Cross Border Electricity Trade in South Asia: Transitioning from bilateral to trilateral/multilateral trade (Including power markets)
Content

- **Scenario of Cross Border Electricity (CBET) & Outlook in South Asia (SA)**
- **Key Policy/Regulatory Enablers for Trilateral/Multilateral CBET (TMCBET)**
- **Regional Power Market & Power Exchange-Commercial/market form of CBET**
- **Role of CBET in facilitating Clean Energy Integration**
- **Enablers for transitioning to TMCBET**
- **Initiatives by SARI/EI**
Scenario of Cross Border Electricity Trade (CBET) & Future Outlook

- CBET – Increased by 2.6 times since 2012. (~3760 MW*)
- Historically CBETs are bilateral, Now trilateral trade envisaged
- Bangladesh#- Plan to Import from Bhutan (1 GW), Nepal (3 GW) through India.
- Bangladesh issued LoI for import 500 MW of electricity from Upper Karnali (GMR) in Nepal @ 7.71 cents/unit for 25 years ##

Compiled from

- India connection with Bhutan, Nepal, Pakistan, Sri Lanka as per the CEA-Perspective Transmission Master Plan-Bangladesh-PSMP-2016
- Bangladesh as per the PSMP-2016 of Bangladesh
- India-Bangladesh via India (2030)-Bongaigaon/Rangia - Jamarpur
- Nepal-Bangladesh via India From Nepal (Purnea-Barapukuria) by using Case 3 T/L (initially 400 kV AC) 2025, using Case 3 T/L (upgrade to 765 kV DC) 2025, Bheramara – Bhatpara Additional extension of Bheramara HVDC Power Import from Nepal (Including GMR) 2025
- India-Bangladesh-Rangia/Rotla - Barapukuria 1,000 MW by 2020 & another 1,000 MW by 2025 Power import by using Case 2 T/L (±800 kV DC), Tripura – Comilla-400 MW by 2020, Bhibyana - Meghalaya (PSPP) 1,000 MW 2020 PSPP in Meghalaya State, Tripura – 765 kV AC 1,000 MW

# - Letter of intent
## - Power System Master Plan 2016 (Final)

LoI - Letter of intent
* - Maximum Peak Trade

South Asia Current Power Installed Capacity 441 GW

44.4 GW Cross Border Grid Interconnection by 2036/2040
Emphasized the need to promote regional power trade, enables CBTE based on bilateral, trilateral & mutual agreements.

Encourages Cross Border Energy Trade, enables cross border grid interconnection based on bilateral/trilateral/multilateral mutual agreements.

"CBTE" means transactions involving import or export of electricity between India and any other country and includes transactions related to passage of electricity through our country in transit between two other countries.

India's Prime Minister called for connecting solar energy supply across borders Hon'ble Prime Minister Shri Narendra Modi during first assembly of the International Solar Alliance on October 2018.

On May 2020, MNRE issues RFP on OSOWOG which envisages large scale trans-regional grid integration.

Phase-I Middle East-South Asia-South East Asia (MESASEA) interconnection:

Indian Grid connection with MESASEA, Phase-II MESASEA grid with Africa Power Pools, Phase-III (Global interconnection) to achieve the OSOWOG vision.
Regional Power Market & Power Exchange (PX) - Transitioning to Market form of CBET in SA

- CBTE on Commercials/Market basis increasing ~ 1226 MW of CBET (i.e. ~33%)
- Demand Diversity - Daily, weekly, Monthly, Seasonal
- PXs - Fair, Transparent, Neutral Market Place

- PXs offers a platform for trilateral/multilateral CBET
- SARI-Study on Gains from BBIN Multilateral electricity Trade (Capex reduces by USD 17 billion due to regional trade)

- SARI-Study - SARPEX - Pilot Market Exercise - Demonstrated CBET in DAM in PX Platform
- Bangladesh, Nepal, Bhutan in PXs, the quantum of MCV increased in the range of 5-7% (2015-16)

- New power market initiatives in India also offers an opportunity to leapfrog in Cross Border Power Market Design front.

Seasonal complementarity - Monthly Electricity Load Profiles across South Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>January</th>
<th>February</th>
<th>March</th>
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Low | Medium | High

Regional Power Market Development

- Possible - Phases of Market development for CBET
- Continuous Trading
- Spot Markets on exchanges
- Auction Markets
- OTC Markets
- Trading Licence
- Deemed Trading Licence
- Nodal Agency
- Reduced Improper Disconnections
- Level of Energy Cooperation & Harmonization among SACs

SACs - South Asian Countries

1 Source: World Bank Study
2 Government of India (GoI) | Ministry of Power (MoP) guidelines - Import/Export Cross Border Electricity

SARPEX - South Asia Regional Power Exchange - addition of BBIN to the Indian domestic market resulted in an increase of 1,918 MUs (5.3%) and 2,550 MUs (7.0%) in the MCV for the unified & sequential modes, respectively, over the Indian domestic market. CBTE - Cross Border Trade of Electricity
Benefit of CBET in facilitating Clean Energy Integration in SA

Rapid Renewable Energy Expansion

CBET can act as a tool for flexibility, managing RE Intermittency, Grid Balancing RE Integration

Large Regional hydro potential

~350 GW (19% developed)

Hydro is one of the best Balancing resource
Sharing of reserves

Opportunity for developing Regional Power Market
Trading of balancing services Ancillary Market

Successful 9 PM, 9 Minute-A generation flexibility of ~ 400 MW was achieved from hydropower plants in Bhutan

South Asia- Hydro Power Potential (GW) & % Developed

- India 450 Gw² by 2030
- Bangladesh 7.9 Gw² by 2041
- Sri Lanka 50% Generation from RE by 2030
- Pakistan 16 Gw³ by 2040


ASIA CLEAN ENERGY FORUM 2020

Cross Border Electricity Trade in South Asia: Transitioning from bilateral to trilateral/multilateral trade (Including power markets) / Rajiv Ratna Panda, Technical-Head /SARI/EL/TRADE

ACEF 2020 Side Event I 6

Successful 9PM, 9 minute event Highlights the Outstanding Cooperation in Electricity Grid Management in South Asia
https://posoco.in/download/report-on-pan-india-lights-off-event-from-8-minute-on-5th-april-2020/?wpdmdl=28819
## Enablers for Trilateral and Multilateral CBET

<table>
<thead>
<tr>
<th>Political</th>
<th>Regulatory</th>
<th>Technical and Commercial</th>
<th>Institutional</th>
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<tbody>
<tr>
<td>• Regional Outlook/Vision</td>
<td>• Provision to use intermediary transmission network under open access</td>
<td>• Standards and grid codes</td>
<td>• Institutional arrangements</td>
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<tr>
<td>• Political Consensus</td>
<td>• Rules for identification of transmission capabilities &amp; congestion</td>
<td>• Grid Connectivity</td>
<td>• Regional Coordination Forums are desirable</td>
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<td>• Intergovernmental agreement(s)</td>
<td>• Rules for measurement of imbalance &amp; settlements</td>
<td>• Common understanding on Transmission &amp; transit charge.</td>
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<td>• Co-ordinated Grid Planning</td>
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<td>• Settlement &amp; payment mechanism</td>
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<td>• Dispute resolution mechanism</td>
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Cross Border Electricity Trade in South Asia: Transitioning from bilateral to trilateral/multilateral trade (including power markets) / Asia Clean Energy Forum-2020/ Cross Border Power Trade and Future Energy Markets /June 16, 2020 (Tuesday) - 8:30 pm Manila Time/ 8-9:30 am EDT/ Rajiv Ratna Panda, Technical-Head /SARI/EI/IRADE
Various Initiatives by SARI/EI for TMCBET & Regional Power Market Development in SA

**Efforts on Implementation & Institutionalisation**

**Regional Forums**
- Forum of Electricity Regulators
- Forum of Transmission Utilities
- Forum of System Operators
- Electricity Market Forum
- Investment Forum

**Technical-Studies**
- Transition of **bilateral power trade to trilateral and multilateral power trade** in South Asia.

- Assessing the Benefits of CBET for Affordable Supply of Electricity, **Facilitating Grid Balancing, Renewable Energy Integration**, and Suggesting a **Framework for Ancillary Service Market** in the SA Region

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**South Asia Regional Power Exchange (SARPEX) Mock Exercise**

**Gains from Multilateral Electricity Trade among BBIN Country**

**Non-discriminatory Open Access in Transmission for Facilitating CBET in SA.**

**Harmonisation of Grid codes, Operating Procedures & Standards to facilitate/promote CBET**

**Framework for Trading Licence Regime to facilitate CBET in SA Region**

**Regional Regulatory Guidelines for Promoting CBET in South Asia Region**
It always seems impossible until it's done.

Nelson Mandela

Contact: Rajiv Ratna Panda
Technical–Head
SARI/EI/IRADe
rajivratnapanda@irade.org
rajivratnapanda@gmail.com
https://sari-energy.org/
https://www.irade.org/

Thank You