

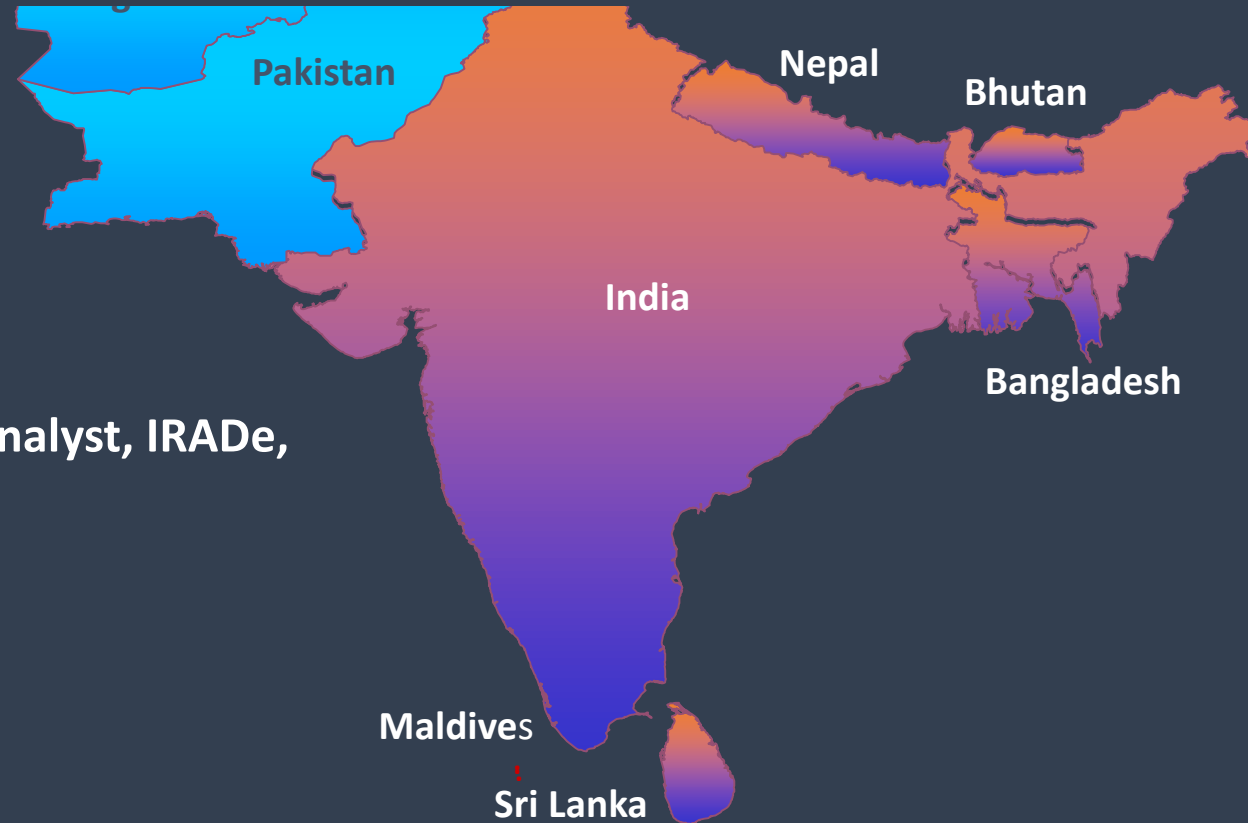


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South Asian Regional Power Exchange Need of a Day Ahead Market and its Possible Implication



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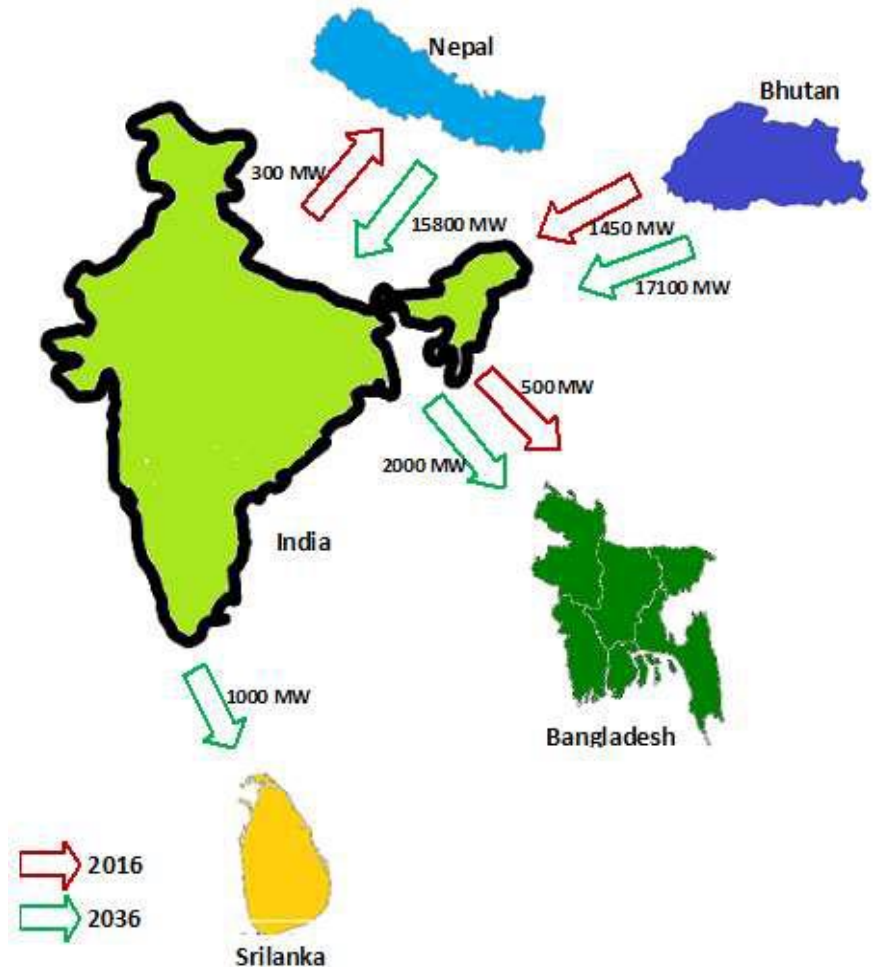


Content

- Existing Trade in South Asian Region
- What Day Ahead Market offers
- How Power Exchange is providing demand-supply position
- Need of DAM and implication in South Asian Region
- International Power Market and Exchanges
- Recent guidelines, orders and agreements related to CBET
- Conclusion

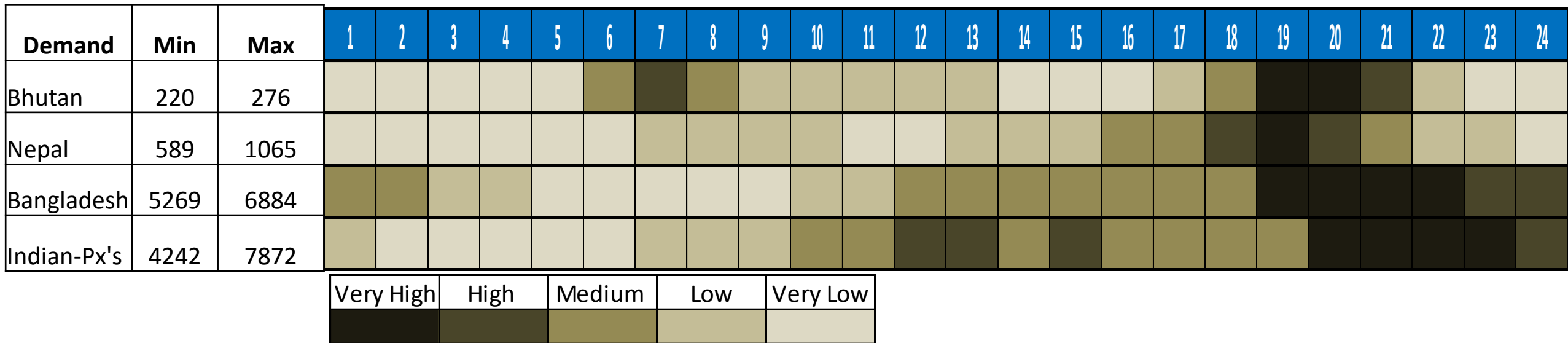
Existing Trade and Market Product available in South Asian region

Country	Contracts quantum and duration	Type
Bhutan → India (1450 MW)	Chukka (336 MW), Kurichhu (60 MW) and Tala (1040 MW) long term power trade agreement	G to G
	Dagachhu (126 MW) Long Term	Commercial
India → Bangladesh (660 MW)	BPDB Long-term contract for 250 MW	G to G
	BPDB Medium-term contract for 250 MW	Commercial
	Tripura – Comilla 160 MW contract	G to G
India → Nepal (420 MW)	NEA Contracts in tune of 420-440 MW	G to G
	NEA Past contracts (2011-2015) during December-April months for ~20-30 MW	Commercial



Commercial Mechanisms of Price Discovery in Power Trading is well established now in all the BBIN countries. Long term, medium term and Short term market product available in SA region.

Hourly complementarities- DAM may reap this opportunity



Country	Peak – Off peak	Seasonal Variation Average Demand
Bangladesh	30 - 90%	45 - 50%
Bhutan	15 - 55%	20 - 25%
India	7 - 30%	8 - 10%
Nepal	50 - 125%	10 - 15%

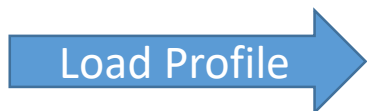
Source: Presenter's analysis based on 1st April 2015 Electricity Met Demand no's and IEX Market Clearing Volume

Source: Presenter's analysis based on FY 2015 Electricity Met Demand no's.

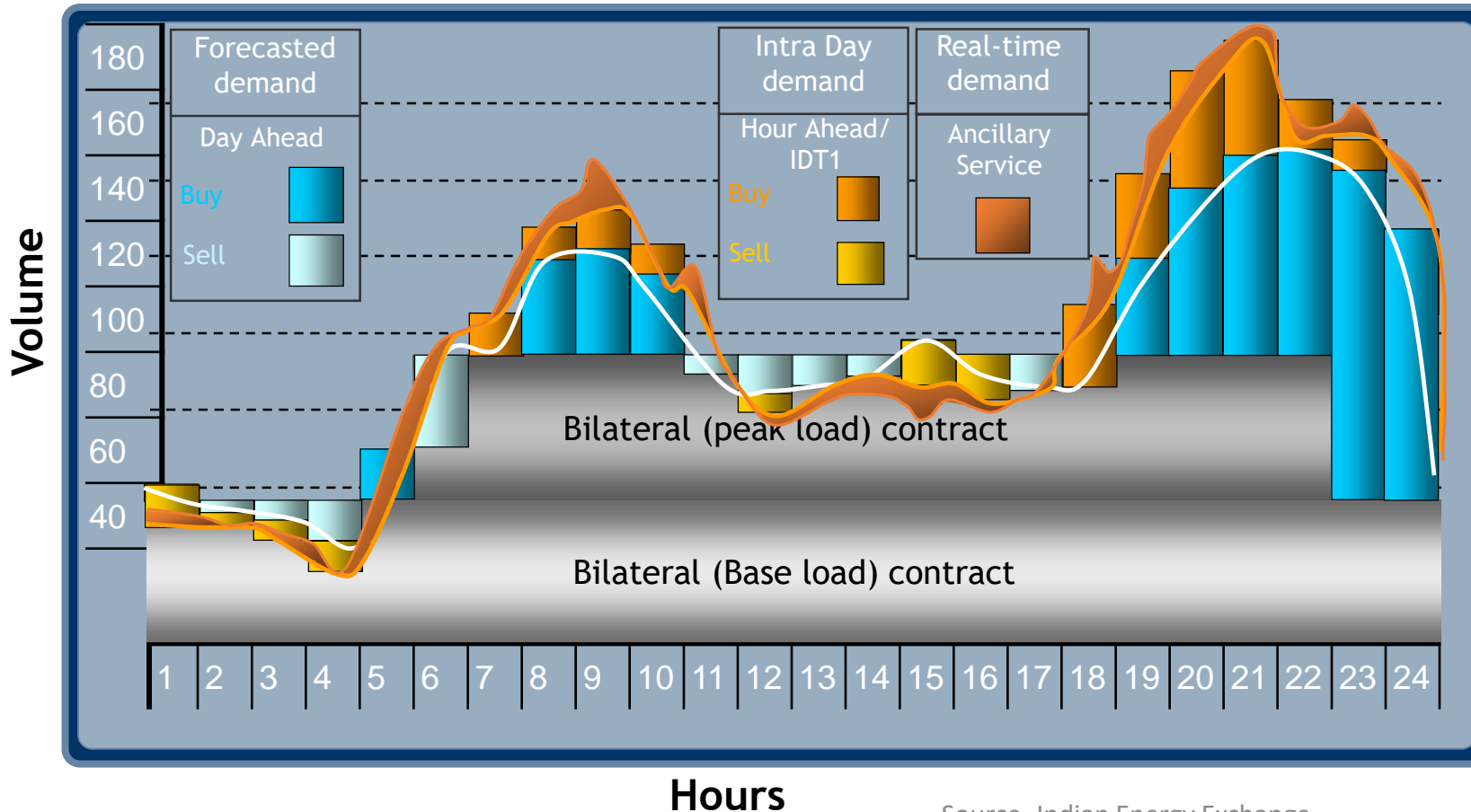
Seasonal Complementarities: Short Term Trade opportunity

	January	February	March	April	May	June	July	August	September	October	November	December
Bangladesh	Green	Green	Blue	Red	Red	Red	Blue	Blue	Blue	Blue	Green	Green
India - North East	Blue	Green	Blue	Green	Green	Blue	Red	Red	Blue	Red	Red	Blue
Bhutan	Red	Red	Blue	Blue	Blue	Green	Green	Green	Green	Blue	Blue	Red
India - East	Green	Blue	Red	Red	Blue	Red	Red	Red	Red	Blue	Green	Green
Nepal	Red	Red	Blue	Blue	Green	Green	Green	Green	Green	Blue	Blue	Blue
India - North	Blue	Blue	Green	Green	Blue	Red	Red	Red	Red	Blue	Green	Blue
India - West	Red	Red	Red	Blue	Blue	Blue	Green	Green	Green	Red	Red	Red
Pakistan	Green	Green	Blue	Blue	Blue	Red	Red	Red	Red	Blue	Blue	Blue
India - South	Red	Red	Red	Red	Blue	Green	Green	Blue	Blue	Blue	Green	Blue
				Low	Medium	High						

Source: World Bank report



PX's is provide an optimal daily Demand-Supply



Source- Indian Energy Exchange

- The DAM spot with 15-minute dispatch is inherently more compatible than bilateral for closer to the real time needs for balancing the demand supply gaps
- Optimal management of daily / seasonal variations in demand or supply - buy/sell the surplus / deficits

Need of DAM and implication in South Asian Region

Need of Day Ahead Market

- Reaping the daily demand complementariness of SA countries.
- Demand-supply balancing opportunity near to real time.
- Standardized contract.
- Increased in the investment by providing more market choices.
- Competitive power market platform and market determined prices.

Implication of DAM in South Asian region

- Better resource utilization and increase energy access in the region.
- Social Welfare Maximization (10 Billion Rs).
- Price signals for investment growth in generation and transmission. (Additional 1900 MU- Unified or 2200 MU in Sequential Mode)
- Increase in underutilized generation assets PLF. (>90% of time blocks - Sell bids higher than Buy bids)
- Surplus of about 30 BUs in the year 2016-17 (About 3400 MW on an average day.)
- Opportunity for economic gain by power trade and forging relationship with neighboring countries.

International Cross-Border Power Trade

Power Trading region	Norwegian	Pennsylvania-New Jersey Maryland	UK Power Market	South Asian Region (Indian Power Exchange)
Exchange Name	NPS (Nord Pool)	Pennsylvania-New Jersey-Maryland	APX- ENDEX	Indian Energy Exchange (IEX) & PXIL
Electricity Reform	1991	1927	2001 (NETA)	2003
Exchange Operation	1993	1993	1999	2008
Participating Region / Area	Finland, Norway, Denmark and Sweden	Pennsylvania New Jersey Maryland District of Colombia	United Kingdom Netherland Belgium	Indian states
Product Available for Trade	Day Ahead Market Intra- Day Contract for Differences	Hourly Day Ahead Spot Trade Financial Transmission Right	Day Ahead Base, Peak and Off-peak Intraday	Day Ahead Term Ahead Contract

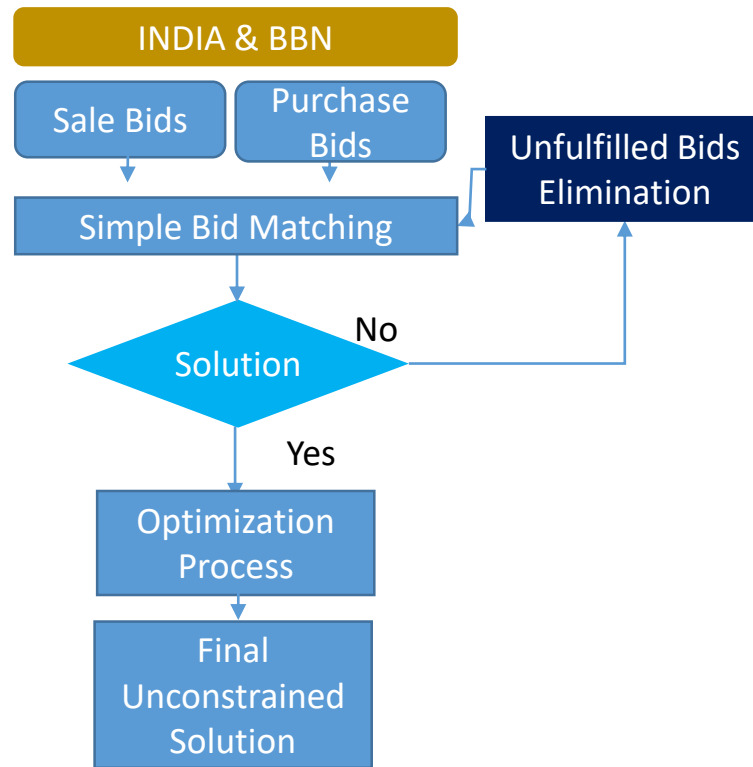
Primary Product- Day Ahead Market is available in Most of the Regional Power Market for balancing Demand-Supply

SARPEX would enable closer to real-time balancing and Social Welfare Maximization in the Region

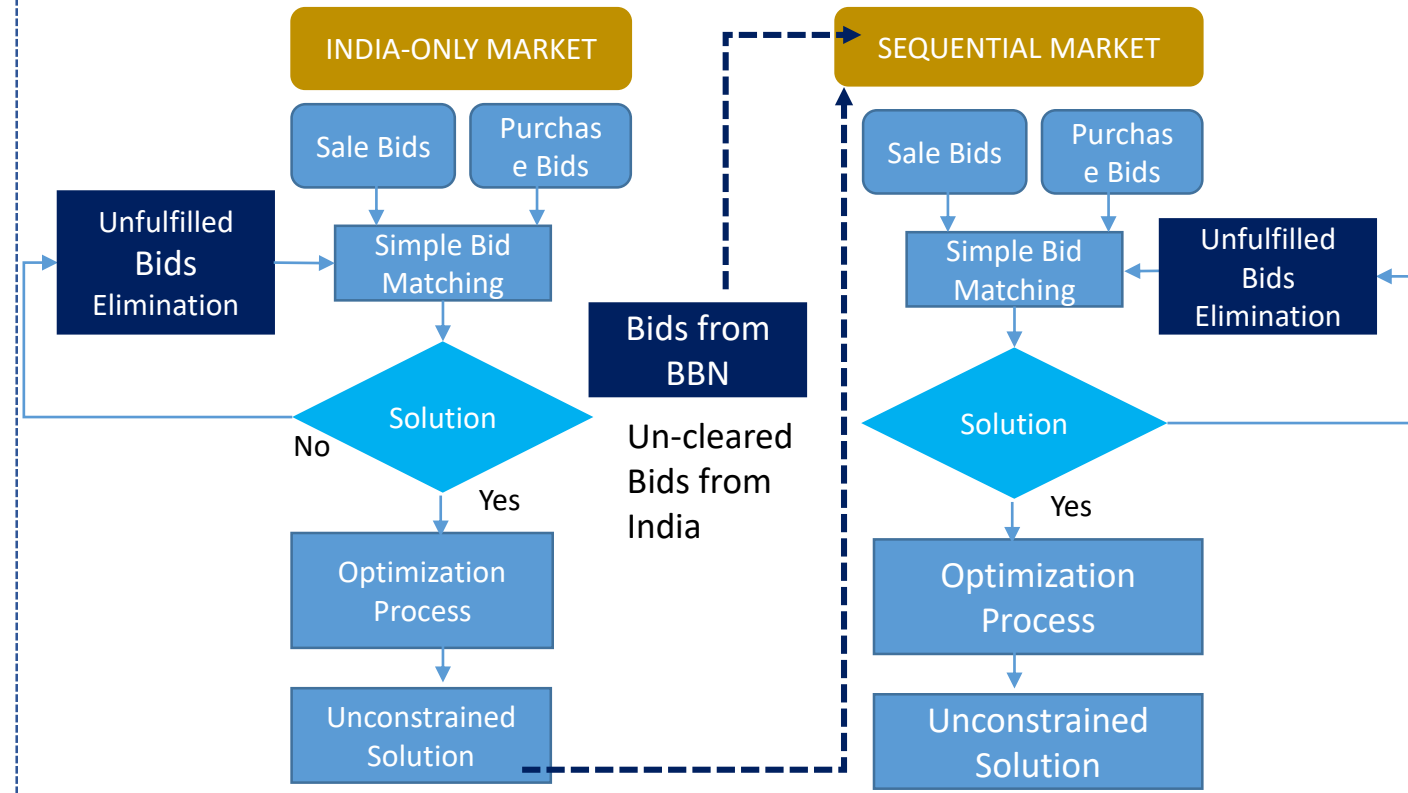
- A fair, neutral and robust price discovery platform and create an orderly marketplace
 - Market-determined prices
 - Greater flexibility since trades are on a short-term
 - Allows for absolving the counterparty risk
 - Economic dispatch
- Apart from the other benefits of Exchange, it will not only supplement the existing bilateral trade in BBIN but also **encourage more choice and investments in the sector**

SARPEX- Mode of Operation

UNIFIED MODE – 15 MINUTE DAM INTERVAL

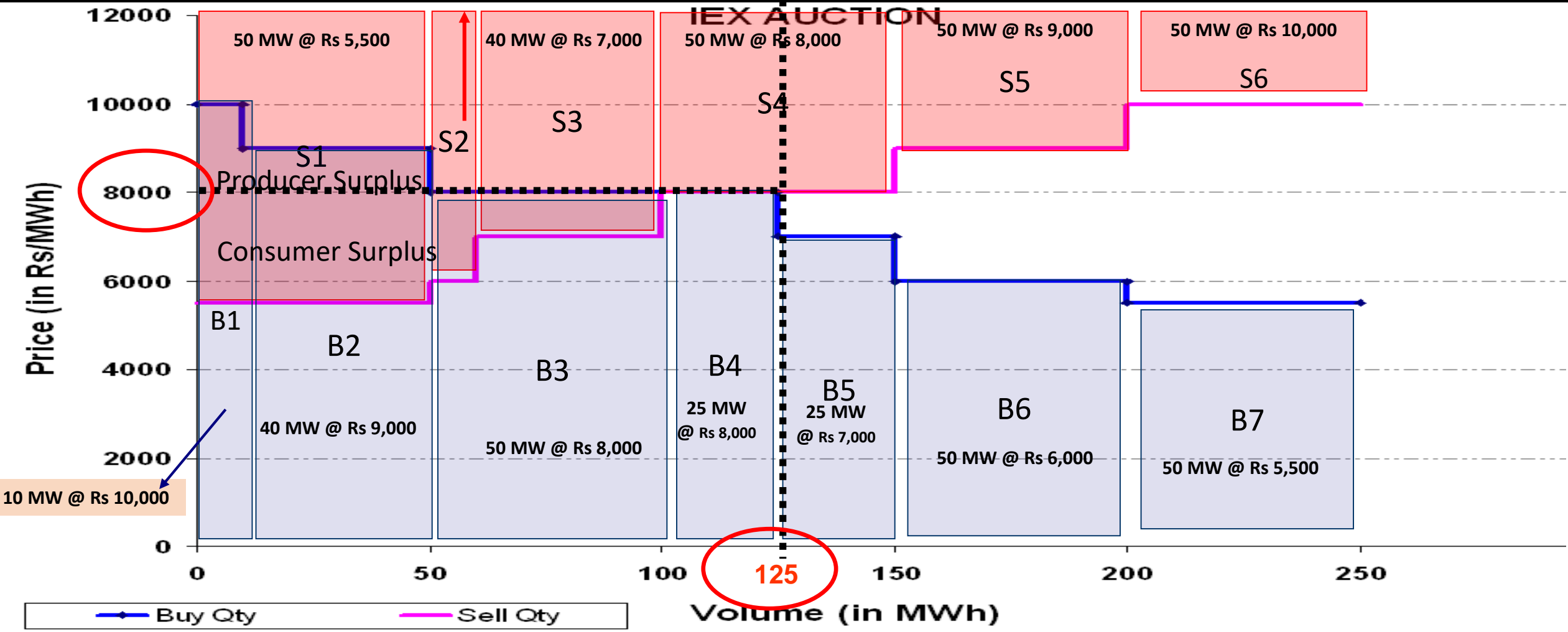


SEQUENTIAL MODE – 15 MINUTE INTERVAL DAM



MCP :Rs 8000/MWh Volume: 125 MW

10 MW @ Rs 6,000



Implementation of a Regional Exchange Market has been delayed on account of multiple factors

Perceived Challenges

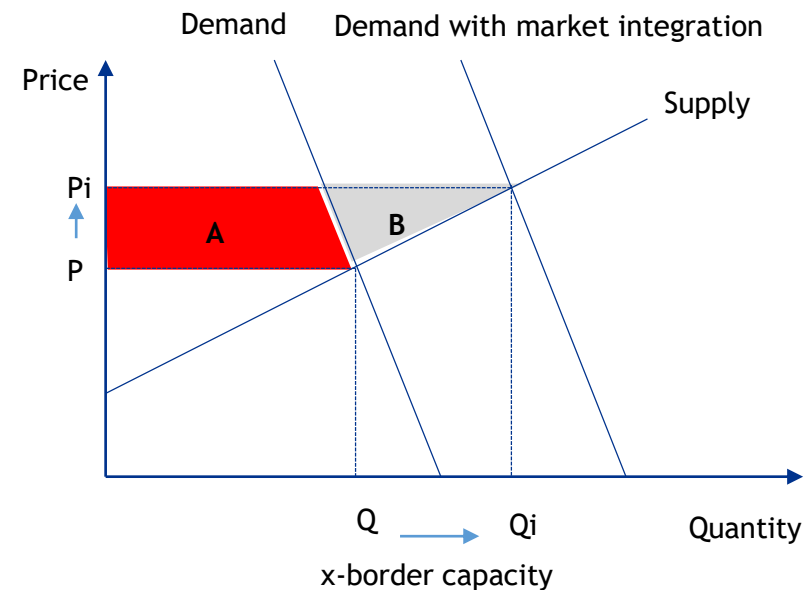
- Provisions w.r.t. institutional, legal, policy, market and regulatory framework essential for a **Regional Spot Market development**
- Apprehensions about price increase in the Indian Spot Market (Unified- About 16 paisa/unit, Sequential- 51 paisa/unit excluding Indian consumer)
- Transmission Charges & Losses - (PoC charges and Losses are published for Bangladesh and Bhutan)
- Agreement on redistribution of benefits or losses accrued by the various participants – *“Consumer & Producer Surplus”*

SARPEX Pilot Market Exercise analyzing these issues and find solutions

Market Coupling Issues

- Market Design and Rules for a Regional Day Ahead Spot Market?
- Price convergence and impact on the prices in each country?
- Social Welfare of each country?
- Market power - behavior of consumers & producers in the respective countries?
- Capacity Building of BBN countries for initiating DAM transactions through Exchanges

Welfare Impacts of market integration (illustration only)



The mock exchange conducted to provided an answer for above mentioned key questions related to Market Volume, Prices and Social Welfare.

Key Conclusion

- Day Ahead Complementarities' and Seasonal Complementarities' providing an case for DAM in SA region.
- Indian existing power exchange does have more sell bids than buy bids. India underutilized and stranded generation capacity may improve. Surplus power should be traded to the neighboring countries.
- International Experience showcases the DAM as a widely used market product in cross-border electricity trade.

Thanks

Question & Answer

For further information related to ppt you may contact Mr. Gaurav Jain at gjain@irade.org