affairs (MoEA) with Mr Dasho Yeshi Wangdi and others, Druk Green Power Corporation (DGPC), Bhutan Power Corporation (BPC), Druk Holding & Investment etc.



## India Stakeholder Consultation

- **Central Electricity Authority:** “South Asian Regional Power Exchange (SARPEX) Mock Exercise One-to-one meetings with Central Electricity Authority (CEA) with Principal Chief Engineer, Chief Engineer and Director etc. and later on with Member Power System who is the Designated Authority as per the MoP India Notification for Cross Border Electricity Trade.
- **POSOCO:** The SARPEX mock exercise stakeholder consultation was held at POSOCO on 20<sup>th</sup> July’2017. The same was attended by CEO POSOCO and other high level officers. Mr Soonee, earlier CEO POSOCO and current Advisor, has always given his valuable suggestions in this matter right from the inception stage.
- **Central Electricity Regulatory Commission:**  
**Submission followed by supplementary submissions to CERC draft notification were presented to CERC. The same are also available on CERC website.**  
The SARPEX road-map and mock exercise was also shared and discussed in one to one meetings with various senior level officials of CERC.



## Key Terms of Reference of the TOR of TF-3 are :-

- South Asian Country specific assessment of preparedness for Cross-Border Electricity Trade. - **Completed**
- Recommend a dispute resolution mechanism related to commercial aspects of Cross Border Electricity Trade- **Completed**
- Develop a design of the Pilot Market and creation of a pseudo trading platform – **Completed**
- Identify the required market structure in the South Asian region for a separate market or trading mechanism for renewable energy products. – **Part of separate project of USAID.**
- Based on pilot market data, deliberate and recommend the desired evolution path of Cross Border Electricity Trade – **Ongoing and part of this meeting**
- Suggest various principles on which a standard bilateral agreement (PPA's and TSA's) should be based in case of Cross Border Electricity Trade.- **Completed.**
- Based on the pilot market experience, advice changes in market rules, grid coordination related procedures, applicable charges, etc. if any.- **Ongoing and part of this meeting**
- Recommend international best practices in electricity market that needs to be adopted in order. This shall include efficient ways of handling congestion, market-based instruments such as financial transmission rights and ancillary services market to ensure grid security, etc. – **Completed (TF-3 & TF-2 part)**

## The Deliverables of the ToR of TF-3 are :-

- Develop the design of a Pilot Regional Electricity Market with supporting data and trading platform within two years from the date of formation of the task force. The Pilot Market coupled with market simulation eventually must publish price indicators to guide future investment.- **Completed**
- Finalize market design of a South Asian grid at the completion of the Pilot phase should include a draft set of market rules that would go through a stakeholder consultation process in all the South Asia countries. Eventually, the South Asian Electricity Market Rules document that should form the basis of the actual market. – **Completed.**
- A South Asian Electricity Plan document that identifies options for Energy Integration covering commercial aspects. This will also include a comprehensive inter-regional electricity road map which will enumerate the various phases of Cross-Border Electricity Trade. – **Final project report after incorporating the inputs of analytical studies, TF-1 , TF-2 and TF-3.**
- Statement of Opportunity for South Asian Electricity System for prospective investors and consumers- **Final Project Report incorporating the inputs of analytical studies, TF-1 and TF-2.**

THANK YOU

**For more details please contact:-**

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