Regional Technical Institutional (RTI) Mechanism
For Harmonising Power System Operation Practices & Norms in South Asia

Presented by
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Associate Director, SARI/EI IRADE

Webinar on Importance of Creating Regional Technical Institutional (RTI) Mechanism for Harmonizing Power System Operation Practices and Norms in South Asia and Key Considerations Towards its Formulation | Tuesday, 23rd March 2021
Cross Border Electricity Trade in South Asia (SA) : Current Status & Future Scenario

Power System Operation in SA Countries

Present Arrangements, Regional Level Platform Supplementing the Bilateral Efforts

International Experiences –Key Insights

Experience in SA Region- Success Story of FOLD (Forum of Load Despatchers), India

Proposed RTI Function

Discussion Points
Cross Border Electricity Trade in South Asia: Current Status & Future Scenario
Cross Border Electricity Trade in South Asia: Current Scenario

- Annual CBET ~ 21 BUs. Dominant BBIN ~ 16 BUs
- Bilateral & G-G trade Dominates
- Comm. CBET in BBIN on Rise 2010-0 MW, 2020 ~ 1266 MW (~33%)
- CBET Potential Remains Large
- EUROPE-Leading Regional Power System, CBET trade volume - 467 TWh

CBET in South Asia – BUs (TWh)

- South Asia all CBET
- South Asia BBIN
- India to Bangladesh
- Bhutan to India
- India to Nepal
- Uzbekistan to Afghanistan
- Tajikistan to Afghanistan
- Iran to Afghanistan
- Turkmenistan to Afghanistan
- Iran to Pakistan
- India to Myanmar

Note: All the data are for 2020 except Afghanistan import is for 2019. Based on Data Source from:
- POSOCO
- NEPRA
- NSIA
- CERC-MMR
- Numbers are after rounding of decimal number

Presentation on Regional Technical Institutional For Harmonising Power System Operation Practices & Norms in South Asia & key considerations for its formulation/Rajiv Ratna Panda, Associate Director/SARI-EI-IRADE/23rd March 2021

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**Cross Border Electricity Trade South Asia (SA) : Future Scenario**

**SA CBET Outlook**
- ~43.8 GW, Cross Border Interconnection Capacity by 2040

**Enabling Policy & Regulatory Frameworks**
- Guidelines for the Import / Export (Cross Border)-2018 of Electricity
- Central Electricity Regulatory Commission (Cross-Border Trade of Electricity) Regulations, 2019
  - Section 3 (2), 6, 12 (6)
- Procedure for approval and facilitating Import/Export (Cross Border) of Electricity by the DA Authority-Feb, 2021
  - Section 8, Annex-V, 6.5, 6.6 (iii), Annex-III

**Transitioning from Bilateral to Trilateral CBET in SA**

**Renewable Energy based CBET**
- (One Sun One World One Grid)

**Commercial form of CBET, Trade Through Power Exchange Platform**

**Regional Power Market Development & Market Integration**

**Rapid expansion is envisaged, ~43.8 GW Cross Border Grid Interconnection by 2036/2040**

- India connection with Bhutan, Nepal, Pakistan, Sri Lanka as per the CEA-Perspective Transmission Master Plan, Bangladesh-PSMP-2016/2018
- India-Bangladesh as per the PSMP-2016 of Bangladesh
- Bhutan-Bangladesh via India (2030) Bongaigaon/Rangia/Jamarpur
- Nepal-Bangladesh via India-From Nepal (Purnea-Barapukuria) by using Case 3 T/L (initially 400kV AC) -2025, using Case 3 T/L (upgrade to 765kV AC)-2030, Bheramara – Bahrampur-Additional extension of Bheramara HVDC Power import from Nepal (including GMR) -2021
- India-Bangladesh – Rangia/Rohia - Barapukuria 1,000 MW by 2022 & another 1,000 MW by 2035 Power import by using Case 2 T/L (±800kV DC), Tripura – Comilla 400 MW by 2020, Bibiyana - Meghalaya (PSPP) 1,000 MW 2030 PSPP in Meghalaya State, Existing 1160 MW

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Power System Operation Scenario in South Asia

Operating Model, Maturity Level, Roles
Different Types of Operating Models, Maturity Exist w.r.t to Power System Operation in South Asia (SA)

- Operating Model, Maturity Level, Roles Varies
  - Various Level of Structure VIU to ISO
  - Maturity of Mechanisms & Institutions depends on the Size, Complexity, Degree of Unbundling & Priorities of the Country’s Power System
  - The Role of System Operator in terms of Coverage & Exhaustivity varies based on the type of System Operation Model Prevailing in each SA country
  - Power System Operating Frameworks Varies across SA
  - Co-operation in the matters of system operation will be needed to enhance regional integration in South Asia

With more CBET in the future and considering the diversity among existing Power System Operational Institutional Apparatus in each SA countries, A RTI related to Power System Operation will be useful for facilitating Power System Operation Coordination and Harmonization.
Present Arrangements, Regional Level Platform Supplementing the Bilateral Efforts
Present Arrangements in South Asia (SA), Regional Level Platform Supplementing the Bilateral Efforts

Existing Arrangements are at Bilateral Level

- Bilateral G-t-G level arrangements are already in vogue in South Asia to facilitate CB Trade
  - India-Bangladesh; India-Nepal; India-Bhutan, India-Myanmar, Nepal-Bangladesh
  - Committees- JWG and JSC have been constituted to carry out discussions under these

- Procedure For Approval & Facilitating Import/Export (Cross Border) Electricity by Designated Authority (DA) also specifies such arrangements
  - Joint Operation Committee (JOC)
  - Joint Technical Team Transmission (JTT-T)

Facilitate Regional Harmonisation of Operating Practices and Norms for SA
- Rendering Support towards Harmonising Codes & Standards for SA Region
- Support the Regional Participants with Common Studies for SA
- Support towards Reliability and Security of the Regional Grid of SA

However, when the Transactions are Trilateral/Multilateral in nature, any platform to discuss and cooperate in a collective manner shall bring better Harmony, Trust, Convergence, Enhanced Spirit of Coordination & Cooperation.
International Experiences – Key Insights

Presentation on Regional Technical Institutional for Harmonising Power System Operation Practices & Norms in South Asia & key considerations for it’s formulation/Rajiv Ratna Panda, Associate Director/SARI-EI-IRADE/23rd March 2021

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Across the Regional Power Systems, Power pools, Power markets, Regional Institutions exist in some form or the other, the evolution and nature of these Institutions Varies from Case to Case, Although there is lot of Commonality.
International Experiences - Key Insights

**Varied Evolution**
Gradual Legalization, Organizations started with **basic Structures**, later turn towards **more Legal Structure**

**Multi-Layered Governance Structure** to undertake various roles and responsibilities

**Combination of Committees of varying nature to focus on Key Technical areas & other tasks as needed**

**Initial Handholding support by suitable institutions/Multilateral agencies /MDBs/DFIs at Early Stage of Development**

**Varied Financing Model - Membership Fee, Various Service Fees, Donor, Grant, Organizational & Secretariat Support**

**Location**
Mostly, organizational headquarters **Established in a Member Country** with the support of members

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"During the early-stage, a **simple legal structure** with not too onerous financial mechanism, with strategy to crowding sourcing of required support for various technical activities, voluntary organizational, secretariat support may be the strategy to begin with"
Experience in the SA Region - Success Story of FOLD (Forum of Load Despatchers), India

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Evolution of Grid Integration, System Operation, Creation of FOLD (Forum of Load Despatchers), India

Growth of Indian Power Sector
Regional Grid Integration, System Operation, Creation of FOLD

One Nation One Grid One Frequency

Source: PGCIL-Power Map of India, Transmission – Line CSM CEA as on Jan, 2021, *Substitution As on Jan 2021
Separation, whole owned subsidiary, 2014-Cabinet Approval, POSOCO as ISO, 2017-Schedule A CPSU

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**The Success Story of FOLD (Forum of Load Despatchers), India**

**Mission**

1. Technical Cooperation & Knowledge Sharing
2. Regular Interaction & Active Collaboration
3. Mutual Respect, Cooperation, Consensus Building, International Benchmarking
4. Promoting Ethical, Non-Discriminatory & Fair Practices

**Governance Structure**

1. As per the FOLD charter, the Steering Committee comprises of the Head of State/Regional/National Load Despatch Centres or its authorized representative
2. As per the FOLD charter, the Working Groups to advise the Steering Committee on matters related to Power System & Electricity Market Operation
3. General Body of FOLD*

**Operating Structure**

1. As per the FOLD charter, the Secretarial assistance to the FOLD is provided by the National Load Despatch Centre located in New Delhi
2. No Hassles towards Collection of Membership Fee/Contributions from Individual Members
3. Holding of Meetings & Discussions mostly through Virtual Platform (even before Covid-19)

**Some Recent Examples of Co-operation**

2. Cooperation towards successfully holding of the Pan-India #9PM 9Minutes lights-off Event on 5th April 2020 (PM announced on 3rd April, 2020)

* As per the FOLD charter, all the executives working in SLDCs, RLDCs, NLDC would be members of the General Body of Forum of Load Dispatchers (FOLD).

**Information Source:** FOLD Charter, FOLD Website
Key Function of Proposed RTI Mechanism Related to System Operation in South Asia
**Key Functions of Proposed Regional Technical Institutional Mechanism Related to Power System Operation**

1. **Platform**
   - Platform for Crosscutting Deliberations & Exchange of Ideas for efficient power system operations in South Asia

2. **Facilitate**
   - Facilitate the work of Development & Implementation of Common Procedures/Guidelines and frameworks

3. **Provide**
   - Provide technical Support towards harmonization of System Operation Practices & compliance with reliability standards, in the matter of cross border connections

4. **Render**
   - Render Technical Support in the System Operation matters related to exchange of power in SA

5. **Provide**
   - Provide Inputs & Technical Support to Regional Regulatory Institutional mechanism & Regulators of South Asian Countries on the matters related to system operation

6. **Render**
   - Facilitate and render Assistance towards development of a Code of Ethics for Load Despatchers in South Asia

7. **Promote**
   - Promote and render Assistance towards Capacity Building in power system operation and associated areas

Act as a Facilitator and Advisor, shall aim to arrive at decisions through Mutual Discussions and Consensus Building

Aims to Supplement Existing Bilateral Cooperation amongst countries in SA in the matters of Power System Operation
Discussion Points
Discussion Points

1. What can be the main Objectives towards Formation of such Regional Institution & What Specific Roles this Institution can perform?

2. What type of Institutional Framework & Governance Mechanism can be best suited towards Formation of such Institution in South Asia Context?

3. What Operating Structure can be adopted for the Regional Institution, since Electricity Grid in the different South Asian Countries are at different level of evolution?

4. What are International Best Practices in respect of Handholding & Financial aspects of such Institutions, particularly during the Initial Periods?

5. What Specific Advantages can be derived out of this Institution, in terms of Enhancement of CBET, Energy Cooperation and Sustainability in the region?
Thank You

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https://sari-energy.org/
https://www.irade.org/
Different Types of Operating Models exist w.r.t to Power System Operation in South Asia

- **Vertically Integrated Utilities (VIU)**
  - Traditional energy-market model
  - National VIUs- NEA (Nepal), CEB (Sri Lanka), DABS (Afghanistan), FENAKA (Maldives)
  - Undertake generation, transmission and distribution of electricity

- **Legally unbundled Transmission System Operator (LTSO)**
  - Bangladesh
    - PGCB owns and operates the transmission grid.
    - PGCB is a subsidiary of BPDB which undertakes generation and distribution
  - Bhutan
    - BPCL owns and operates the transmission grid, undertakes system operation
    - BPCL does not have generation assets, but undertakes distribution of electricity

- **Independent Transmission System Operator (ITSO)**
  - Pakistan
    - NTDC owns and operates the transmission infrastructure
    - No interests in generation and distribution segments

- **Independent System Operator (ISO)**
  - India
    - POSOCO - NLDC/RLDC operates the transmission system
    - TRANSCOs like PGCIL owns and maintains it

Countries can adopt and function with different models, however each may have its own peculiarity and operating layers.
## Comparison of key institutions across key elements of an organization’s structure

<table>
<thead>
<tr>
<th>ENTSO-E</th>
<th>PJM</th>
<th>SWPP</th>
<th>SAPP</th>
<th>WAPP</th>
<th>GCCIA</th>
<th>GMS</th>
<th>FOLD</th>
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</thead>
</table>
| Legal Framework | Formal Legal advisory body based on EU mandate and registered as Association under Belgian Law | Limited Liability Company | Incorporated as a non-profit Corporation | Inter-government and Inter-utility agreements | Inter-governmental agreement | Joint Stock Company | Inter-Government Agreement/MoU | Associatio

| Member Countries | 35 EU countries | Parts of 13 states in USA & District of Columbia | Parts of 14 states in USA | 12 Southern African Countries | 15 West African Countries | 6 Gulf Countries | 6 Member Countries (including 2 provinces of China) | States and regions in India |

| Organizational Membership | 42 TSOs of member countries | 1040 members (genco, transco, discoms, end consumers etc.) | 98 members across various stakeholders | 17 national electric companies from member countries | 29 national electric companies from member countries | Ministries of Energy and Water from member countries | Governments of member countries | 29 SLDCs, 5 RLDCs & NLDC |

| Headquarter Location | Brussels, Belgium | Valley Forge, Pennsylvania, USA | Little Rock, Arkansas, USA | Emerald Hill, Harare, Zimbabwe | Cotonou, Benin | Al Khobar, Saudi Arabia | ADB, Manila - Philippines | NLDC, Delhi, India |
## Comparison of key institutions across key elements of an organization’s structure

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<td>Assembly</td>
<td>Board</td>
<td>Board/Members Committee</td>
<td>SADC Directorate of Infra &amp; Services</td>
<td>General Assembly</td>
<td>Ministerial Committee</td>
<td>GMS Summit</td>
<td>General Body</td>
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<tr>
<td>Board</td>
<td>Members committee</td>
<td>Executive Committee</td>
<td>Executive Board</td>
<td>Advisory &amp; Regulatory Committee</td>
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<td>Steering Group</td>
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<td>Management Committee</td>
<td>General secretariat</td>
<td>Board</td>
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<td>Working groups</td>
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<tr>
<td>Secretariat</td>
<td>Other committees and working groups</td>
<td>Operation Subcommittee</td>
<td>Other committees</td>
<td>Committees</td>
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### Operating Structure

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<th>(Committee and working groups undertakes various tasks)</th>
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<td>Engineering and Operations</td>
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<td>Operating Structure</td>
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<td>Fee for operating transmission system and market</td>
<td>Transmission Fee</td>
<td>Member contributions</td>
<td>Fee on exchange transaction</td>
<td>Member contributions</td>
<td>ADB funds</td>
<td>Organizational &amp; Secretariat support by NLDC (POSOCO)</td>
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  - Assembly
  - Board
  - Committees
  - Secretariat

- **Operating Structure**
  - System Operation
  - System Development
  - Markets
  - R&D

- **Funding Mechanism**
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