Brief Report
On
SARI/EI Participation in the Fourth Meeting of SAARC Energy Regulators

06-07 Feb. 2020, Namgay Heritage Hotel
Thimphu, Bhutan
Brief Report

Based on the invitation received from SAARC Secretariat, Kathmandu, Nepal, SARI/EI Delegation comprising of Mr. Rajiv Ratna Panda, Technical-Head, SARI/EI/IRADe participated in the 4th Meeting Fourth Meeting of SAARC Energy Regulators, 06-07 Feb. 2020, Thimphu, Bhutan.

Mr. Panda, made a comprehensive presentation on Presentation on three important subjects a) Emerging Trends in Cross-border Electricity Trade (CBET) in South Asia and Future Outlook: Regulatory Implications and Roadmap b) Common Minimum Grid Code for facilitating Cross-Border Electricity Trade in South Asia and c) Open access in Transmission and Trading License Frameworks for advancing CBET and development of regional power trade in South Asia. On “emerging trends in CBET in SA, he spoke, mainly on, power system and market integration evaluation across the globe; significant environment degradation/climate change in the SAARC region; role of regional hydro power in regional renewable grid integration and regional Grid balancing; moving towards market form of trade and trade through competitive power market; developing regional power market & Future Outlook: Regulatory Implications & Roadmap”

Through his presentation, he laid out a 5 point regulatory road map for SAARC countries taking in account the recent development and future perspectives: a) SAARC countries needs to continue to work on developing harmonious policy & regulatory frameworks across countries b) Developing Complementary/parallel regulations across SAARC countries, taking steps for development of appropriate Regulation (Model SAARC Electricity Regulation for Regional Power Trade (SERRPT) can be used as a reference c) SAARC countries need to develop Regulatory Framework including rules/procedures for facilitating Trilateral Power trade d) SAARC countries needs to develop Regulatory Framework for developing power market, region grid balancing market, ancillary services market for RE grid integration e) SAARC countries needs to develop rules and associated regulatory framework for trading through power exchange and other power market platforms e) SAARC countries to work on to put some minimum regulatory requirements for advancing market, trilateral trade-harmonisation of grid code, open access, trading license, transmission pricing, connectivity, deviation settlement etc.

Speaking on the Common Minimum Grid Code for South Asia (CMGCS), a first of its kind initiative in South Asia, he said CMGCS, lays down the rules, guidelines and standards to be followed by various South Asia country participants in the system for CBET, while operating the power system, in the most secure, reliable, economic and efficient manner. He touched upon the objective, applicability, structure & brief explanation of codes i.e. Connection Code, Operating code, Scheduling & dispatch code and administration of grid code.

He also presented on the a) key findings of the SARI/EI study on framework & guidelines for non-discriminatory open access in transmission for facilitating CBET in SA covering open access desirable pre-requisites availability in SA power sector and summary of the framework and guidelines and b) Key findings of the SARI/EI study on Framework & Guideline trading license regime in SA & Grant of Trading license covering desirable pre-requisites availability in South Asia Power Sector and summary of the framework and guidelines.

The SAARC Energy Regulators and chairperson of the meeting thanked Mr. Panda for his comprehensive presentation. The detailed presentation is attached as annexure-1
Annexure-1
South Asia Regional Initiative for Energy Integration

Presentation on

- Emerging Trends in Cross-border Electricity Trade in South Asia and Future Outlook: Regulatory Implications and Roadmap

- Common Minimum Grid code for facilitating Cross-Border Electricity Trade in South Asia

- Open access in Transmission and Trading License Frameworks for advancing Cross-Border Electricity Trade and Development of Regional Power Trade in South Asia

Presented by

Rajiv Ratna Panda, Technical-Head, SARI/EI, IRADe

Fourth Meeting of SAARC Energy Regulators, 06-07 Feb. 2020, Thimphu, Bhutan
Contents

- **Emerging Trends in Cross-border Electricity Trade in South Asia & Future Outlook: Regulatory Implications and Roadmap**
  - Evolution of Cross Border Electricity Trade (CBET): Current and Future Scenario
  - Emerging Trends South Asia Power Grid
  - Complementary Regulatory Requirements and Road Map

- **Common Minimum Grid Code for facilitating Cross-Border Electricity Trade in South Asia**
  - Objective
  - Applicability
  - Structure
  - Brief on Codes

- **Open access in Transmission and Trading License Frameworks for advancing Cross-Border Electricity Trade and Development of Regional Power Trade in South Asia.**
  - Desirable pre-requisites
  - SARI Study - Brief Summary of Framework & Guidelines
Evolution of Cross Border Electricity Trade (CBET) in South Asia
History of evolution of Energy Cooperation, CBET- Key Policy & Regulatory Development

Kosher treaty between Nepal & India
1954

Nepal-India Power Exchange Committee (PEC) constituted
1992

Jaldhaka agreement
Indo-Bhutan hydropower cooperation
1961*

Agreement between Govt. of India and Royal Govt. of Bhutan on Tala Hydro Power Project - 1020 MW - First unit commissioned on July 31, 2006 & last unit on March 30, 2007
5th Mar, 1996

Indo-Nepal Power exchange 5 MW in initial Years
1971

Agreement between Govt. of India and Royal Govt. of Bhutan on cooperation in Hydroelectric Power
Mar 1974 **

Agreement between Govt. of India and Royal Govt. of Bhutan on Chuka hydro power project to India (Plant inaugurated on October 21, 1988)
Jul 2006

52 Years

Emerging Trends in CBET in SA and Future Outlook:
Significant Developments in Energy Cooperation, CBET- Key Policy & Regulatory Development

**Jan 2010**
MoU between Govt. of India and Govt. of Bangladesh, on cooperation in power sector (500 MW trade started on 5th October, 2013)

**Jun 2010**
MoU for carrying out a feasibility study for interconnection of the India-Sri Lanka electricity grids (Signed among GOSL, GOI, CEB & PGCIL)

**Dec 2010**
SAARC Inter-governmental Framework Agreement on Energy Cooperation

**Oct 2010**
Sub-Regional Cooperation between Bangladesh, Bhutan, India and Nepal (BBIN)

**Oct 2011**
MoU on Cooperation in the field of Power Sector signed Myanmar & India

**Nov 2011**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Sept 2012**
Ministry of Power Designates Nodal agency for CBTE

**Dec 2012**
CEA-Draft Conduct of Business Rules (CBT) Regulations

**June 2013**
CERC draft notification on CBET Regulations

**Oct 2013**
Inter-Governmental Agreement between Bhutan and India on development of JV Hydropower Projects

**Jan 2014**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Feb 2015**
SAARC Inter-governmental Framework Agreement on Energy Cooperation

**Nov 2015**
MoU between Nepal & Bangladesh, on cooperation in power sector

**Oct 2015**
MoU on BIMSTEC Grid Interconnection

**Dec 2015**
New CBTE Guidelines Issued (Repealed 2016 Guideline)

**Feb 2016**

**April 2016**
CEA-Draft Conduct of Business Rules (CBR) for CBTE.

**Oct 2016**
MoU on CASA 1000 Project signed among 4 participating countries* (Project was conceived in 2008)

**Dec 2016**
Indo-Nepal Power Trade Agreement

**March 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**April 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**June 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Aug 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Oct 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Dec 2017**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Feb 2018**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Aug 2018**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Aug 2018**
MoU on BIMSTEC Grid Interconnection

**Dec 2018**
New CBTE Guidelines Issued (Repealed 2016 Guideline)

**Oct 2018**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**Dec 2018**

**March 2019**
CEA-Draft Conduct of Business Rules (CBR) for CBTE.

**April 2019**
Guidelines on Cross Border Electricity Trade (CBTE) issued

**17th Aug, 2019**
Mangdechhu hydroelectric power plant (720 MW) in Bhutan inaugurated

**10 Years**

* Core project agreements viz. Master Agreement and the Power Purchase Agreements between 4 participating countries, April 2015


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Current Cross Border Electricity Trade (CBET) & Future Scenario
South Asia-CURRENT CROSS BORDER POWER TRADE (MW) Scenario and It’s Evolution

Current Cross Border Power Trade (MW) Scenario

- Bangladesh
- Bhutan
- Nepal
- India
- Pakistan
- Afghanistan
- Uzbekistan
- Iran
- Tajikistan
- Turkmenistan

Across the Region:
- India-Myanmar ~ 3-5 MW of CBET, Pakistan-Iran ~ 104 MW CBET, Afghanistan-Imports around 1000 MW collectively from Uzbekistan (326 MW), Iran (164 MW), Tajikistan (433 MW), Turkmenistan (77 MW)

Emerging Trends in CBET in SA and Future Outlook:
- Regulatory Implications and Roadmap
- Common Minimum Grid code for facilitating CBET
- Open access in Transmission and Trading License Frameworks for advancing CBET
- Development of Regional Power Trade in SA

PM Modi inaugurated Mangdechhu hydroelectric plant, Bhutan, Aug 17, 2019

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South Asia Power Sector: 1068 GW by 2040

Current South Asia-Power Installed Capacity (GW)

364 (84%)

36 (9%)

432 GW

South Asia Power Installed Capacity (GW)-2040*

1068 GW

783 (73%)

67.8 (6%)

173 (16%)

11.7 (1%)

9.3 (1%)

4.8 (1%)

14.8 (2%)

7 (1%)

1 (0%)

Source: Compiled from Various Sources


* Projection as per the World Bank Report on "How Much Could South Asia Benefit from Regional Electricity Cooperation and Trade?" For Maldives 1000 MW of capacity is Assumed by 2040.
Rapid Expansion is envisaged.

43.8 GW of cross border Grid Interconnection by 2036.
Cross Border Electricity Trade in South Asia: Emerging Trends
Emerging Trend-1
Power system and Market Integration evolution across the Globe

Establishing Bilateral Connections, bilateral Market

Moving towards Trilateral/Quadrilateral Connection, Trilateral Market

Developing Subregional Grids, Sub-Regional Power Market

Fully Interconnecting subregional Grids and Creating Common Grid and Unified Market

SA CBET Emerging Trend-1:-Moving from Bilateral to Tri/Multilateral and Market Integration
3.1 The import/ export of electricity between India and the neighbouring country(ies) may be allowed through mutual agreements between Indian Entity(ies) and Entity(ies) of the neighbouring country(ies) under the overall framework of agreements signed between India and the neighbouring country(ies) consistent with the provisions of the prevailing laws in the respective country(ies), including-

(a) through bilateral agreement between two countries
(b) through bidding route; or
(c) through mutual agreements between entities

Provided that in case of tripartite agreements, the cross border trade of electricity across India shall be allowed under the overall framework of bilateral agreements signed between Government of India and the Government of respective neighbouring country(ies) of the participating Entity(ies).

8.6 Where tripartite agreement is signed for transaction across India, the participating entities shall sign transmission agreement with Central Transmission Utility of India for obtaining the transmission corridor access. Further the transmission system in India for transmission of electricity across the territory of India under cross border trade of electricity shall be built after concurrence from Government of India and necessary Regulatory approvals.
Bangladesh to import from Bhutan and Nepal through India: Bhutan, 500 MW by 2032, 500MW by 2034 (Bongaigaon/Rangia – Jamarpur); from Nepal, 500 MW by 2031, 500 MW by 2035 and 500 MW by 2038.

Bangladesh will import 500 MW of electricity from Upper Karnali (GMR) in Nepal @ 7.72 cents per unit for a period of 25 years. (Deal Finalised)
Emerging Trend-2
SAARC Countries - Significant Environment/Climate Change Challenge

SAARC Countries - fossil CO2 by sector in Mt CO2/yr (2018)


SAARC - Significant Environment/Climate Change Challenge

Fossil CO2 Emission by Sector-India (Mt CO2/yr) & Per Capita (t CO2/cap/yr)

Power Industry | Buildings | Transport | Other industrial combustion | Other sectors | China t CO2/cap/yr | India t CO2/cap/yr | United States t CO2/cap/yr | EU28 t CO2/cap/yr | GLOBAL-t CO2/cap/yr

Fossil CO2 Emission in Mt CO2/yr (% Share)
4 Nations - 60% Global Emission

China 11256 (30%)
India-2622 (7%)
US 5275 (14%)
EU-3457 (9%)
Rest of World 15277 (40%)


INDIA POWER INSTALLED CAPACITY (MW) IN OCT. 2019

- Hydro *: 10%
- Solar: 3%
- Coal + Lignite: 14%
- Gas: 36%
- Nuclear: 5%
- Wind: 7%
- Biomass: 2%

Total: 364 GW

INDIA POWER INSTALLED CAPACITY (MW) IN 2030 **

- Hydro *: 9%
- Solar: 32%
- Coal + Lignite: 17%
- Gas: 3%
- Nuclear: 1%
- Wind: 9%
- Biomass: 2%

Total: 831 GW

** As per CEA-DRAFT REPORT ON OPTIMAL GENERATION CAPACITY MIX - 2029-30, FEB 2019

RES (Hydro+Solar+Wind)=118 GW (32%) RES (Solar+Wind)=68 GW (18%)

RES (Hydro+Solar+Wind)=513 GW (62%) RES (Solar+Wind)=440 GW (53%)

* including small hydro
* including small hydro of 5000 MW and hydro imports of 4356 MW
Regional Hydro Power can help in Renewable Integration and Grid Balancing

- **Role of Cross Border Hydro in Renewable Integration and Grid Balancing.**

- **India RE Target - 175 GW by 2022**

- **India: 450 GW of renewable energy by 2030** *

- **Hydro share in India has been declining over the years (45% in 1970 to Apprx 12 % in 2020)**

- **National Electricity policy (GoI), spinning reserves at 5%** **.**

- **Developing Regional Ancillary Market- India has started ancillary market.**

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Source: *

- [https://presidentofindia.nic.in/speeches-detail.htm?798](https://presidentofindia.nic.in/speeches-detail.htm?798), [https://economictimes.indiatimes.com/small-biz/productline/power-generation/india-to-have-450-gw-renewable-energy-by-2022-president/articleshow/73804463.cms?from=mdr](https://economictimes.indiatimes.com/small-biz/productline/power-generation/india-to-have-450-gw-renewable-energy-by-2022-president/articleshow/73804463.cms?from=mdr), [https://www.livemint.com/politics/policy/india-confident-of-adding-450-gw-of-renewables-by-2030-raj-kumar-singh-115711155594129.html](https://www.livemint.com/politics/policy/india-confident-of-adding-450-gw-of-renewables-by-2030-raj-kumar-singh-115711155594129.html), While the timing is sometime unclear, recent government reports indicate 2030 as the target year for the 450 GW target. CEA’s National Electricity Plan (NEP) 2018 had already projected a higher share of renewables (44%) compared to coal (56%) in 2027. CEA’s draft report on Optimal Generation Capacity Mix for 2029-30, renewable energy sources (solar + wind) installed capacity will become 440 GW by the end of year 2029-30 which is more than 50% of total installed capacity of 831 GW. **with +275 GW generating capacity and nearly 150 GW peak demand. Technical Committee for “Large Scale Integration of Renewable Energy, need for balancing, Deviation Settlement Mechanism (DSM) and associated issues.”**
Regional Hydro Power can help in Renewable Integration and Grid Balancing

- Role of Cross Border Hydro in Renewable Integration and Grid Balancing.
- India RE Target - 175 GW by 2022
- India: 450 GW of renewable energy by 2030 *
- Hydro share in India has been declining over the years (45% in 1970 to Apprx 12% in 2020)
- National Electricity policy (GoI), spinning reserves at 5%**.
- Developing Regional Ancillary Market- India has started ancillary market.

Very Important Recent Development: Innovative Model to Address RE Intermittency and Ensure RE Grid Integration

- **BIDS**
  - SECI - Bids called to develop 1200 MW ISTS-Connected RE Projects* with assured Peak Power Supply in India i.e. with Energy Storage System
  - (01.08.2019)

- **BUSINESS MODEL**
  - Provided a flat tariff payment of Rs. 2.70/kWh (Off Peak power)
  - peak power tariff through e-Reverse Auction

- **Result**
  - Greenko-awarded 900 MW peak power tariff - rate of Rs 6.12 (~$0.086)/kWh,
  - ReNew Power - 300 MW, peak tariff Rs 6.85 (~$0.096)/kWh on 31.01.2020

Source: *https://presidentofindia.nic.in/speeches-detail.html/7098, **https://economictimes.indiatimes.com/smallbiz/productline/power-generation/india-to-have-450-gw-renewable-energy-by-2030-president/articleshow/73804463.cms?from=mdr, While the timing is sometimes unclear, recent government reports indicate 2030 as the target year for the 450 GW target. CEA’s National Electricity Plan (NEP) 2018 had already projected a higher share of renewables (46%) compared to coal (50%) in 2027. CEA’s Grid report on Optimal Generation Capacity Mix for 2029-30, renewable energy sources (solar + wind) installed capacity will become 440 GW by the end of year 2029-30 which is more than 50% of total installed capacity of 831 GW. **With ~275 GW generating capacity and nearly 150 GW peak demand, Technical Committee for Large Scale Integration of Renewable Energy, need for balancing, Deviation Settlement Mechanism (DSM) and associated issues.
### Five Year Vision Document for Power Sector - Power Markets

<table>
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<tr>
<th><strong>Goal 04</strong></th>
<th><strong>Implementation Roadmap</strong></th>
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<tr>
<td><strong>Goal</strong></td>
<td><strong>Potential Interventions/ Actions</strong></td>
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</table>
| Enhance cross border trade through market products | • Introduce standardized products in Day-Ahead Markets, Intra-day, Term-Ahead market for cross-border electricity trading – physical delivery  
• Introduce products in Balancing market for trading of balancing services from fast response plants such as Hydro  
• Introduction of financial products – futures & derivatives |

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<th><strong>Goal 03</strong></th>
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</tbody>
</table>
| Deepen products in markets to enhance clean energy | Introduction of Real Time Market (RTM) for improved reliability and control and better absorption of RE  
Move from regulated to market based mechanism for Ancillary Services  
Inclusion and scale up of innovative models for Decentralised Renewable Energy (DRE) based access |
Emerging Trends-3

Moving Towards Market form of Trade

South Asia: Market Integration Evolution

- Legal (G to G, bilateral agreements, trade of excess power etc.)
- Contractual
- Regional Power Market

Possible Phases of Market development for CBET
- Continuous Trading
- Spot Markets on exchanges
- Auction Markets
- OTC Markets
- Trading Licence
- Deemed Trading Licence
- Nodal Agency

Level of Standards, Grid Code, System operation, planning (Technical), Policy, Regulatory Harmonization

An mix of Long Term, Medium Term, Short term and PX based Trade will be desirable one for A Journey towards the Vision of a Competitive Power Market
### Moving Towards Market form of Trade (G-G & Market)

<table>
<thead>
<tr>
<th>Country (~ CBET)</th>
<th>Capacity/Source (MW)</th>
<th>Type</th>
<th>Trader</th>
<th>Tenure in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhutan- India (~1800-1900 MW)</td>
<td>2136</td>
<td>G-G</td>
<td>PTC</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>126</td>
<td>Commercial/Market based</td>
<td>TPTCL</td>
<td>25</td>
</tr>
<tr>
<td>India – Bangladesh (~1160 MW)</td>
<td>410</td>
<td>G-G</td>
<td>NVVNL</td>
<td>25/5 (Tripura)</td>
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<td>750</td>
<td>Commercial/Market based</td>
<td>PTC*, NVVNL, Sembcorp</td>
<td>15/3 (PTC)</td>
</tr>
<tr>
<td>India-Nepal (~550 MW)</td>
<td>237</td>
<td>G-G</td>
<td>NVVN/PTC**</td>
<td>Renewed Every year</td>
</tr>
<tr>
<td></td>
<td>280- Upto 350 MW</td>
<td>Commercial/Market based</td>
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Gol guidelines allows CBET through PXs, Trade is expected to start in near future

Regulatory Implications and Road Map

- SAARC countries need to continue to work on developing harmonious policy & regulatory frameworks across countries.

- Developing Complementary/parallel regulations across SAARC countries, taking steps for development of appropriate Regulation based on Model SAARC Electricity Regulation for Regional Power Trade (SERRPT) as a reference.

- SAARC countries Need to develop Regulatory Framework including rules/procedures for facilitating Trilateral Power trade.

- SAARC countries needs to develop Regulatory Framework for developing power market, region grid balancing market, ancillary services market for RE grid integration.

- SAARC countries needs Develop Rule and associated Regulatory framework for trading through Power Exchange and other Power market platforms.

- SAARC Countries—Some Minimum Requirements for Market, trilateral trade: - grid code, Open access, trading license, Transmission Pricing, connectivity, deviation settlement etc.
Common Minimum Grid Code for Facilitating CBET

Common Minimum Grid Code: Objective

- The Common Minimum Grid Code for South Asia: lays down the rules, guidelines and standards to be followed by various South Asia country participants in the system for cross border trading in electricity, while operating the power system, in the most secure, reliable, economic and efficient manner.

- Facilitation of cross border trading of power, while ensuring secure, reliable, economic and efficient operation of the grid.

- Facilitation of the coordinated optimal operation of the South Asian Grid.

- Facilitation of coordinated and optimal maintenance planning of generation and transmission facilities in the South Asian grid.
### Common Minimum Grid Code: Applicability

**Applicability**

Applicable to all countries of South Asia (SA), who get connected to the SA grid through a synchronous or a-synchronous (i.e. HVDC) connection.

Each SA country will initially be represented by a single point of contact for the initiation of implementation of the Common Minimum Grid Code.

Single point of contact will be supported by the relevant Ministry dealing with power, the Regulator of the respective country, the transmission agency of the respective country, the system operator of the respective country and the accounts settlement/market operator of the respective country.

Later, to formalize the process of implementation, Regional coordination bodies need to be formed for South Asia, i.e. South Asia Forum at the Government level, at the Regulator level, at the planning body level, transmission utility level, at the system operator level and at the accounts settlement/market operator level.

A South Asia Power Portal would be made for information of all South Asian countries. This would be maintained by the South Asia Forum at the planning level.
Common Minimum Grid Code: Structure

Connection Code

Operating Code

Scheduling & Despatch Code

Administration of the Grid Code
Common Minimum Grid Code: Structure

Connection Code:
- Procedure for Inter Country connection
- Important Technical Requirements for Connectivity to the Grid
- Connection Agreement

Operating Code:
- Frequency Band 49.9 – 50.05 Hz
- Voltage Band for 400 kV at inter. Point 380-420 kV
- System Security-Protection Coordination & periodic Protection testing
- Operation liaison.
- Restoration Plans including Black Start.
- Periodic Reports – Daily, Monthly Reports.
- Outage Planning

Scheduling and Despatch Code:
- Scheduling and Despatch Procedure.
- maintaining actual drawal from SA Asia grid close to schedule
- Deviation Settlement mechanism.
- Reactive power drawals to be controlled at inter-country connection points.

Administration of the Grid Code:
- Ultimately, the Forum of South Asia Regulators would do that.
Open access in Transmission and Trading License Frameworks for advancing Cross-Border Electricity Trade and Development of Regional Power Trade in South Asia
SARI-EI Study: Open Access Desirable pre-requisites availability in South Asia power sector

<table>
<thead>
<tr>
<th>Article 12</th>
<th>Transmission Access</th>
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<tbody>
<tr>
<td><strong>Member States</strong> shall, for the purpose of cross-border trade, <strong>enable non-discriminatory access</strong> to the respective transmission grids as per the applicable laws, rules, regulations and applicable inter-governmental bilateral trade agreements.</td>
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<tr>
<th>Article 6: Promoting Competition:</th>
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<tr>
<td><strong>Member states</strong> will encourage the process of opening up of the electricity sector, guided by the respective national priorities with the aim of <strong>promoting competition</strong>.</td>
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<table>
<thead>
<tr>
<th>Article 13: Facilitating Buying and Selling Entities:</th>
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<tbody>
<tr>
<td><strong>‘Member states shall enable Buying and Selling Entities to engage in cross border electricity trading</strong>, subject to the laws and regulations of the concerned member states’.</td>
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<tr>
<th>Article 9: Transmission Service Agreements</th>
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<tr>
<td><strong>Member States may facilitate authorized Buying and Selling Entities to enter into transmission service agreements with the transmission service providers for the purpose of cross-border electricity trade.</strong></td>
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<tr>
<th>Article 7: Planning of Cross-border interconnections</th>
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<td><strong>Member States may enable the transmission planning agencies of the Governments to plan the cross-border grid interconnections through bilateral/trilateral/mutual agreements between the concerned states based on the needs of the trade in the foreseeable future through studies and sharing technical information required for the same.</strong></td>
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### SARI-EI Study: Open Access Desirable pre-requisites availability in South Asia power sector

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<th>Institutional Framework</th>
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<th>Bangladesh</th>
<th>Bhutan</th>
<th>India</th>
<th>Maldives</th>
<th>Nepal</th>
<th>Pakistan</th>
<th>Sri Lanka</th>
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<td>Power Market Structure</td>
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<td>Independent Transmission Operator</td>
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<td>Independent System Operator</td>
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<th>Legal and Policy Framework</th>
<th>Afghanistan</th>
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<td>Legal Provision</td>
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<td>Policy Intent</td>
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<th>Nepal</th>
<th>Pakistan</th>
<th>Sri Lanka</th>
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<td>Independent regulator</td>
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<td>Technical Standards</td>
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<td>Commercial – Tariff, etc.</td>
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<table>
<thead>
<tr>
<th>Operational Framework</th>
<th>Afghanistan</th>
<th>Bangladesh</th>
<th>Bhutan</th>
<th>India</th>
<th>Maldives</th>
<th>Nepal</th>
<th>Pakistan</th>
<th>Sri Lanka</th>
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<tbody>
<tr>
<td>Detailed Process for open access</td>
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<td>Open access in domestic</td>
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<tr>
<td>Open access in CBET</td>
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### Key Articles of SAARC framework agreement for energy cooperation (electricity) related Open Access and Trading License Frameworks:

- **Article 12: Transmission Access**
  - Member States shall, for the purpose of cross-border trade, enable non-discriminatory access to the respective transmission grids as per the applicable laws, rules, regulations, and applicable intergovernmental bilateral trade agreements.

- **Article 6: Promoting Competition**
  - Member states will encourage the process of opening up the electricity sector, guided by the respective national priorities with the aim of promoting competition.

- **Article 13: Facilitating Buying and Selling Entities**
  - Member states shall enable Buying and Selling Entities to engage in cross-border electricity trading, subject to the laws and regulations of the concerned member states.

- **Article 9: Transmission Service Agreements**
  - Member States may facilitate authorized Buying and Selling Entities to enter into transmission service agreements with the transmission service providers for the purpose of cross-border electricity trade.

- **Article 7: Planning of Cross-border Interconnections**
  - Member States may enable the transmission planning agencies of the Governments to plan the cross-border grid interconnections through bilateral/trilateral/mutual agreements between the concerned states based on the needs of the trade in the foreseeable future through studies and sharing technical information required for the same.

**SARI-EI Study: Summary of model Framework & guidelines for open access regime in South Asia**

| Introduce enabling provisions for open access | • Introduction of **open access in the legislative framework** for electricity where it does not exist  
• Treatment of open access for cross border trade  
• Introducing **changes in the power market structure** to aid and enable open access  
• **Enable system operators** to co-ordinate cross border power flows |
| Define features and eligibility criteria for connectivity and open access | • **Types** of open access  
• **Tenure and priority** of various types of open access  
• Eligibility **criteria for connectivity and open access** |
| Fixation of open access charges | • **Segregation and fixation** of transmission & system operation charges  
• Application **fees**  
• **Relinquishment** charges for open access |
| Terms and conditions, and information system for open access | • **Terms and conditions** for open access  
• Open access register and other information systems |
| Procedure for grant of connectivity and open access | • **Procedure** for connectivity  
• Procedure for STOA, MTOA and LTOA  
• **Nodal agencies**, processing time lines, required documents etc. |
| Establishing the operational and commercial mechanisms | • Approval of **detailed procedures** for open access  
• Committee to prepare **monthly energy accounts**  
• **Standard agreements.** |
| Encouraging regional mechanisms for co-ordination in CBET | • Ensuring co-operation and support in the operationalization of **regional forums** for collaboration in CBET |
Trader are important market intermediaries.

In SA, CBET is transacted through Trading Licenses.

CBET through PXs through Traders of India in future.

Act as counter party in the transactions.

Transparency, reduce information asymmetry.

Increase liquidity market, facilitate competitive discovery of price, Offer risk mitigation options.

Aiding in wholesale competition & power market development.
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### Trading license framework in South Asian countries

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<tbody>
<tr>
<td>Afghanistan</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Bangladesh</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Bhutan</td>
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<td>India</td>
<td>✔</td>
<td>✔</td>
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<td>Maldives</td>
<td>X</td>
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<td>Nepal</td>
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<td>Pakistan</td>
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<td>Sri Lanka</td>
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<td>X</td>
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</table>

- Yes
- No
- Partial
### SARI-EI Study: Summary of model Framework & guidelines Trading License

<table>
<thead>
<tr>
<th>Operationalization of legal and regulatory framework for trading licensees</th>
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</thead>
<tbody>
<tr>
<td>• Introduce trading as a defined &amp; allowed activity under statutory legislation.</td>
</tr>
<tr>
<td>• Empower national electricity regulators to exercise market oversight &amp; price control through measures such as trading margin cap and emergency provisions.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Extending the trading license framework in the context of cross border trade</th>
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</thead>
<tbody>
<tr>
<td>• Introduce the concept of “authorization for cross border trade”, so that domestic trading license regime can be extended to cover cross border trade.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Categories of trading licensees and qualification criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Categorization of trading licensees; based on annual trading volume.</td>
</tr>
<tr>
<td>• Authorization for CBET initially, only traders falling in highest category.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grant and revocation of trading licence</th>
</tr>
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<tbody>
<tr>
<td>• Clearly define the procedures for issue, renewal, amendment and revocation of trading licenses.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Terms, conditions and obligations of trading licensees</th>
</tr>
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<tbody>
<tr>
<td>• Trading licensees to be made responsible for fair, transparent and competitive market operations and safe grid operation through terms &amp; conditions &amp; obligations specified in legal/regulatory framework.</td>
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<tr>
<th>Market development</th>
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<tr>
<td>• Hurdles against the introduction and participation of power traders in the power market may be removed through legal/regulatory changes.</td>
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<tr>
<th>Regional forum for coordination of trading license</th>
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<tbody>
<tr>
<td>• All efforts to operationalize the proposed regional electricity regulatory forum. SAFER can issue non-binding recommendations on regulatory harmonization for CBET trading licensees.</td>
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</table>
Thank You

Contact

rajivratnapanda@irade.org
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+91-9650598697

SARI-EI Study: Summary of guidelines for open access regime in South Asia

Customer is situated in Country C procuring power from generating station in Country A using transmission system of Country B

Country A
- Generator (G)
- Injection: 220 kV Inj.
- Country A NLDC
- Country A transmission losses
- Country A Tariff for 100 MW: Rs. 3 per kWh

Country B
- Bhutan LTOA
- India-PGCIL Inter-State Open Access
- Country B NLDC
- Country B transmission losses
- Country B Tariff for Transmission charges: Rs. 3.28 per kWh
- Country B Tariff for Operating charges

Country C
- Bangladesh Intra-State OA
- Country 3 NLDC
- Country 3 Tariff for Transmission charges: Rs. 3.76 per kWh
- Country 3 Tariff for Operating charges: Rs. 4.31 per kWh

Withdrawal: 220 kV

*Values are assumed, and not reflective of actual figures*
Open Access tenure

In India, the Central Electricity Regulatory Commission defines the tenure for various open access as follows:

<table>
<thead>
<tr>
<th>Tenure of open access</th>
<th>Tenure of typical power contracts</th>
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<tbody>
<tr>
<td>Short Term OA STOA</td>
<td>- Not more than 1 month</td>
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<td></td>
<td>- OTC products are more prevalent</td>
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<td></td>
<td>- Can even buy/sell power for only a few hours through power exchanges</td>
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<td></td>
<td>- Exceeding 1 year but not exceeding 5 year (CBET)</td>
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<td></td>
<td>- Usually 3 month to 3 years</td>
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<td></td>
<td>- Bilateral contracts</td>
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<tr>
<td>Medium Term OA MTOA</td>
<td>- Equal to or More than 3 months</td>
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<tr>
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<td>- Not more than 5 years</td>
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<td></td>
<td>- 7 years or more</td>
</tr>
<tr>
<td></td>
<td>- Usually 12-25 years</td>
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<tr>
<td></td>
<td>- Bilateral contracts</td>
</tr>
<tr>
<td>Long Term OA LTA</td>
<td>- More than 7 years</td>
</tr>
</tbody>
</table>

Illustration of OA between Countries

Customer is situated in Country C procuring power from generating station in Country A using transmission system of Country B

- **Country A**: Injection
  - Generator Tariff for 100 MW
    - Country A Transmission charges: 0.25 Rs./kWh
    - Country A Operating Charges: 0.01 Rs./kWh

- **Country B**: India - PGCIL Inter-State Open Access
  - POC Injection: 0.24 Rs./kWh
  - POC LDC Charges: 0.002 Rs./kWh
  - POC Drawal: 0.09 Rs./kWh

- **Country C**: Bangladesh Intra-State OA
  - Country 3 LDC Withdrawal 220 kV

- **Other Charges**: Landed Tariff for Customer
  - Rs 3 per kWh
  - Rs 3.30 per kWh
  - Rs 3.72 per kWh
  - Rs 4.09 per kWh

- **Rs 1.09 per kWh for the wheeling**

- * - Assumption
- Bhutan losses as per BPC annual report FY19
- Bangladesh losses as per PGCB MIS October 2019
- India figures as per POC charges on 01 Feb 2020, considering Short Term Open Access

Transiting from Bilateral to Trilateral/Multilateral Power Trade in South Asia - Models of Trilateral and Multilateral Power Trade "Workshop on Deepening Regional Energy Cooperation, CBET& Clean Energy Development in SA, 15th January 2020, Sri Lanka by Rajiv Ratna Panda, Technical-Head /SARI/EI/IRADE
Significant balancing reserves shall be required to manage variability and achieve 175 GW of RE capacity target.

Sample Load Generation in a BAU Scenario in July 2021

RE Scenario in 2022:
1. It is expected that Renewable energy shall induce a swing of over 80 GW in net load in 2021-22. Balancing reserves capacity can be sourced from a range of resources.
2. Coal and hydro power plants shall play a key role in providing balancing reserves. Storage resources such as pumped hydro and batteries shall also be important considerations.
3. Along with these options, RE curtailment shall also be a last resort option.

Source: Flexibility report, CEA, January 2019, Report