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# REGIONAL REGULATORY GUIDELINES FOR PROMOTING CROSS-BORDER ELECTRICITY TRADE IN SOUTH ASIA

SOUTH ASIA REGIONAL INITIATIVE FOR  
ENERGY INTEGRATION (SARI/EI)  
(Task Force-1 Report)



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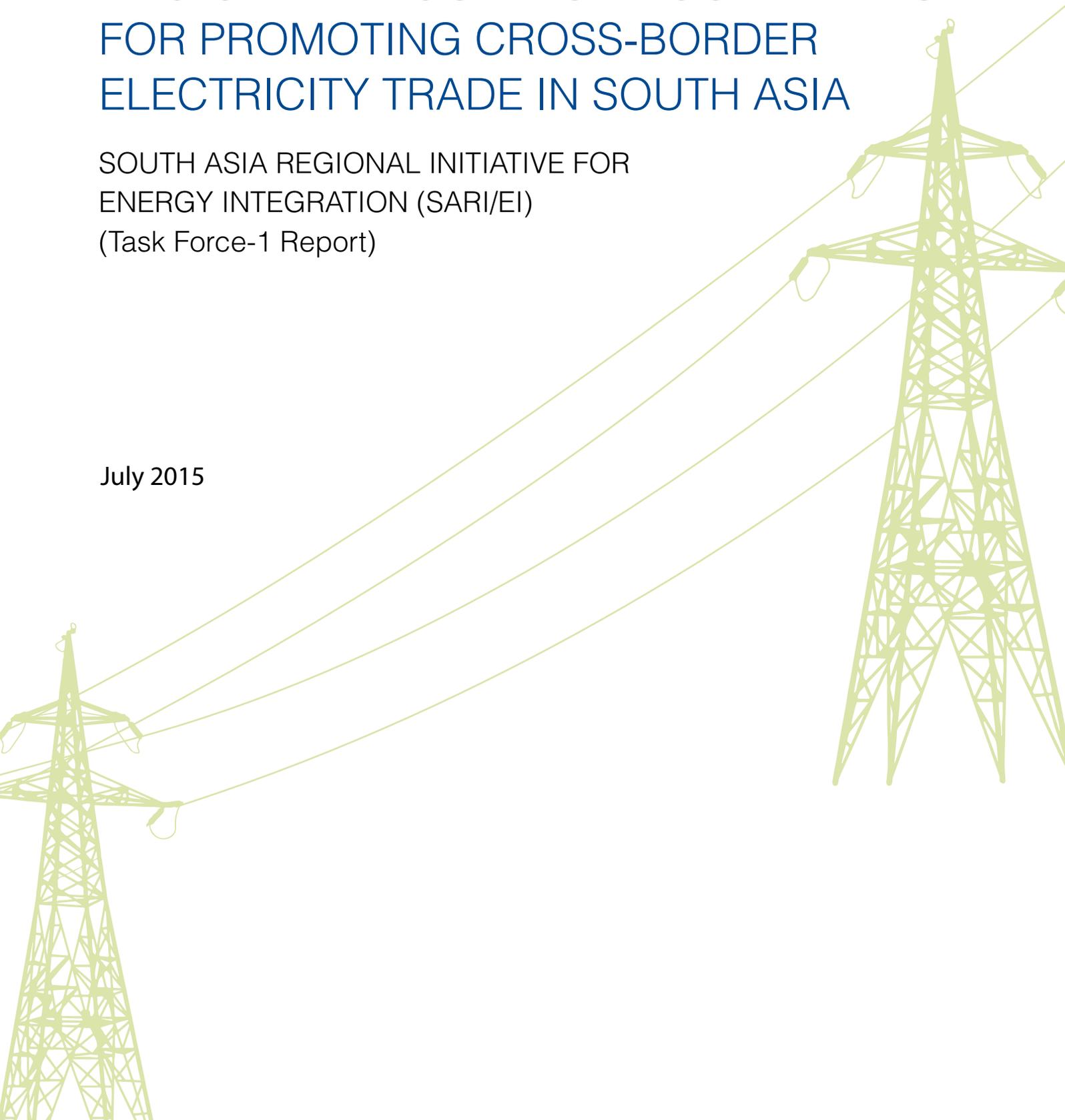
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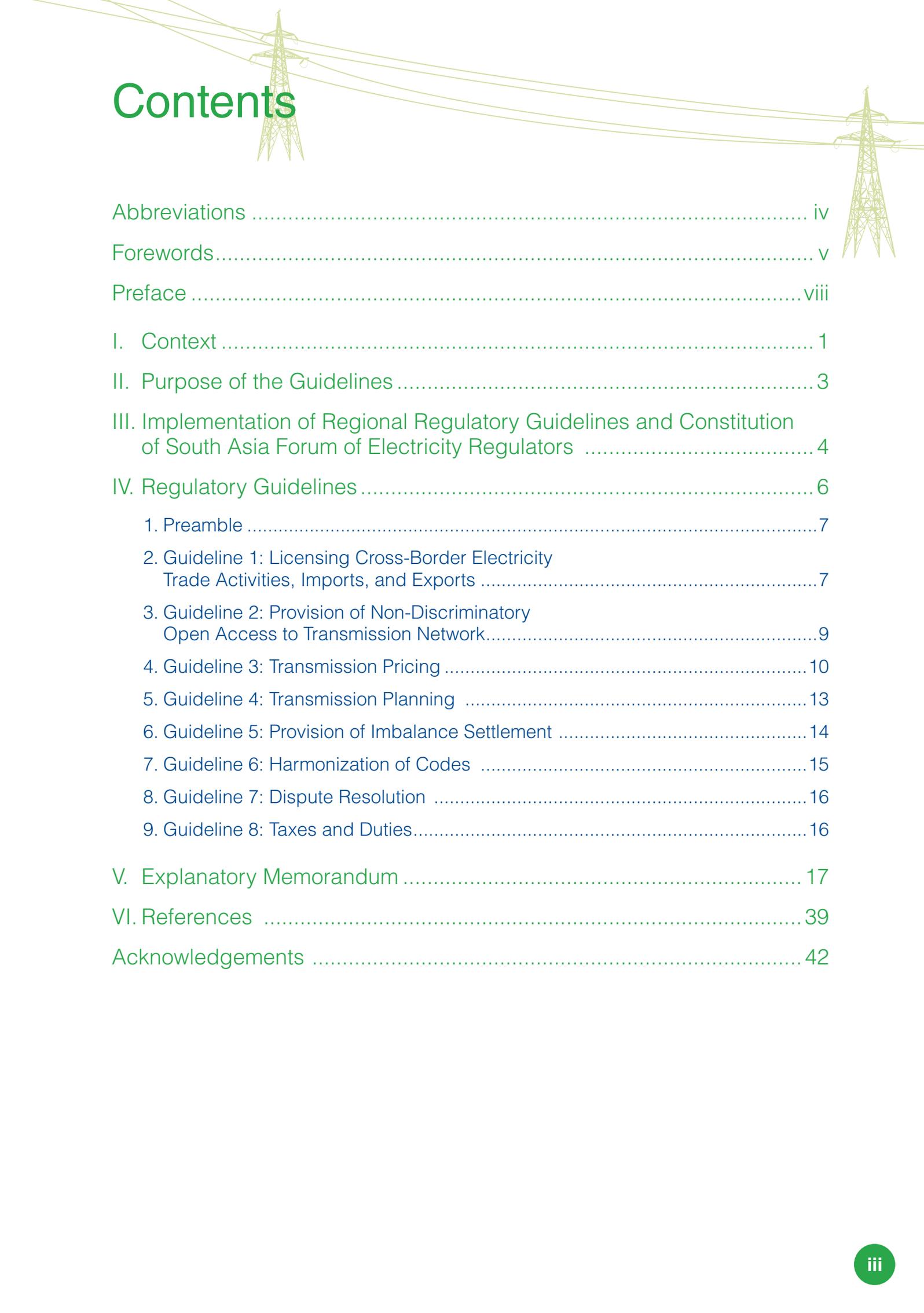
SOUTH ASIA REGIONAL INITIATIVE FOR  
ENERGY INTEGRATION (SARI/EI)  
(Task Force-1 Report)

July 2015





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# Abbreviations

CBET	Cross-Border Electricity Trade
CERC	Central Electricity Regulatory Commission
DOE	Department of Energy
EA 2003	Electricity Act 2003
GEMM	Georgian Electricity Market Model
GMS	Greater Mekong Sub-Region
GNEWRC	Georgian National Electricity and Water Services Regulatory Commission
IGFA	Inter-Governmental Framework Agreement
MEA	Ministry of External Affairs, India
NERSA	National Energy Regulator of South Africa
SAARC	South Asian Association of Regional Cooperation
SAC	South Asian Countries
SAFER	South Asian Forum of Electricity Regulators
SAPP	South African Power Pool
WAPP	West African Power Pool
OA	Open Access
SERC	State Electricity Regulatory Commission – India
BEA	Bhutan Electricity Act
BERC	Bangladesh Electricity Regulatory Commission
PGCB	Power Grid Corporation of Bangladesh
FERC	Federal Energy Regulatory Commission
POC	Point of Connection
PPA	Power Purchase Agreement
PWG	Planning Working Group
RPTOA	Regional Power Trade Operating Agreement
BRE	Balance Responsible Entities



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### **FOREWORD**

Cross Border Electricity Trade (CBET) in South Asia is gaining momentum on a rising trajectory with more and more number of projects and interconnections being planned and proposed. Power Sector of South Asian countries are governed by different regulatory regimes. Therefore the regulatory regimes in relation to CBET needs to be coordinated/harmonized for smoother Cross Border Electricity Trade (CBET).

In this context, I am happy to note that SARI/EI Task Force-1 which is working on to develop harmonized/coordinated policy, regulatory and legal frameworks among South Asian countries has come out with a report on "Regional Regulatory Guidelines for promoting Cross Border Electricity Trade in South Asia".

I would like to congratulate the work done by Task Force-1 Members, Staff at SARI/EI/IRADe Project Secretariat and SARI/EI Consultant - M/s Mercados Energy Private Limited (now KPMG) for preparing this comprehensive report. I hope the findings of this report will be actively considered by South Asian Energy / Electricity Regulatory Institutions of South Asian Countries for promotion of electricity trading to optimally utilize the available natural resources in the region.

*Major Singh*  
(Major Singh)

## Integrated Research and Action for Development

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**Dr. Jyoti Parikh, Ph.D, FNASc**  
Executive Director

### Foreword



South Asia Regional Initiative for Energy Integration (SARI/EI) a program of USAID being implemented by IRADe aims to “Promote integration of Energy Systems and to enhance Cross-Border Electricity Trade (CBET) among the South Asian countries. The Program focuses on the three key outcomes for overall socio-economic progress of the region i.e. i) harmonization/coordination of Policy, Regulatory and Legal Issues, ii) advancement of Transmission Systems Interconnections and iii) establishment of South Asia Regional Electricity Markets. We began this journey three years ago at the Integrated Research and Action for Development. To address these issues, we at SARI/EI/IRADe constituted three dedicated task forces represented by government nominated members from South Asian Countries headed by a steering committee. All together 28 members from South Asia Countries are working for last 3 years.

Task Force 1 is working on to develop harmonized/coordinated Policy, Regulatory and Legal Framework among South Asian countries. To achieve this, SARI/EI has commissioned a study under Task Force 1 on “Review of Electricity Laws, Regulations, Policies (EL&R&P) and legal structure of South Asia Countries (SACs) to identify areas that can hinder CBET and to recommend changes/amendments therein for consideration of the SACs”. It is heartening to see that Study has come out with the report on Regional Regulatory Guidelines (RRGs) for harmonizing/coordinating the various regulations among South Asian Countries and eventually helping in developing a Regional Regulatory Framework in South Asia Region. The Regional Regulatory Guidelines (RRGs) will help in developing consistent and common regulatory approach on Cross-Border Electricity Trade transactions in South Asian Countries. One of the important recommendations of the report is to create a South Asia Forum of Electricity Regulator (SAFER) for coordinating the implementation of the Regional regulatory guidelines. Currently South Asia is moving towards deeper regional integration in the South Asia region and CBET can play a very crucial role in this process of integration. We think the time has come to institutionalize the process of Cross Border Electricity Trade in South Asia and South Asia Forum of Electricity Regulator (SAFER) will play a crucial role for energy integration in the region.

This report breaks new ground by addressing the thorny aspects challenging cross border trade by addressing issues such as licensing process for trading, fair rules for nondiscriminatory open access, transmission pricing, collective process of transmission planning, settling the imbalance by energy accounting and scheduling, harmonizing codes of voltage and frequency standards and most importantly taxes and duties harmonization, preferably transition to zero tax regime and finally suggesting a process of dispute resolution. What is important is that these issues are debated among task force members from all countries along with international experts and USAID/SARI/IRADe staff members.

I would like to take this opportunity to commend the work done by Task Force 1 members, staff at SARI/EI/IRADe Project Secretariat, SARI/EI Consultant M/s Mercados Energy Private Limited (now (KPMG Advisory Service Private Limited) for preparing this report. I hope the findings of this report will be actively considered by the South Asian Country Governments.



Dr. Jyoti Parikh  
Executive Director,

Integrated Research and Action for Development (IRADe)



## Foreword

The United States Agency for International Development (USAID) through its South Asia Regional Initiative for Energy Integration (SARI/EI) program, aims to support greater regional energy integration in South Asia. The region is growing rapidly (at per capita GDP growth rate of six percent), which can be sustained only with increased and improved access to energy. However, each of the countries in South Asia is struggling with issues such as power shortages, high reliance on fossil fuels, and rapidly increasing electricity demand.

Since 2000, USAID's SARI/EI program has been working to address these challenges in a number of ways to promote cross-border electricity trade (CBET) thereby enhancing energy security in the region. Despite these efforts, South Asia has yet to engage in significant levels of power trading and, therefore, remains one of the least integrated regions in the world. However, in recent years there have been several positive developments in the region: the signing of the South Asian Association for Regional Cooperation (SAARC) Framework on Energy Cooperation; the signing of the India-Nepal power trade agreement; the forming of a sub-committee (comprising of Bangladesh, Bhutan, India and Nepal) within SAARC focused on regional energy integration; the signing of agreements to enhance the India-Bangladesh transmission links from 500 MW to 1000 MW; and the signing of power purchase agreements between the Nepali Government and Indian private sector developers to develop export-oriented large-hydro power plants. These recent developments are a strong signal that the region is finally ready to have a regional power grid.

One of the remaining hurdles in promoting power trading between countries in the region is the inherent disparity in their power sector policies, and regulations. To harmonize these legal frameworks, SARI/EI constituted a Task Force to identify actionable recommendations to promote effective CBET.

This report on Regional Regulatory Guidelines for promoting Cross-Border Electricity Trade in South Asia recommends establishing a South Asian Forum of Electricity Regulators (SAFER). The report includes recommendations for regional regulatory guidelines and it details the minimum changes needed in the policy and regulatory frameworks in each country that will promote CBET. This report cites successful examples from other regional power pools that have adopted similar processes in establishing regional regulatory fora/ institutions for harmonization/ coordination of policy and regulatory issues related to power trading. USAID is pleased to extend its support to this process of establishing a regional regulatory forum for South Asia.

I would like to thank all the members of the task force on harmonization of policies (Task Force 1) for their time and expert guidance in developing this report. I look forward to their continued support in taking the recommendations of this report to its logical conclusion in their respective countries. I would also like to acknowledge the SARI/EI/IRADE Project Secretariat and M/s Mercados Energy private limited (now KPMG) for this high-quality report. I am confident that the recommendations in this report will be extremely effective at promoting regional energy trade.

**Christopher B Adams**  
**Office Director (A)**  
**Clean Energy & Environment Office**



## Preface



Cross Border Electricity Trade (CBET) in South Asia is currently being undertaken in the form of bilateral trade and is limited between India-Nepal; India-Bangladesh; and India-Bhutan. The trade has been mainly through bilateral G2G arrangements based on case-to-case negotiations. Policy and Regulatory Provisions, Institutional frameworks and few other aspects promoting/facilitating CBET exist in some South Asian Countries (SACs) but are not exhaustive in nature. The SACs envisages a manifold increase in the quantum of Cross Border Electricity Trade (CBET) by the end of next decade. This scenario is rapidly changing with several new transmission interconnections being proposed across South Asian Countries which will enable greater Integration of Power Systems of South Asian Countries (SACs). Such Integration shall also enable trading on a multi-lateral basis wherein two countries having no common border could trade electricity through a third country acting as transit route.

Recent developments in SAARC region from the perspective of CBET are extremely encouraging and gives the direction for increased CBET in the region in near future. During the 18<sup>th</sup> SAAARC Summit held on 26-27 November 2014 at Kathmandu, eight member states of SAARC countries concluded the historic Framework Agreement of Energy (Electricity) Cooperation. The political climate is becoming increasingly more and more conducive for CBET both at the bilateral and as well as at the multilateral level. Further, the historic Power Trade Agreement (PTA) signed between India-Nepal, opens up whole range of new possibility for trade electricity between Nepal-India and also gives an access to Nepal Power Developers to Indian Power Market. India-Bangladesh and India-Bhutan are taking steps to increase quantum of Cross Border Electricity Trade (CBET) in manifold.

There is a need to have Common/Coordinated set of Regulations, Policies and Legal Framework which addresses the mechanism of interconnection, recognizes the CBET, Open access to transmission Network, licensing, dispute resolution, etc. The different set of Electricity Regulation, Policy and Legal frameworks in the SACs, are perceived impediment for CBET. Moreover the existing electricity regulatory, policy and legal frameworks of SACs primarily address domestic power sector issues and are not necessarily developed to address issues related to CBET.

Without consistent and coherent regional regulatory framework in place, investment opportunities and consequently large scale CBET between nations that could benefit both importing and exporting nations may not happen. In the South Asian regional context, the risks associated with forging an intraregional, CBET project would be greatly minimized if each participating country adopts complementary regulatory frameworks to facilitate cross border interconnection and electricity trade.

The development of harmonized/coordinated regulatory framework and procedures to facilitate competitive Cross Border Electricity Trade is a key “building block” for sustainable Cross Border Electricity Trade/Exchange among SACs. Therefore it is important and prudent to develop coordinated regional mechanism for aligning the policy, legal and regulations for facilitating the CBET at a much higher level of trade in a sustainable manner. This implies establishment of common/coordinated norms, rules and protocols in technical, commercial, economic, and legal matters pertaining to CBET.



To address above issues, SARI/EI has constituted Task force 1 on “Coordination of Policy, Regulatory and Legal frameworks “which is represented by Government Nominated Members from Energy/Power/Economy Ministries, Electricity Regulatory Commissions etc., of South Asian Countries. Task Force 1 is working on to 1) develop coordinate/harmonized policy, regulatory and legal frameworks for promoting CBET and 2) to develop regional investment policy guidelines and investment frameworks for promoting investment in CBET generation and transmission infrastructure as well as in South Asia Power Sector.

To address various policy, regulatory and legal issues with respect to CBET, under Task force 1, SARI/EI has commissioned a demand driven study on “Review of Electricity Laws, Regulations, Policies (EI&R&P) and legal structure of South Asia countries (SAC) to identify areas that can hinder Cross-Border Electricity Trade (CBET) and to recommend changes/amendments therein to promote CBET.

The study has conducted a detailed review and analysis of the Electricity Laws, Regulations, Policies (EI&R&P) and Legal structure prevailing in each SACs. Based on the review and analysis, the study proposed the formation of South Asia Forum of Electricity Regulators and have also proposed changes and amendments in Electricity Laws, Policies and Regulations of South Asian Countries for promoting CBET. The study has identified the minimum requirements/critical ingredients required to facilitate CBET which are (i) Recognition of CBET in National law (ii) Policy for Regional Electricity Trade (iii) Licensing Regimes (iv) Duties and Taxes (v) Transmission Plan and Charges (vi) Open Access in Transmission (vii) Commercial Mechanisms to Settle Imbalances (viii) Cross Border Tariff Determination and (ix) Dispute Resolution Mechanism.

The study undertook a detailed review of international power pools and regional trade arrangements to understand good practices around the world that would serve as a learnings to find out the basis on which initiatives across the South Asian Countries can be defined. Based on the detailed analysis and review, the study has proposed formation of South Asian Forum of Electricity Regulators (SAFER) to manage the process of harmonization of regulations in close coordination with various regional bodies such as SAARC secretariat, technical committees, forums and other relevant SAARC entities etc. The SAFER will be neutral body and will be critical for the success of CBET and harmonization/coordination of regulatory frameworks among South Asian Countries.

The above necessitate establishment of Regional Regulatory Guidelines (RRGs) in the form of common regulations, rules and protocols in technical, operational and legal matters for promoting CBET in the South Asian Region. This report focuses only on the Regional Regulatory Guidelines (RRGs).

The RRGs aims to 1) establish transparent regulatory environment to promote CBET 2) to provide a common course of action that can be referred for decision making on CBET by the electricity/energy Regulators in their respective countries 3) to ensure consistency in the transactions and remove delays on account of unclear and complicated regulatory regimes applicable to such transactions. Specifically, the aim of the RRGs is to provide the national electricity regulators of the South Asian countries with a set of consistent guidelines that can be referred for developing regional regulatory framework and for decision making on CBET. To begin with, these guidelines would be agreed between the regional entities and endorsed by the national electricity regulators will be non-binding in nature and would not have a formal legal status.

I hope this report on Regional Regulatory Guidelines (RRGs) will be very useful for Electricity Regulators of South Asian Countries to take forward the process of coordination/harmonization of Electricity Regulation, Policies and laws of South Asian Countries for Promoting CBET.

  
V.K. Kharbanda  
Project Director

SARI/EI/IRADe Project Secretariat

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## CONTEXT

Cross-Border Electricity Trade (CBET) in South Asia is currently being undertaken in the form of bilateral trade and is limited to only few instances covering India and Nepal; India and Bangladesh; and India and Bhutan. Additionally, Pakistan imports electricity from Iran, and Afghanistan imports from Uzbekistan, Tajikistan, and Iran. This scenario is, however, set to change in the medium and long term with several new transmission interconnections being proposed that will enable greater integration of power systems in member countries. Such integration shall also enable trading on a multi-lateral basis wherein two countries having no common border could trade electricity through a third country acting as a transit route.

As recognized during the earlier stages of this study, harmonization of regulatory frameworks that governs such cross-border electricity trade transactions among the South Asian Countries (SAC) is critical from many dimensions. **This implies the establishment of common norms, rules, and protocols in all technical, commercial, economic, and legal matters pertaining to regional integration. Such common rules also need to recognize that SAC is governed by different individual legal, policy, and regulatory frameworks, and there exists a wide diversity between them. Hence, the focus has to be limited to critical parameters that are necessary for removing barriers and facilitating CBET.**

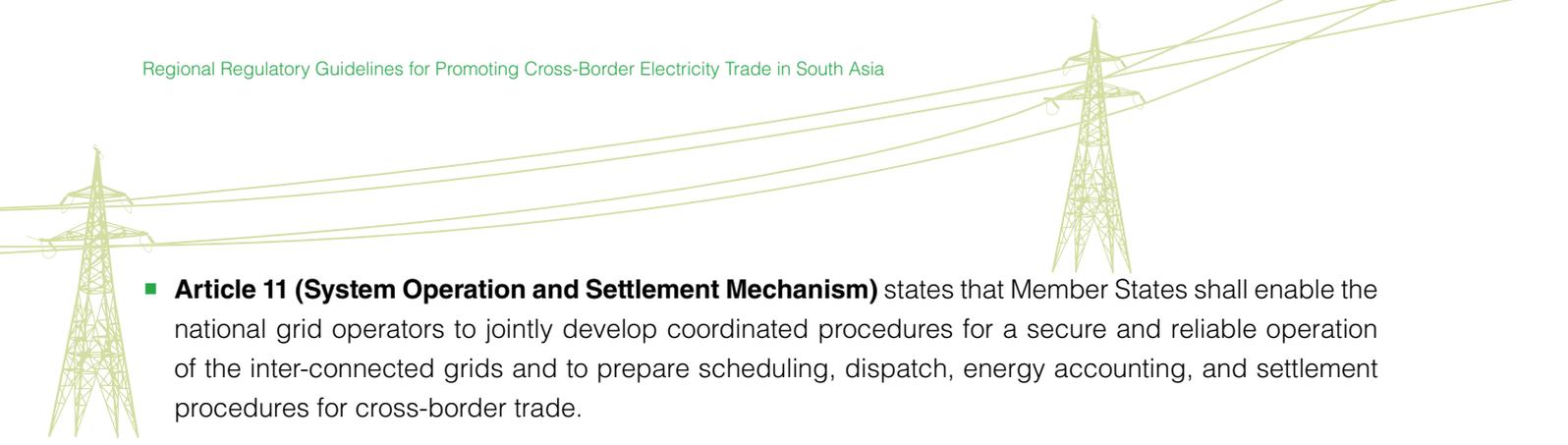
Based on the review of prevailing legal, policy, and regulatory frameworks in SAC and the review of CBET practices undertaken in different regions of the world (including various power pools and power system integration schemes), the key parameters have been identified to affect CBET as detailed below. Therefore favorable and coherent provisions across these parameters are likely to provide certainty to cross-border electricity trade transactions and promote investments. The key parameters are:

- Licensing for cross-border electricity trade
- Non-discriminatory open access to transmission network
- Transmission pricing regime applicable to CBET transactions
- Transmission planning particularly recognizing the planned/proposed cross-border interconnections
- Imbalance settlement mechanism for trade transactions
- Harmonization of codes
- Dispute resolution
- Duties and tax regimes applicable to CBET

**It is important to mention that the SAARC Inter-Governmental Framework Agreement (IGFA) for Energy Cooperation, signed on November 27, 2014, by Foreign Ministers of the eight member states also provides a strong basis for ensuring consistency in approaches across the above parameters.**

For instance:

- **Article 4 (Duties and Taxes)** states that Member States may work towards exempting from export/import duty/levies/fees etc., for cross-border trade and exchange of electricity between Buying and Selling Entities.

- 
- **Article 11 (System Operation and Settlement Mechanism)** states that Member States shall enable the national grid operators to jointly develop coordinated procedures for a secure and reliable operation of the inter-connected grids and to prepare scheduling, dispatch, energy accounting, and settlement procedures for cross-border trade.
  - **Article 12 (Transmission Access)** states that Member States shall, for the purpose of electricity trade, enable non-discriminatory access to the respective transmission grids as per the applicable laws, rules, regulations and applicable inter-governmental bilateral trade agreements.
  - **Article 15 (Regulatory Mechanisms)** states that Member States shall develop the structure, functions, and institutional mechanisms to resolve regulatory issues related to electricity exchange and trade.

**The above provisions clearly establish that there is political will and consensus among the countries of South Asia to take forward the cooperation; however, it is essential to define the operating principles and rules for undertaking cross-border electricity trade.** Post the signing of the IGFA, the press release by the SAARC Secretariat states the following:

*“The Leaders directed the relevant SAARC bodies and mechanisms to identify regional and sub-regional projects in the area of power generation, transmission, and power trade, including hydropower, natural gas, solar, wind, and bio-fuel, and implement them with high priority with a view to meeting the increasing demand for power in the region. The Leaders welcomed the signing of the SAARC Framework Agreement for Energy Cooperation (Electricity).”*

*– Press Release from the SAARC Secretariat, November 2014*

**Hence, it is imperative to initiate action to implement the provisions of the IGFA by defining the articles into operating rules that guide the CBET transactions. Therefore, the proposed Regional Regulatory Guidelines (RRGs) aim at furthering the guidance provided by the IGFA into common operating rules that govern the CBET transactions.** The guidelines proposed herein are based on the following: (i) review of the existing CBET transactions and the existing laws, policies, and regulations; and (ii) review of the international experience of various power pools and CBET regimes including South African Power Pool (SAPP), West African Power Pool (WAPP), Gulf Cooperation Council (GCC), Nord Pool, Georgia–Turkey, Greater Mekong Sub-region (GMS), Afghanistan–Central Asia, Heads of ASEAN Power Utilities Authorities (HAPUA), and Central American Electrical Interconnection System (SIEPAC).



## PURPOSE OF THE GUIDELINES

The regulatory guidelines have been developed to establish a clear regulatory environment for cross-border trading that provides reasonable certainty to the participants involved in cross-border trade transactions.

The objective of these guidelines is to provide national regulators/empowered entities of South Asian countries with a common course of action that can be referred to for decision making on CBET in their respective countries. **This will ensure consistency in the CBET transactions and will remove the constraints that are often plagued or delayed because of the unclear and complicated regimes.**

The Regional Regulatory Guidelines and the supporting explanatory memorandum are described in the form of principles and processes that need to be adopted on various aspects. In order to preserve a consistent regulatory approach on cross-border transactions in SAC, the Regulatory Guidelines deal with areas where such common guidelines are necessary. For all other purposes, the respective national regulations apply and govern the CBET.

**In summary, the guidelines and the framework are sufficiently flexible to work with different national legal, policy, and regulatory frameworks. The provisions allow accommodating different country circumstances, yet have a sufficiently broad application to promote consistent decision making.**

However it may be noted that regulation is not the only factor required for creating an enabling environment. There are a host of other factors that affect CBET, including harmonization of grid codes, standard and bankable contracts, and regional transmission master plan, among others. A number of these dimensions are being worked upon by different bodies and are collectively critical for CBET to thrive in SAC.

# IMPLEMENTATION OF REGIONAL REGULATORY GUIDELINES AND CONSTITUTION OF SOUTH ASIA FORUM OF ELECTRICITY REGULATORS

It is envisaged that the Regional Regulatory Guidelines (RRGs) would be agreed between the regulatory entities of SAC. Initially, these will be non-binding in nature and will not have a formal legal status.

**The RRGs is flexible in nature and focuses only on the specific aspects of CBET which would permit both the RRGs and the national electricity regulatory framework to co-exist for a reasonable period of time. Gradually, a legal effect shall be provided to these guidelines through a structured framework.** The following approach is proposed in order to ensure this transition:

**STEP 1:** Regional Regulatory Guidelines endorsed by the national regulators in South Asian countries as a non-binding framework guiding Cross-Border Electricity Trade.

**STEP 2:** National electricity regulators identify specific changes required in the national regulations **(also refer to the changes proposed as part of this study).**

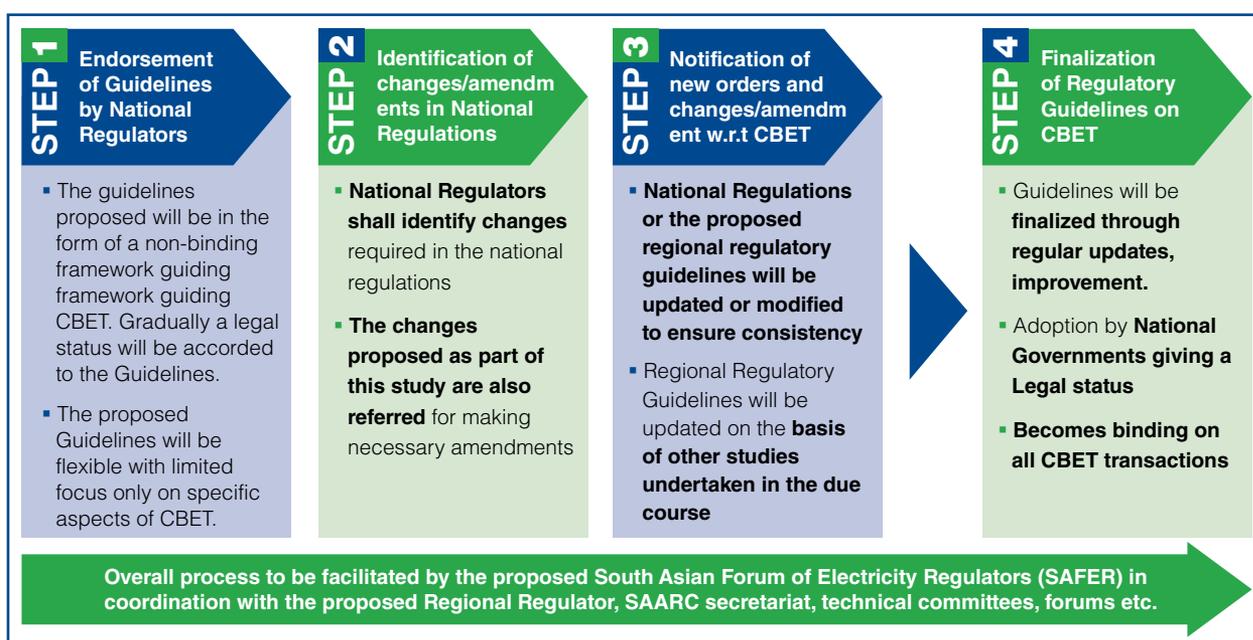
**STEP 3:**

- a) National Electricity Regulations are updated and/or regional regulatory guidelines are modified to ensure full consistency.
- b) Additional studies/reviews undertaken in due course contribute to defining the national regulations in a more detailed form, eventually leading to the updating of regional regulatory guidelines.

**STEP 4:** Regional regulatory guidelines are updated and adopted for governing cross-border trade transactions (binding nature). The legal effect could gradually be increased by adoption through the national country governments.

The overall process is illustrated in Figure 1.

**Figure 1: The Process of Implementation of Regional Regulatory Guidelines**



The above steps will require consensus building and hence, will need to be facilitated through a strong sponsor. **The study proposes South Asian Forum of Electricity Regulators (SAFER)<sup>1</sup> to manage this process in close coordination with various regional bodies including the proposed regional electricity regulatory authority,<sup>2</sup> the South Asia Association for Regional Cooperation (SAARC) secretariat, technical committees, forums, and other relevant SAARC entities and programs in the area of facilitating cross border electricity trade.**

Given the above background and rationale, the following is proposed:

### SAFER Objectives<sup>3</sup>

“Forum focused to work towards a consistent and harmonized/coordinated regulatory framework for CBET within the SAARC nations”.

### Functions of SAFER

SAFER would have the following key objectives or guiding principles as part of its strategic plan to promote CBET in South Asia:

- i. Facilitate harmonized/coordinated electricity sector regulations to advance CBET in South Asia Region.
- ii. Deliberate and make recommendations on regulatory issues such as regional regulatory guidelines/regulatory opinions etc., affecting CBET that fall outside national jurisdiction.
- iii. Facilitate regulatory capacity building among members at both national and regional levels through information sharing and skills training.
- iv. Act as a clearing house of information and data bank including dissemination of global and regional best practices.
- v. To act as a platform responsible for the facilitation of cross cutting regulatory issues for comprehensive regional energy integration in the long run.

### SAFER Vision Statement

To be a world class Regional Forum that catalyzes enabling conditions for regional energy integration in the SA region.

### SAFER Mission Statement

To provide a multi-stakeholder platform among SACs to convene, deliberate and provide recommendations to the country governments on overcoming barriers to advancement of CBET in the region.

**SAFER will need to be established as a formal association through a separate declaration or cooperation agreement among the member countries.**

<sup>1</sup> It is understood that there is already a discussion on setting up a regional regulatory forum at the South Asia level. In case this institution is set up, the responsibilities could be subsumed or taken up by such regional regulator.

<sup>2</sup> <http://www.dhakatribune.com/bangladesh/2014/dec/23/plan-made-form-saarc-energy-regulatory-authority>

<sup>3</sup> Please note: The intent is not to have a super regulator, but create a forum of regulators for coordinated development and operationalizing harmonized regulatory frameworks



## REGULATORY GUIDELINES

As mentioned above, the regulatory guidelines have been developed to establish a clear regulatory environment for cross-border electricity trading that provides reasonable certainty to the participants involved in cross-border trade transactions.

In particular, the aim of the guidelines is to provide the national regulators of South Asian countries with a set of consistent guidelines that can be referred to for decision making for CBET. A brief summary of the guidelines followed is as follows (Figure 2):

**Figure 2: Brief Summary of Guidelines**

1	<b>Licensing CBET</b>	<ul style="list-style-type: none"> <li>• Recognition of Trading as a separate licensed business activity</li> <li>• Grant of licence for CBET through a well defined process</li> <li>• License requirements and the underlying rules/limitations</li> </ul>
2	<b>Non-discriminatory open access</b>	<ul style="list-style-type: none"> <li>• Setting of fair rules and procedures for non-discriminatory open access</li> <li>• Modification/amendment of applicable regulations and gradually legally binding provisions</li> <li>• Defining application process, eligibility criteria, priority order and nodal agency for QA</li> </ul>
3	<b>Transmission Pricing</b>	<ul style="list-style-type: none"> <li>• Transmission pricing mechanism based on a country's requirement and acceptability</li> <li>• Setting up principles and mechanism for determination of economically efficient transmission pricing regime based on concept of location specific pricing</li> <li>• Adoption of tariff framework in respective country power system through enabling regulations</li> </ul>
4	<b>Transmission Planning</b>	<ul style="list-style-type: none"> <li>• Development of regional coordination forum of National Transmission Utilities to coordinate between Member Countries on transmission planning aspects</li> <li>• Development of a database of information that enables coordination and cooperation towards transmission planning</li> <li>• National Transmission Plans to also include details of cross border transmission lines (specially for CBET) and associated infrastructure</li> <li>• Sharing of the national transmission plan at the regional level and progress towards developing a regional level master plan.</li> </ul>
5	<b>Imbalance Settlement</b>	<ul style="list-style-type: none"> <li>• Member countries to develop a common set of procedures for Imbalance Settlement for CBET transactions</li> <li>• This will include preparation of scheduling, dispatch, energy accounting and settlement procedures for both AC-AC and AC-DC interconnections in the region.</li> </ul>
6	<b>Harmonization of Codes</b>	<ul style="list-style-type: none"> <li>• Harmonization through formulation of guidelines on technical standards for interconnection of power systems on aspects related to voltage standards, frequency tolerance, thermal limits etc.</li> <li>• Sharing of technical characteristics and system specific data among the member countries</li> <li>• Rules on metering standards, communication technologies, Protection Schemes etc.</li> </ul>
7	<b>Dispute Resolution</b>	<ul style="list-style-type: none"> <li>• Dispute Resolution process should primarily be in accordance with the agreements or through amicable settlement</li> <li>• Referring the disputes to the SAARC Arbitration Council in case the member countries are unable to resolve disputes through amicable settlement</li> </ul>
8	<b>Taxes &amp; Duties</b>	<ul style="list-style-type: none"> <li>• Countries to gradually move towards a zero tax regime</li> </ul>

**The Detailed Guidelines are as follows:**

## 1. PREAMBLE

- 1.1. These Regional Regulatory Guidelines apply to CBET among the South Asian Countries.
- 1.2. These guidelines are non-binding in nature and are aimed to provide the national regulators of SAC with a consistent set of guidelines applicable to CBET.
- 1.3. The guidelines deal only with limited areas where a need for such common guidelines has been felt by the SAC and are not meant to be comprehensively dealing with all matters related to CBET. For all other purposes, the respective national regulations, rules, and guidelines shall apply.
- 1.4. SAFER<sup>4</sup> shall be the institutional body working towards enabling the guidelines and facilitating the required changes to be made in the national regulatory framework. Such an entity shall work in close coordination with the SAARC secretariat and various bodies under the same.
- 1.5. In countries where regulators do not exist, the responsibilities shall rest with the relevant ministry and/or empowered entity for specific issues.

## 2. GUIDELINE 1: LICENSING CROSS-BORDER ELECTRICITY TRADE ACTIVITIES, IMPORTS, AND EXPORTS

**Rationale:** Licenses are regulatory tools that help the regulators to keep an oversight of the market. Licenses, in essence, are permissions required under the law and are not agreements in themselves. Licenses generally contain information about the applicant with respect to its financial and technical capabilities as per the requirement of the regulator. It is important to have harmonized licensing frameworks for CBET across Member Countries of the region to ensure that licensing does not restrict entry as all the countries have different licensing rules and procedures.

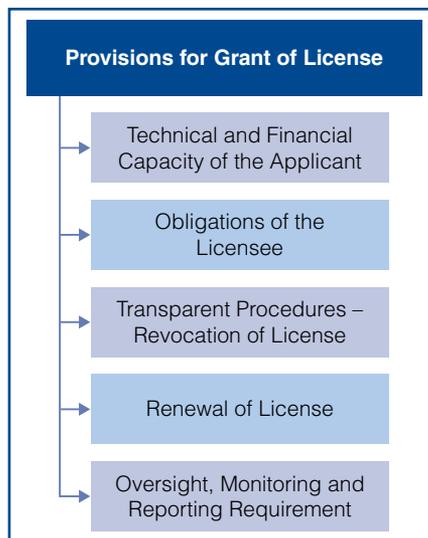
- 2.1. Member Countries shall aim to recognize CBET as a separate/distinct activity.
- 2.2. Recognition of trade as a distinct activity may be through suitable amendment in the existing laws or regulations or through enactment of separate enabling regulations.
- 2.3. The national regulators subject to their national legal and policy requirements shall define the process of obtaining and issuing licenses for the export and import of cross-border electricity trade transactions.

<sup>4</sup> In case a regional regulatory forum is established as per discussion in Section IV, the forum could take such responsibilities.



2.4. The enabling provisions for granting trading license shall *inter alia* include and ensure the following:

- i. The application shall comply with the applicable legal and regulatory frameworks.
- ii. **Technical and Financial Capacity of the Applicant:** The applicant shall have demonstrated technical and financial expertise to construct, operate, and maintain any associated power facility in compliance with the grid codes of the exporting and the importing countries.
- iii. **Procedure for filing applications for obtaining license, grant of license, and tenure of the license:** Applications for obtaining a license for CBET shall be made to the respective national regulators/empowered entities as per the required formats. This will include all the relevant forms with information that are required to be submitted by the applicant pertaining to its technical and financial capabilities.
- iv. **Obligations of the licensee** to comply with the national laws, policies, and regulations in force, etc.,
- v. **Transparent procedures and conditions for revocation/ termination of license by the regulator/empower entity, which may include** willful and prolonged default, and breach of terms and conditions of the license.
- vi. **Procedure for renewal of license:** The procedure may include submission of information by the licensee to the national regulator/empowered entity for renewal of its license.
- vii. **Regulatory oversight, monitoring, and reporting requirement**



2.5. The license may also impose requirements on the licensee to provide certain information to the respective national Regulator:

- i. that will be required for the Regulator to make other regulatory decisions in relation to the cross-border transaction;
- ii. to enable the Regulator to monitor compliance with the law or the terms of the license;
- iii. to notify the Regulator of any major problems that may result in termination or renegotiation of a cross-border agreement;
- iv. to notify the Regulator of any subsequent change to a cross-border agreement that affects the approved tariff or risk allocation under the cross-border transaction;
- v. compliance with any relevant planning, technical aspects and market rules with which all regional and national participants in the electricity sector must comply in order to achieve grid and market discipline for the benefit of all the participants; and
- vi. any other information on the request of the Regulator.

2.6. The license shall impose conditions to comply with the prescribed planning and technical standards set out in national policies, any national grid code, and other legal/regulatory instruments.

2.7. Unless otherwise prohibited by national regulators, the summary of license granted and the underlying conditions shall be made public.

2.8. In case where regulators do not exist, the grant of license shall rest with the relevant Ministry/ government department or institution.

3.

## GUIDELINE 2: PROVISION OF NON-DISCRIMINATORY OPEN ACCESS TO TRANSMISSION NETWORK

**Rationale:** *Opening access to the grid is an evolutionary process in developing a competitive marketplace in an interconnected region. It is one of the most essential requirements of CBET, enhancing competition and system efficiency. Open access makes it possible for any party to sell or buy electricity, irrespective of its location across the interconnected grid, subject to transparently formulated system-security constraints without discrimination, against payment of adequate fees for accessing and using the system.*

To ensure non-discriminatory access to their respective transmission systems, Member Countries in South Asia shall coordinate and undertake the following measures:

- 3.1. Support the setting of fair rules and procedures for non-discriminatory open access to transmission grids through notification of enabling regulations in the respective SAC by working along with the national regulators and/or other empowered entities.
- 3.2. The national regulators (or other empowered entities) in SAC shall enable non-discriminatory access to the respective transmission grids through transparent rules and procedures. The above would be as per the applicable laws, rules, regulations, and inter-governmental bilateral trade agreements.

Where access to transmission is denied by a transmission owner, the party seeking access can make a complaint to the Regulator. Based on the applicable laws, the Regulator will then consider the merits of the complaint and the transmission owner's reasons for denying access.

- 3.3. In particular, in the context of CBET, open access to a transmission system would imply access to power importers and exporters to the transmission systems of their respective countries and/or the transit country transmission system.
- 3.4. Enablement of non-discriminatory open access shall be explicitly defined through modification/ amendment of applicable regulations or shall be through enactment of separate regulations/orders applicable to CBET.
- 3.5. The enactment of various provisions/regulations *inter alia* shall include the following:
  - i. **Nominating nodal agency for granting open access:** An entity responsible for undertaking scheduling and dispatch operations in the Member Countries shall be appointed as the nodal agency. The nodal agency shall do the necessary coordination with the transmission utility and process applications on a first-cum-first service basis.
  - ii. **Procedure for filing applications and application fee:** The open access customers shall have to apply for access in a format to be prescribed by the nodal agency, giving necessary details such as the capacity required, point of injection, point of drawal, duration, type of service required, average load, and peak load etc. An application fee may be prescribed. The application for firm capacity allocation shall be duly supported by agreement for the purchase/sale/drawal of power.
  - iii. **Processing of applications:** The request for transmission access shall be processed by the nodal agency in a time-bound manner taking into account line loading, voltage profile, system stability, etc., and ensuring that the existing loads continued to be serviced with reasonable reliability. The system impact studies shall be carried out, as necessary.

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- iv. **Setting priority order for participants and criteria for grant of access:** Subject to Available Transmission Capacity (ATC), long-term customers shall have priority over short-term customers and firm customers shall have priority over non-firm customers in the allocation of capacity. This shall be applicable when multiple transactions happen.
  - v. **Principles with regard to non-discriminatory and transparent charges for network use including interconnecting lines in the transmission system:**<sup>5</sup> The objective in the design of the open access charges should be to recover the sunk cost of the transmission system. This will enable open access customers to compensate the nodal agency for scheduling, system control, and dispatch services rendered by them.
- 3.6. The regulators or other empowered entities shall create enabling provisions for the system operators in respective countries, as applicable to coordinate and confirm scheduling and dispatching of cross-border flows in a transparent manner in accordance with the applicable network codes, standards, and regulations.
- 3.7. Eventually, in the long-term, legislative enablement of open access may be considered through the inclusion of non-discriminatory open access provisions in the relevant laws.

## 4. GUIDELINE 3: TRANSMISSION PRICING

**Rationale:** For CBET, it is essential to have a pricing mechanism that separates the pricing of “carriage” and “content.” Pricing must be cost-reflective, efficient, and transparent. The term “cost-reflective” refers not only to capital, operation, and maintenance cost recovery by the operator, but also implies the incorporation of location-specific congestion costs in the price signals.

### Note:

The preference and feasibility of a transmission pricing mechanism is entirely a country's prerogative and depends on whether the power system in that particular country has reached the stage wherein it is ready to adopt a particular pricing mechanism. This is more relevant for situations where trade is already happening or is possible in the near future (particularly, considering situations where either a network exists or it is under construction). This includes trade through a transit country.

In most of the above cases, the Point of Connection (PoC) charges currently prevalent in India can either be directly used and/or further adapted to arrive at an approach for transmission pricing.

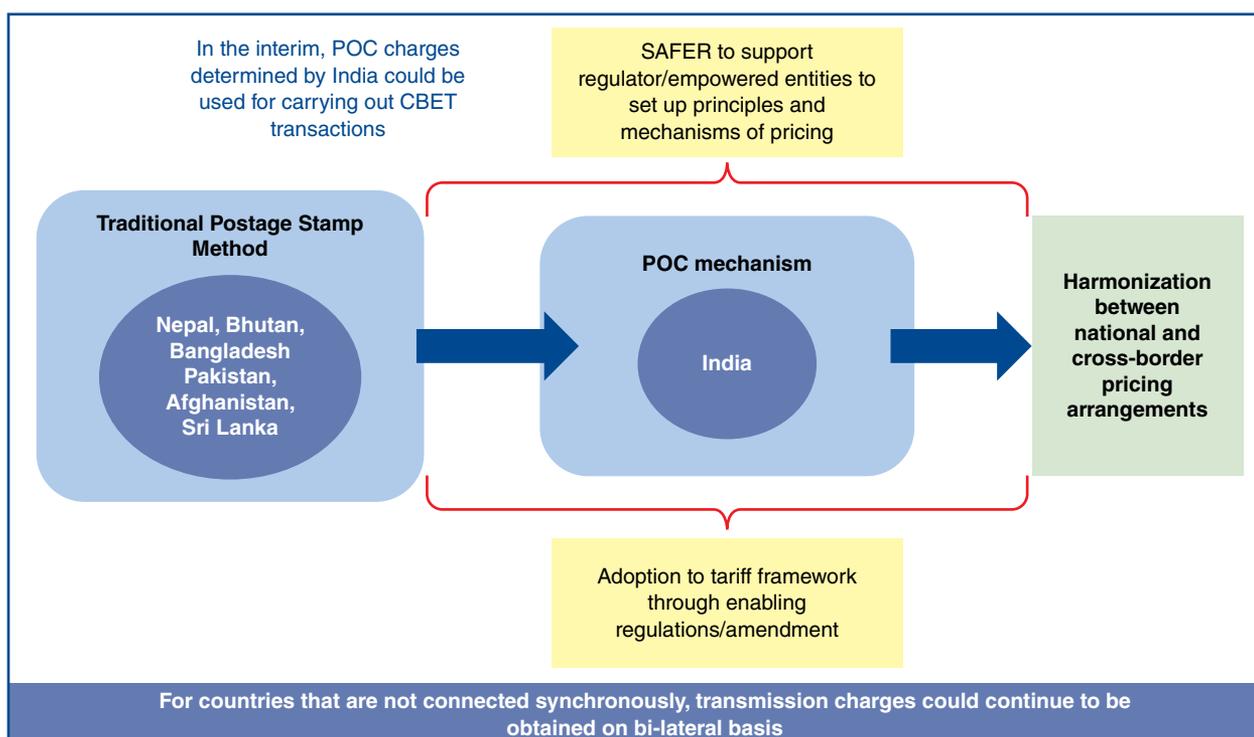
- 4.1. SAFER shall support the setting up of principles and a mechanism for the determination of transmission charges. It shall work along with the relevant national Regulator and/or other empowered entities in SAC to formulate the methodology and action points for the development of economically efficient transmission pricing regime based on the concept of location-specific pricing.

<sup>5</sup> This is also discussed separately as part of Transmission Pricing

**Table 1: Possible Trade Arrangements with a Transmission Pricing Mechanism**

Trade Scenario	Type of Interconnection	Mechanism of Transmission Pricing
India-Nepal	AC	Injection and withdrawal charges determined on the basis of PoC mechanism
India-Bangladesh	DC	Injection and withdrawal charges determined on the basis of PoC mechanism
India-Bhutan	AC	Injection and withdrawal charges determined on the basis of PoC mechanism
Nepal-India-Bangladesh	AC, DC	Injection and withdrawal charges determined on the basis of PoC mechanism
Bhutan-India-Bangladesh	AC, DC	Injection and withdrawal charges determined on the basis of PoC mechanism
Afghanistan-Pakistan	DC	Provided for in the CASA meter agreement

- 4.2. The Regulators (or other empowered entities) in SAC shall gradually adopt such tariff frameworks in their respective system through the enabling regulations.
- 4.3. Gradually, the Member Countries shall move towards a pricing framework based on the principle that the transmission system users must share the total transmission cost in proportion to their respective utilization of the transmission system, while at the same time covering the revenues of the transmission licensee. Other methods may have to be adopted during the interim period depending on the acceptability and readiness of the Member Countries.
- 4.4. The tariff framework shall be sensitive to distance and direction and is related to the quantum of power flow; it shall include the following:
- Location-based charges such that a generator/demand customer is required to pay a single charge based on its location to gain access to any demand customer/generator.

**Figure 3: Transformation from Traditional Pricing to an Efficient Pricing Mechanism**

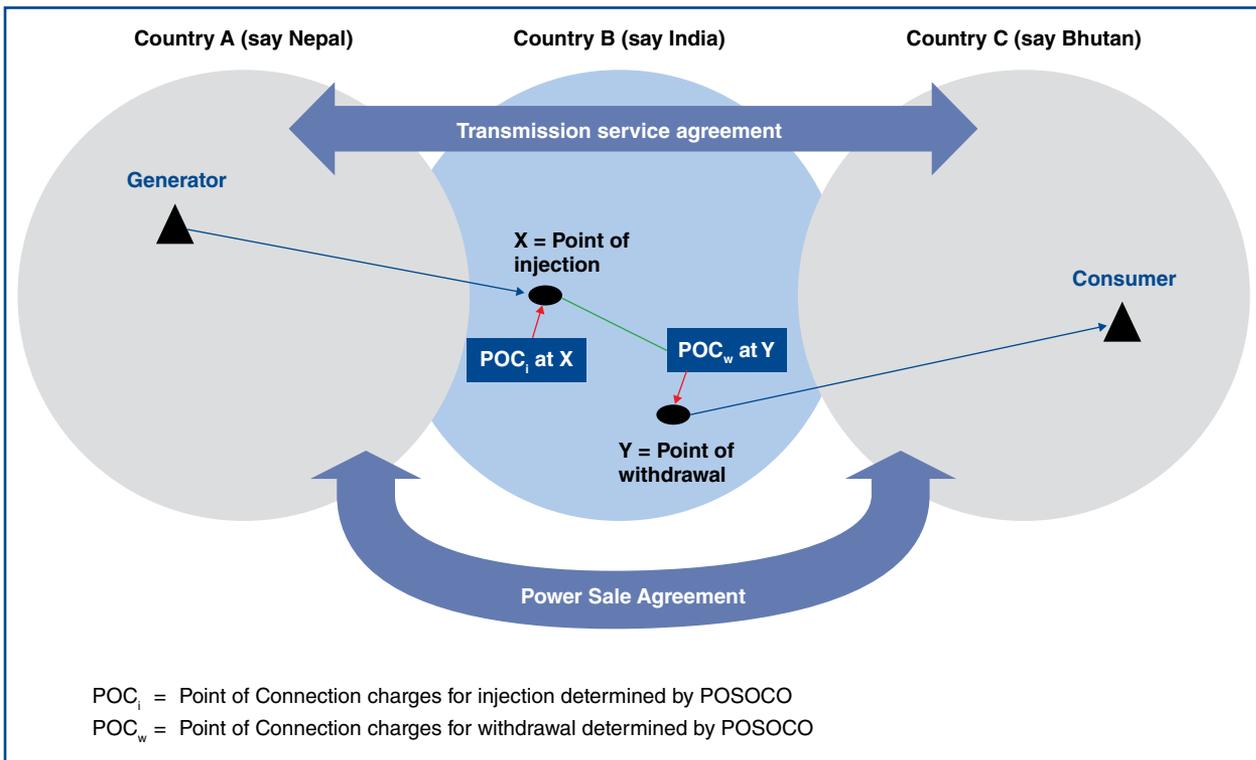
- ii. Incorporate location-specific congestion charges determined on the basis of the AC load flow studies, which compute the utilization of each transmission line in the network because of injection/ withdrawal at each generation/demand node.
- iii. Distinction should be made between generators and demand customers in terms of injection charges and withdrawal charges. This shall provide siting signals to system users through accurate transmission charges. This will help generators to take a view on both the transmission costs of electricity and the transportation costs of fuel.
- iv. The overall mechanism would help facilitate the integration of electricity markets (being envisaged to be achieved in the future) and enhance open access and competition by obviating the need for the pancaking of transmission charges.

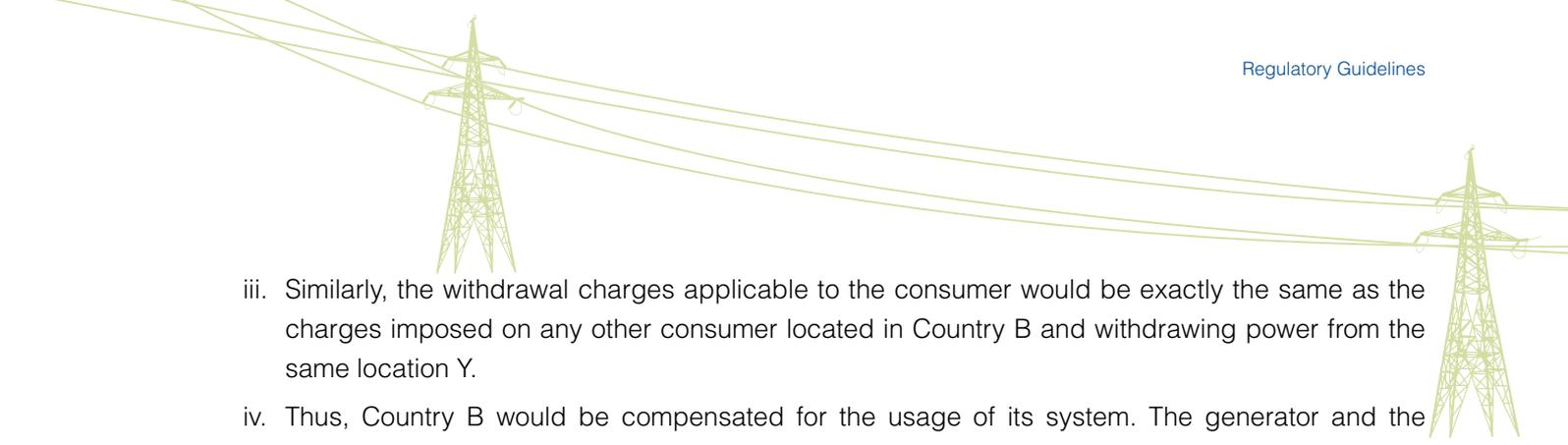
4.5. Ultimately, single point charges in the form of injection charges and withdrawal charges shall be determined for each cross-border interconnector/national boundary. An example of how such location-based charges would be imposed on cross-border transactions is given below.

In a typical multilateral trade scenario (Figure 4): *Use of POC charges determined by India*

- i. A generator in Country A is injecting power at location X in Country B. A consumer in Country C is withdrawing from location Y in Country B. Country B is the transit country.
- ii. The injection charges applicable to the generator would be exactly the same as the charges imposed on any other generator located in Country B and injecting power at the same location X.

**Figure 4: A Multilateral Trade Scenario between Nepal-India-Bhutan**



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- iii. Similarly, the withdrawal charges applicable to the consumer would be exactly the same as the charges imposed on any other consumer located in Country B and withdrawing power from the same location Y.
  - iv. Thus, Country B would be compensated for the usage of its system. The generator and the consumer would mutually decide on the payment terms and conditions through a separate agreement.

## 5. GUIDELINE 4: TRANSMISSION PLANNING

**Rationale:** *Transmission planning is an important ingredient for CBET. CBET in South Asia is presently being undertaken on a bilateral/case-to-case basis with minimal planning for future trade. Development of a regional transmission plan for the region will facilitate coordinated development. For a comprehensive regional transmission plan, it is imperative for all the Member Countries to have their individual and comprehensive national transmission plans with the identified cross-border interconnections.*

- 5.1. SAFER shall facilitate the development of a regional coordination forum of National Transmission Utilities for the purpose of transmission planning (from the CBET perspective).
- 5.2. The forum shall facilitate coordination between Member Countries to develop common guidelines for the development and augmentation of the national transmission plans to support the existing bilateral CBET.
- 5.3. The national transmission plans shall include and ensure the following:
  - i. Adequate coverage of the transmission system for feasible trade scenarios with the Member Countries of the region.
  - ii. Details of planned transmission lines (particularly for CBET) and associated infrastructure, their capacity, interconnecting points in the regions, timelines for commissioning, sources of funding, etc.
- 5.4. Member Countries shall develop a database of transmission projects (for CBET) that are under construction/planned or that have been identified for augmentation. The database shall comprise information for a time period common to all countries. Augmentation and periodic revision of the database shall be undertaken by the respective Member Countries to ensure comprehensive coverage.
- 5.5. Subsequent to the formation of the database, the transmission plans imperative for CBET shall be shared with the regional coordination forum and will be available to all the Member Countries to facilitate coordinated development. This will facilitate both CBET transactions and the setting up of export-oriented generation projects.
- 5.6. Eventually, in the long term, the Member Countries shall work towards evolving a coordinated regional-level master plan based on prescribed guidelines, utilizing information from databases shared at the regional level.

## 6. GUIDELINE 5: PROVISION OF IMBALANCE SETTLEMENT

**Rationale:** Imbalance settlement refers to financial settlement (in the form of penalties) for deviations in the schedules of injection/withdrawal of electricity. It addresses the issue of mismatch between the scheduled and the actual delivery of power in the grid through a penalty mechanism in case of default. The settlement may happen in cash or in other forms as negotiated between the trading parties.

- 6.1 Member Countries shall develop a common set of procedures for an imbalance settlement of CBET transactions.
- 6.2 The common set of procedures shall be evolved by empowered entities (designated system operators or central transmission agencies) in the respective Member Countries. This shall include the preparation of scheduling, dispatching, energy accounting, and settlement procedures for both AC–AC and AC–DC interconnections in the region.
- 6.3 The imbalance settlement mechanism shall be explicitly defined by Member Countries through the modification/amendment of the applicable regulations or through the enactment of separate regulations applicable to CBET.
- 6.4 All participants involved in CBET shall submit their injection and withdrawal schedules to their respective designated system operators who in turn will coordinate with their counterparts in other countries on the basis of a common set of procedures.
- 6.5 The enactment of various provisions/regulations *inter alia* shall include the following:
  - i. **Charges for deviation:**
    - a. Methodology for the determination of imbalance/deviation charges, which shall be payable for over drawl by the buyer and under injection by the seller and receivable for under drawl by the buyer and over injection by the seller.
    - b. Charges for deviation for each frequency category.
  - ii. **Limits on deviation volume and consequences of violating limits:** The permissible limits on over drawl/under drawl and over injection/under injection shall be specified as part of the regulations. Additional charges for deviation shall be applicable for the over drawl and the under injection of electricity for each block in excess of the volume limit and the grid frequency.
  - iii. **Accounting of charges for deviation:** The statement for deviations including additional charges, if any, shall be prepared by the respective country system operators on a weekly basis/or as decided by the regulators as per the regulations.
  - iv. **Schedule of payment of charges for deviation:** The regulatory commission/empowered entities shall establish timelines within which imbalance/deviation charges shall be paid by the respective countries.

## 7. GUIDELINE 6: HARMONIZATION OF CODES

**Rationale:** CBET requires regional integration through an interconnection of different power systems. The scale of harmonization of codes across countries would vary depending upon the type of interconnection and the scale of transactions undertaken. For bilateral small-scale transactions, there is no major harmonization requirement, particularly if the interconnections are DC. However, in case of high volumes being transferred through AC interconnection, the risks of deviation and grid security would be significant and necessitate the harmonization of standards and codes.

- 7.1 For the purpose of harmonization of technical standards, SAFER shall coordinate and facilitate the sharing and exchange of technical characteristics and system-specific data among the owners/operators of power systems in Member Countries.
- 7.2 SAFER shall facilitate harmonization through the formulation of guidelines on technical standards for the interconnection of power systems in SAC. The guidelines shall be framed in consultation with the empowered technical bodies in the Member Countries.
- 7.3 Harmonization to be achieved in the following aspects:
  - i. **Voltage standards:** South Asian countries have adopted their own AC voltage standards even though all are 50-Hz power systems. For inter-connection, the harmonization of the voltage standard is inevitable.
  - ii. **Frequency tolerance limits:** Despite operating at the same frequency, each country has its own allowable frequency variation depending upon the country-specific system requirement and tolerance limit of the connected plant, equipment, consumer appliances, etc. Alignment of tolerance limits would be required for harmonization.
  - iii. **System voltage regulation:** Generally maintained at 5%–10% of nominal value and is maintained to avoid system voltage collapse and damage to customer loads. A uniform voltage level shall be maintained throughout the system. When and on which side a voltage regulating device needs to be installed shall be decided and incorporated appropriately at the system planning and design stage.
  - iv. **Thermal limit constraints:** Transmission lines across the interconnection shall have same characteristics in terms of capacity and thermal limits to avoid loading issues.
- 7.4 Guidelines to additionally include rules on (i) metering standards, communication technologies, and monitoring; and (ii) protection schemes covering system islanding and congestion.



## 8. GUIDELINE 7: DISPUTE RESOLUTION

**Rationale:** *Dispute resolution procedures provide for the settlement of disputes through conciliation and arbitration, creating conditions favorable for fostering greater investment by investors of one Member State in the territory of another Member State.*

- 8.1 A transparent, fair, commonly accepted legal framework and clearly defined dispute resolution procedures are an absolute necessity as they govern and affect the existing and future trade relations between two countries.
- 8.2 Any dispute arising out of the interpretation and/or implementation of the agreements/contracts entered into shall be resolved amicably among the Member States.
- 8.3 If unresolved, the Member Countries may choose to refer the dispute to the SAARC Arbitration Council. The SAARC Arbitration Rules shall govern the arbitration procedure.

## 9. GUIDELINE 8: TAXES AND DUTIES

**Rationale:** *Taxes and duties have commercial implications on end consumers, and uncertain tax regimes deter investor confidence. Therefore, to promote CBET in the South Asia region, countries should adopt a zero tax regime on CBET Transactions.*

- 9.1 Member Countries to move towards exempting export/import duty/levies/fees/taxes, etc., for CBET.
- 9.2 National governments to facilitate the implementation of a zero tax regime through modification/ amendment of extant notifications/regulations.



# EXPLANATORY MEMORANDUM

A.

## LICENSING CROSS-BORDER ELECTRICITY TRADE ACTIVITIES, IMPORTS, AND EXPORT

The purpose of a licensing regime is to impose relevant conditions and requirements on a licensee throughout the period of the license. Licensing helps the Regulators to keep an oversight of the players in the market in the interest of national and regional security. The conditions contained in the license should not focus on controlling entry to the electricity sector, but should seek to influence the behavior of the licensee over the term of the license. The objective is to protect the consumer, attract investment, and avoid situations that may deter or delay investment in this context. All Regulators need to be sensitive to investors' perceptions of regulatory risk (and uncertainty) in a way that license conditions are imposed.

Licenses shall contain specific provisions that give the licensee certain powers and places certain obligations on them. The licensee shall ensure compliance with any relevant planning, technical, and market rules with which all regional and national participants in the electricity sector must comply in order to achieve grid and market discipline for the benefit of all participants. Licenses, in essence, are permissions required under law and not agreements in themselves. Licenses guide the outcome that a regulator expects from a certain activity. The licensing framework will depend on the policy and legislation in force in the country at that time.

Harmonization of licensing regimes is important as licensing rules, definitions, and procedures for granting license differ across Member Countries. Lack of harmonization may deter investor interest and participants for CBET.

### 1. Current Practice in South Asia

**The provisions with respect to CBET in the applicable laws of the South Asian countries is as follows:**

#### India

**The Electricity Act of 2003 does not mention about CBET. The act only recognizes domestic trading. Domestic electricity trading is a licensed activity and is governed by CERC regulations *Procedure, Terms, and Conditions for Grant of Trading License and Other Related Matters (2009)*. Further the Clause 2(1) (k) of these regulations mentions that “Inter-State trading” means the transfer of electricity from the territory of one State for re-sale to the territory of another State and includes electricity **imported from any other country for re-sale** in any State of India.<sup>6</sup>**

<sup>6</sup> <http://www.cercind.gov.in/2012/regulation/11october.pdf>

Additionally, “the Ministry of Commerce and Industry, vide its notification no. 27 (RE-2013)/2009-2014 (dated 05.07.2013), shifted the import of electrical energy from the restricted category to the free category. The implication of such a notification is that the import of electrical energy will not require authorization from the Director General of Foreign Trade (DGFT). However, no such notification has been issued with respect to the export of electricity. Therefore, it is submitted that the status of the export of electricity is not very clear.”<sup>7</sup>

**The Statement of Reasons<sup>8</sup> issued by CERC while issuing the Procedure, Terms, and Conditions for Grant of Trading License and Other Related Matters Regulations, 2009 states that the import and export of electricity falls under the purview of Ministry of External Affairs (MEA). Concurrence of MEA shall be obtained before the grant of license for the import and export of electricity.** The Electricity Act of 2003 does not envisage the grant of a license by the commission for the export of electricity. CERC regulations are intended to regulate electricity only after the stage of import.

In the year 2012, CERC has amended the Procedure, Terms and Conditions for grant of trading license and other related matters Regulations, 2009 and the Central Electricity Regulatory Commission (Procedure, Terms and Conditions for grant of trading license and other related matters) (First Amendment) Regulations, 2012 ) has come in to force. In these amended regulation definition of “interstate trading “has been amended as follows:

*“‘inter-state trading’ means purchase of electricity from one State for re-sale in another State and includes electricity imported from any other country for re-sale within India or exported to any other country subject to compliance with applicable laws and clearances by appropriate authorities.”<sup>9</sup>*

**Therefore, CBET is subject to the applicable laws of MEA/Ministry of Commerce, and the license for CBET is subject to permission/concurrence by MEA.**

## Bhutan

The Electricity Act of 2001 recognizes export and import of electricity as licensed activities. The Bhutan Electricity Authority issues licenses and monitors the performance of the licensees to ensure compliance with the provisions of Acts, Regulations, Standards, Codes, etc., For instance, the Bhutan Electricity Authority (BEA) has granted license to Dagachhu Hydropower Corporation Limited (or Licensee) to carry out the activities of construction, generation, supply, and export. The license is subject to the provisions of the Electricity Act of 2001, regulations and directives made by BEA from time to time, and any other laws applicable to Bhutan. The license places certain obligations on the licensee, viz. obtain environmental clearances as per the Environment Assessment Act of 2000. Further, the licensee is required to enter into one or more performance agreement as and when required by the authority. The licensee is expected to plan, construct, and maintain the hydropower plant. The license clearly mentions that the licensee is authorized to construct, operate, distribute, and export electrical energy to India. In accordance with the conditions mentioned in the license, the licensee shall comply with Quality of Supply requirements and indicators set out in the BEA–Grid Code Regulations 2008. The license also mentions other conditions such as tenure and penalties in case of non-compliance.

<sup>7</sup> [https://www.powerexindia.com/PXIL/images/uploads/20150203\\_042449\\_PXIL\\_Reply\\_to\\_Petition\\_No.\\_483\\_of\\_2014\\_before\\_the\\_CERC\\_for\\_Cross\\_Border\\_Transactions\\_at\\_IEX.pdf](https://www.powerexindia.com/PXIL/images/uploads/20150203_042449_PXIL_Reply_to_Petition_No._483_of_2014_before_the_CERC_for_Cross_Border_Transactions_at_IEX.pdf)

<sup>8</sup> [http://cercind.gov.in/2009/February09/Statement\\_of\\_Reasons\[1\]-Trading-Licence-Regulations-2009.pdf](http://cercind.gov.in/2009/February09/Statement_of_Reasons[1]-Trading-Licence-Regulations-2009.pdf)

<sup>9</sup> <http://www.cercind.gov.in/2012/regulation/11october.pdf>

## Bangladesh

The Bangladesh Electricity Regulatory Commission Act of 2003 does not mention export and import of electricity as a licensed activity.

## Nepal

The Electricity Act, 2049 (1992) does not explicitly mention the import and export of electricity as licensed activities. **However, the section 22 of the act mentions the following:**

**Import and Export of Electricity:**<sup>10</sup> (1) If the licensee desiring to distribute electricity by importing the same within Nepal may do so by obtaining prior approval of Government of Nepal as prescribed. (2) The licensee desiring to export electricity generated on its own to the foreign country may do so by entering into an agreement with Government of Nepal on such matter.

## Pakistan and Sri Lanka

In case of **Pakistan and Sri Lanka**, electricity trading does not receive a mention as a licensed activity in the applicable laws and regulations of these countries.

## 2. International Experience

### Georgia

A trader is licensed by Georgian National Electricity and Water Services Regulatory Commission (GNEWRC) to buy and sell electricity on domestic and foreign markets and wherein a trader may be a domestic or a foreign entity.

Traders may enter into long-term bilateral agreements or short-term transactions in the balancing market.

The GNEWRC ensures that the licenses and licensing procedures for traders are transparent and non-discriminatory and do not create an undue barrier on the entry of traders into the Georgian Electricity Market Model (GEMM). License terms require traders to provide information (regarding their activities and technical and financial information) to GNEWRC, and to comply with all applicable regulations and the Market Operating Rules and the Grid Code.

### Greater Mekong Sub-Region

Each GMS country has its own process for licensing new generation and transmission facilities engaged in CBET. For instance in Cambodia, the Electricity Authority of Cambodia acts as a Regulator; it is a legal public entity with powers under the Electricity Law to regulate the electric power services, and issue and revoke licenses. There are different licenses for generation, transmission, distribution, and retail, and a consolidated license that permits the holder to engage in all or some of these businesses. The principal licensee is Electricité du Cambodge (EDC), a wholly state-owned limited liability company with licenses to generate and transmit over the territory of the country with some exceptions; it may also distribute in specified areas. There is a special-purpose transmission license—for the Cambodia Power Transmission Lines Co. to own and operate transmission facilities that run across the border into Thailand, and similar specific provisions for cross-border links with Vietnam.<sup>11</sup>

<sup>10</sup> [http://www.moen.gov.np/pdf\\_files/Electricity\\_Act\\_2049-english.pdf](http://www.moen.gov.np/pdf_files/Electricity_Act_2049-english.pdf)

<sup>11</sup> <http://www.adb.org/sites/default/files/institutional-document/33872/files/assessment-gms-subregion-energy-sector-development.pdf>

## Canada–US

The US Department of Energy (DOE) grants license for building new transmission assets that are used for cross-border power trading. Any party, public or private, wishing to build a transmission facility near the United States border, or engage in cross-border power exports, has to apply to the Department of Energy for approval. Similar approvals are needed from Canadian provincial authorities, particularly the National Energy Board (NEB). In both the United States and Canada, the proposed transmission facilities for cross-border power trading must not have adverse impacts on the reliability of domestic power systems. However, for importing electricity in the United States and Canada, there is no requirement for the importing entity to obtain an import license from any national governmental entity.

## South African Power Pool

The generation, transmission, distribution, import, and export of electricity are licensed activities in Southern African Development Community (SADC) countries. For instance, *the National Energy Regulator of South Africa (NERSA) issues licenses, and the National Transmission Company (NTC) is licensed as the national provider of transmission services. Independent transmission network service providers (TNSPs) are licensed particularly for cross-border trade.* The legal framework makes it an offence to carry out these activities without a license. Licenses are based on some preliminary principles such as the following:

- (i) Minimum Regulation
- (ii) Security of Supply
- (iii) Issues of National Concern
- (iv) Technical Requirements



The following box contains a list of the provisions commonly found in cross-border trading licenses, as well as some specific provisions that might only be included in an import or an export license.

#### **Box: Terms included in Import and Export Licenses Common to Imports and Exports**

- Payments to relevant authorities
- Finance/prudential requirements
- Compliance with grid codes
- Information provision to the Regulator—including provision of information when applying to have PPAs approved or when changes to the agreements are made in writing or by conduct that affects tariffs or the allocation of risk
- Approval to be obtained in relation to changes to the agreements in writing or by conduct that affect tariffs and the allocation of risks
- Providing information to other parties—in particular importers will be required to provide information to transmission and distribution licensees and SAPP
- Powers given to licensee—e.g., eminent domain (compulsory acquisition powers)
- Use and reporting of revenues—creates obligation to declare revenues if required for regulatory tariff setting or review
- Dispute resolution
- Requiring adherence to SAPP agreements (where both parties are members of SAPP)

#### **Imports Only**

- Conditions restricting total import capacity or volume.

#### **Exports Only**

- Obligations in supply emergencies
- Minimum pricing requirements—for example, if prices must at least cover variable costs (i.e., no cross subsidies from domestic buyers to buyer located in another country).

### **3. Recommendation for South Asia**

The existing laws of some Member Countries do not mention/recognize CBET as a distinct activity. It is essential for all Member Countries to primarily recognize the import and export of electricity as a distinct activity. Harmonization of licensing regimes is an important aspect for the facilitation of CBET as licensing rules, definitions, and procedures differ across Member Countries.

Accordingly, amendments to the existing laws should be made and procedures with respect to establishing a licensing regime should be laid out.

The Member Countries should ensure that the provisions of the license should not act as a barrier or as a deterrent to investment.

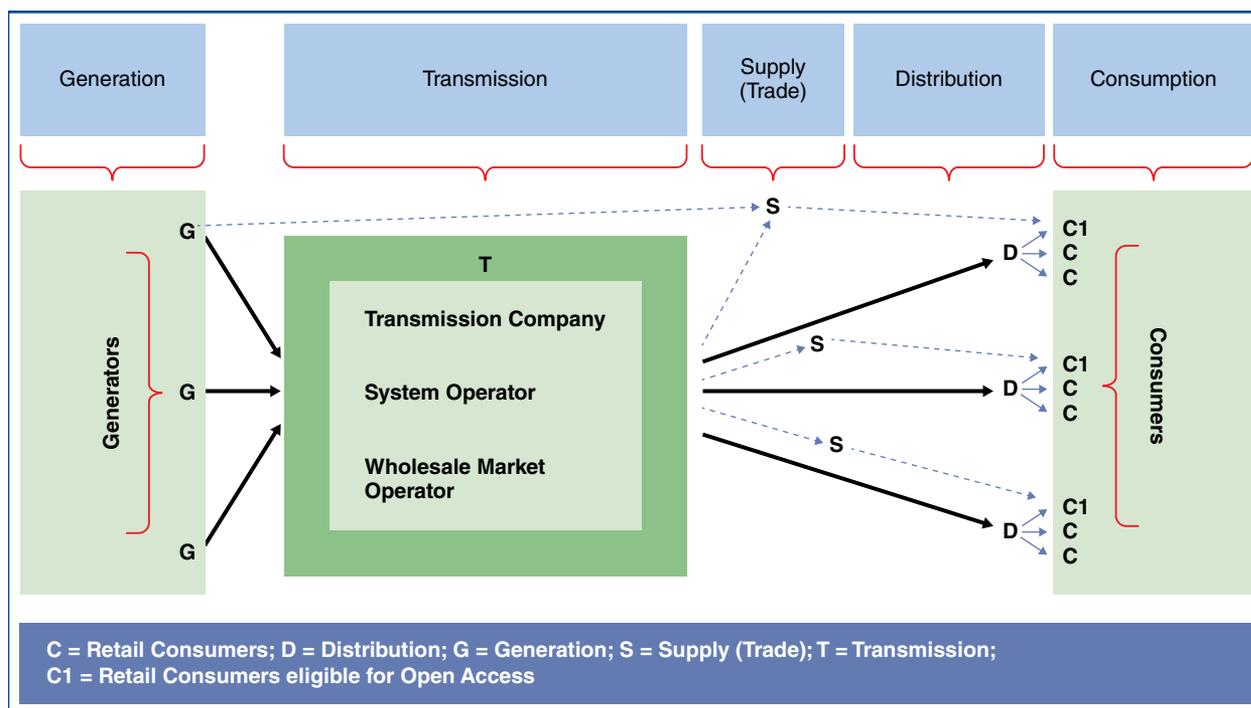
## B. OPEN ACCESS

Open access is the key to free and fair electricity market and facilitates better integration of two or more power systems. **In CBET, wherein power systems of more than one country are interconnected, non-discriminatory access to their respective transmission systems increases opportunities for any party to sell/buy electricity at a cost-reflective fee.** Open access becomes very essential for introducing competition in electricity markets and increasing their efficiency.

Through open access, multiple sellers (generators) and buyers (supply or trading companies, distribution companies, and final consumers) interact in the market, relying on the services of the T&D grid. Figure 5 indicates market segments typically found in the electricity sector and their relation to open access.

In an integrated market, open access provides multiple options to sellers/buyers, leading to a more efficient sector operation, improved quality of power supply, and downward pressure on tariffs. **Open access has added benefits for CBET, allowing for multiple and diverse power supply contracts that take advantage of the load and time diversity and contribute to a better utilization of resources across the region.** It thus encourages private sector/foreign investments.

**Figure 5: Operation of a Typical Electricity Market**



### 1. Current Practice in South Asia

Currently, it is only in India, Bhutan, and Bangladesh that specific provisions related to open access exist, whereas Afghanistan, Pakistan, Nepal, and Sri Lanka have not yet introduced open access.

- India through EA 2003 has mandated open access for inter- as well as intra-State transmission lines. Any consumer above 1 MW can avail open access to the transmission as well as the distribution network. **The Regulatory Commissions (CERC and SERCs) provide a facilitative framework for non-discriminatory open access through enabling regulations. These regulations include**

**provisions on the overall procedure, application process, type of open access consumer, designated nodal agency, eligibility, tenure, priority order, and applicable charges.** Further, they provide for **load dispatch facilities with state-of-the-art communication and data acquisition capability on a real-time basis.**

- In Bangladesh, the EA 1910 and subsequent amendment in 2012 requires the Bangladesh Electricity Regulatory Commission (BERC) to introduce, operate, and maintain an independent, fair, and competitive market structure for the bulk trading of electricity in the country and take necessary measures to facilitate a smooth transition from the single buyer system to the open market system in consultation with the Government of Bangladesh. **While the Act mandates the transmission utility, Power Grid Corporation of Bangladesh (PGCB), to provide non-discriminatory open access to its transmission system for use by any licensee or generating company on payment of the transmission charges, it also directs the Commission to issue necessary regulations in order to ensure open non-discriminatory access by all the concerned parties to the grid system in Bangladesh.**
- In Bhutan, the EA 2001 mandates the Bhutan Electricity Authority to ensure non-discriminatory access to the transmission and distribution system.
- For CBET, India must extend its open access provisions in its Electricity Laws, Policy, and Regulatory framework beyond national boundaries and incorporate provisions on cross-border transactions; Bhutan and Bangladesh must notify the enabling regulations on open access, including specific provisions on CBET as per their respective electricity laws. Other SAC, including Pakistan, Sri Lanka, and Afghanistan, need to establish open access provisions (for both national and cross-border international interconnections) in their respective legal/policy/regulatory framework.

**In an interconnected power system of South Asia with greater bilateral and multilateral trade being envisaged, it is essential that countries coordinate and formulate the relevant guidelines on open access to streamline the processes and facilitate non-discriminatory access to their respective transmission system. An investment-led trade like CBET would require greater certainty on market access. It will become even more essential when CBET gradually moves to a centralized trading market or power exchanges.** Till the time power exchange traded volumes are low and the demand/supply does not majorly affect prices, there may not be major challenges to market access and these can be addressed through bi-lateral contracts that provide commitments to provide access. However, if the volumes start influencing the demand–supply and prices, then market access by sellers/buyers from third countries can face risks. This will necessitate the establishment of a stable regime providing certainty of access.

## 2. International Practice

The experience of countries like **Brazil, Turkey, and Peru** shows that **political commitment to liberalization, legislative provisions for third-party access, conducive market structure (ownership separation), independent system operation, economically efficient pricing, and well-organized transmission planning** are all critical for successfully implementing open access. From a regional perspective wherein more than one power system gets integrated, open access allows maximum freedom for moving electricity across integrated markets. **In some regional markets, notably in the European Union, cross-border transmission interconnections with the freedom of access have been a critical instrument of integration of the national electricity markets or market coupling.**<sup>12</sup>

<sup>12</sup> Market coupling refers to the integration of two or more electricity markets from different countries through an implicit cross-border allocation mechanism.

Legal, regulatory, and institutional interventions that lead to competition through open access in different countries are given below.<sup>13</sup>

## United States

- *The Energy Policy Act of 1992 allowed generators and other participants selling or buying electricity for resale to apply to the Federal Energy Regulatory Commission (FERC) for an order to access utility transmission assets if the utility refused access. Further, in 1996, adherence to non-discriminatory open access rules for the American transmission system was reaffirmed by FERC Order No. 888, promoting wholesale competition through open access.*

## Germany

- *Historically, the German electricity sector was dominated by cartel agreements that prohibited competition. In 1998, Germany legislated an essential facilities doctrine mandating that network access be non-discriminatory. Ordinances in 2006 and 2007 provided general requirements for opening distribution networks and the general terms and conditions for distribution. Power stations were allowed access to the network where technically possible.*

## Brazil

- *Open access provisions were established as part of the first round of reforms in the 1990s, which established that no generator would be subject to discrimination or denied the right (subject to the security constraints in operating the system) to use the nation's grid. Agência Nacional de Energia Elétrica (ANEEL) which is the regulating agency in Brazil ensured that the interests of generators are protected through adequate regulatory provisions. Further, an independent system operator (Operador Nacional do Sistema Elétrico) was established to manage and operate the grid according to competition-neutral and security-conscious protocols.*

## Turkey

- *Open access was introduced in 2001 with the Electricity Market Law, which initiated the creation of a competitive liberal electricity market. The definition of eligible consumers for open access was established in 2003 as consumers of energy in excess of 9 GWh per year or those with an existing direct connection to the transmission system.*

## Nordic Region

- *The initial market reforms in Nordic countries led to a separation of grid transmission activities from the competitive activities of generation. Grid companies were created in each country with the responsibility to monitor and operate the power grid and its cross-border links. The networks were gradually opened to new participants, and legislation was provided for competition and third-party open access.*
- **In most of the developing power pools, open access has been recognized through protocols, and Supplementary Acts and provisions have been laid out through operation manuals;** however, a completely fair and transparent access to transmission facilities is still to be achieved on ground.
- **In SAPP, long-term open access customers (bilateral contracts) are given priority over short-term customers (STEM<sup>14</sup> contracts).** Ideally, the allotment of capacity should be on a first-cum-first basis in the initial stages, this is reasonable as long as sufficient capacity is available to accommodate short-term trade.

<sup>13</sup> Source: International Experience with Open Access to Power Grids, Synthesis Report, ESMAP

<sup>14</sup> STEM- Short-Term Electricity Market

- **WAPP recognizes open access through protocols. However, the exclusive first rights of the transmission network belong to the companies that built international interconnectors.** *Absence of legally binding provisions specific to open access thus subject market participants to serious risks of supply security.*
- A review of power pools shows that the monopolistic behaviour of utilities/companies owning a transmission network can result in the denial of open access (supply country, buyer country, and transit country). **To prevent such conflict of interests, it is important to ensure that system operators (responsible for scheduling and dispatch) and network owners are kept away from generation/trading activities.** Most of the advance pools have achieved this through setting up of an independent body in the form of Transmission Service Operators (TSOs) responsible for fair and transparent electricity transactions.

### 3. Recommendations for South Asia

The functioning of an efficient open access regime depends on the following enabling factors:

- i. A strong and sustainable political commitment to liberalization and competition
- ii. Legislation that grants generators and consumers the right to non-discriminatory access to the grid and inhibits the monopolistic functioning of grid companies
- iii. A market structure that supports functional separation of transmission system and generation facilities
- iv. Establishment of an independent and competitively neutral Transmission System Operator
- v. An efficient transmission pricing mechanism, which is transparent, cost reflective, and separate from the cost of energy being transmitted.

From the point of view of CBET in South Asia, it is important that the above factors are kept in cognizance and appropriate measures are taken in a coordinated manner.

- i. Commitment to non-discriminatory access to be established through common regulatory guidelines
- ii. Fair rules and procedures for “Third-Party Access to Networks” to be framed by the regional forum of regulators in consultation with relevant empowered entities in SAC
- iii. Once the rules/procedures are approved and agreed upon in the Member Countries, each country has to undertake the following:
  - Legislative enablement of open access through inclusion of non-discriminatory open access provisions in the relevant laws
  - Define open access through the modification/amendment of applicable regulations or through an enactment of separate regulations applicable to CBET
- iv. The countries of South Asia (excluding India and Pakistan) have bundled utilities with the same entity undertaking the generation and transmission business. If ownership separation is not possible, a functional unbundling of transmission and distribution facilities from generation could be undertaken to ensure transparency.

## C.

## TRANSMISSION PRICING

The need for an efficient and transparent transmission pricing arises as a consequence of the natural monopoly linked with large-scale infrastructure networks and an electricity transmission system across an interconnected grid is one of them. An effective transmission pricing regime must reflect the following:

- i. Signal efficient investment in generation, load, and transmission projects
- ii. Promote efficient operation of the wholesale electricity market
- iii. Compensate owners of existing transmission assets
- iv. Be simple, transparent, and politically implementable.

## 1. Current Practice in South Asia

Currently, most of the SAC are using the traditional mechanism of transmission pricing based on the “*Postage Stamp*” methodology, wherein costs are based on the specific path agreed for an individual wheeling transaction under a contract. **The postage stamp method is more suited when the geographical area in consideration/the electrical network is relatively small, flows are simple and do not cause large externalities (parallel flows) for intervening/electrically contiguous regions. In this method the priority is accorded to simplicity and social acceptability over economic efficiency. However, the method does not take into account the exact utilization of the system and potentially discriminates between users.**<sup>15</sup>

Until a few years back, transmission pricing in India was also based on the postage stamp method. **With large Inter-State and inter-regional flows due to open access and trading of electricity, the flow patterns across the country changed. “In the changed scenario, the regional postage stamp method was beset with problems of the pancaking of transmission charges, which deterred economy trades across regions and hence, prevented competition and efficient use of resources”.**

Under such circumstances, India graduated to a more efficient method of pricing called the “*Point of Connection (PoC)*” mechanism. **The PoC mechanism requires network users to pay and receive prices that reflect the marginal cost of electricity at different points on the network and is more efficient in terms of cost recovery.** The use of the power flow model helps to find out the actual use of the system, and based on that, the price is determined at various nodes. **Transmission charges determined by using this method are Point Tariffs, thereby indicating that each user of the network, viz., generator/demand customers will be required to pay a fixed charge depending on their location in the network. Such location-based pricing becomes very crucial in regional trade, particularly when power is to be traded across countries.**

In the existing CBET arrangements between India and Bhutan/Bangladesh, the system operator Power System Operation Corporation Limited (POSOCO) computes the PoC charges for the respective countries’ injection and withdrawal locations. This method of factoring transmission usage in cross-border transactions in terms of location-specific prices has been a success. The same method could be used/replicated for other CBET combinations in the region.

<sup>15</sup> Formulating Pricing Methodology for Inter-State Transmission in India, CERC, 2009 <http://www.cercind.gov.in/2009/May09/APPROACH-PAPER-transmission-pricing-150509.pdf>

**Having said that, the preference and feasibility of a transmission pricing mechanism is entirely a country's prerogative and depends on whether the power system in that particular country has reached the stage wherein it can transit from one pricing framework to another.**

## 2. International Practice

The transmission pricing mechanisms being used in different power pools/regions across the world are of varying nature. The choice and feasibility of a pricing mechanism is primarily a function of the power system characteristic in the region and of how developed a region is to adopt a certain pricing regime. **Among the developing power pools, WAPP and GMS have been using the traditional "Postage Stamp" method to determine transmission charges; SAPP, which earlier used "MW-Km"-based pricing, has now moved to a more economically efficient pricing mechanism called "Nodal Pricing." In Nodal Pricing, power flow models are used for reflecting the actual use of a network. Nodal charges vary at nodes depending on the marginal cost of losses and congestion at that node.** WAPP has recently initiated actions in the form of regulatory studies to determine a common methodology of transmission pricing based on efficient techniques. In Nord Pool, the participating countries have moved from traditional methods to more efficient methods of pricing. In the early stages of development of Nord Pool, the participant countries Norway, Sweden, Denmark, and Finland graduated to a point tariff system<sup>16</sup> to ensure efficiency and better compensation for network usage.

Similar mechanisms are also being used in other regions like **Great Britain (England, Scotland, and Wales) and PJM in the United States**. The transmission pricing mechanism used in the United Kingdom is a variant of the PoC mechanism used in India. The transmission network use of system (TNUOS) tariff in the UK has two components (i) Locationally varying element derived from the DC Load Flow (DCLF), Incremental Cost Reflective Pricing (ICRF) transport model to reflect the costs of capital investment in, and the maintenance and operation of a transmission system to provide bulk transport of power to and from different locations; and (ii) non-locationally varying element related to the provision of the residual revenue recovery. The combination of both these elements forms the TNUOS tariff.

**Thus, globally, the intent has been to adopt such mechanisms of pricing that recovers costs, promote efficiency, be transparent and fair, and ensure non-discrimination;** and this could be achieved through the adoption of location-based pricing.

It has been observed that for graduating from a traditional pricing framework to a more efficient location-based pricing regime, the power system in a country must exhibit the following characteristics:

- **There exists differential usability of assets.** For instance, a system user pays for a transmission asset but does not use it.
- **Power system graduates to an open market.** Collective transactions with anonymous buyers and sellers where only points of injection and withdrawal are known without any knowledge of the actual path of power flow.

**Countries must take due cognizance of the above factors and then decide the type of pricing regime that best suits the characteristics of their respective power systems.**

<sup>16</sup> The idea of point tariff system is that the producers pay a fee to the grid for each kilowatt hour that they pour into the grid and the end users pay a fee for each kilowatt hour that they draw off the grid. Moreover, the kilowatt hours can be traded freely in the whole area without additional fees.

### 3. Recommendations for South Asia

Most of the CBET transactions in South Asia that are already happening or could possibly happen in the near future including trade through transit country, are **suitably placed for adopting charges similar to PoC charges determined by POSOCO in India. PoC charges for the respective countries' injection and withdrawal locations, e.g., Bhutan/Bangladesh injection and withdrawal vis-a-vis India are computed on a regular basis.**

- While graduating to a location-based pricing regime, countries must focus on a methodology that is cost reflective and incorporates location-specific congestion cost. If the time is ripe, countries must graduate from the traditional postage stamp pricing to location-based pricing.
- The pricing framework must be adopted through appropriate changes in the legislations/regulations and policies.

**Thus, countries in South Asia must take a judicious view regarding the type of pricing regime that they would want to establish depending upon the state/characteristics of their power systems.**

## D. TRANSMISSION PLANNING

Transmission planning is a process wherein new transmission lines and interconnecting points are identified and planned for development. It also includes the identification and prioritization of lines for capacity augmentation and network strengthening. Efficient transmission planning helps achieve system security; i.e., the transmission system can continue to operate normally even when there is a transmission line outage. Further, it helps avoid network congestion and meet contingencies.

### 1. Current Practice in South Asia

Transmission planning in the South Asian Region is presently based on the master plan/transmission plans at the respective country levels. **The member countries have set targets that they envisage to achieve in the next couple of years/decades. These plans are updated periodically and provide the direction for development. Most of these plans comprise present and planned CBET (in most cases, only with a specific country) and are discussed at a broad level lacking comprehensive coverage. In the existing scenario, the actual transmission systems are constructed with respect to the quantum of the bilateral PPAs** without any focus on regional integration. For instance, in case of India, the existing transmission capacity connecting India and Bhutan has been built to evacuate 1500-MW capacity for the new power plants to be commissioned (Punatsangchu 1, 1200 MW).

#### India

The objectives, approach, and criteria for transmission planning, which has evolved over a period of time, take into account uncertainties in load growth and generation capacity addition while optimizing investment in transmission on a long-term basis. These objectives, approaches, and criteria are considered while developing the transmission plan to meet targets for adequacy, security, and reliability from both the domestic and the regional perspectives. The transmission plan is subject to periodic revisions and is firmed up through system studies/analyses considering various technological options.

Several factors are taken into account while planning and developing the transmission system. Some of them are to facilitate trading, cost optimization, right-of-way optimization; high-capacity corridors from NER, etc. The transmission plan of India takes into account power trade only with Bhutan and has links proposed with other neighboring countries as well, which are as follows:

### India–Nepal

Dhalkebar–Muzaffarpur 400-kV D/C 130-km line is under construction.

### India–Bangladesh

An electrical grid interconnection between India and Bangladesh through a 400-kV Baharampur (India)–Bheramara (Bangladesh) 400 kV D/C 125-km line along with 1×500-MW HVDC Back-to-Back asynchronous link at Bheramara was commissioned to export power from India.

### India–Sri Lanka

A proposal to interlink India and Sri Lanka is under study. Under this proposal, the feasibility of the establishment of a HVDC transmission system of 1000-MW capacity using overhead lines and undersea cables from Madurai, India, to Anuradhapura, Sri Lanka, is being studied. The India–Sri Lanka transmission link is tentatively envisaged to be a +400-kV HVDC Bipole line. The proposed link would consist of the following: (i) Overhead line from Madurai to Pannaikulam in India: 130 km, (ii) Pannaikulam (India) to Thirukketiswaram (Sri Lanka) submarine cable: 120 km, and (iii) Overhead line from Thirukketiswaram to New Anuradhapura in Sri Lanka: 110 km. The techno feasibility study is in progress, and based on the same, this link could materialize in the future.

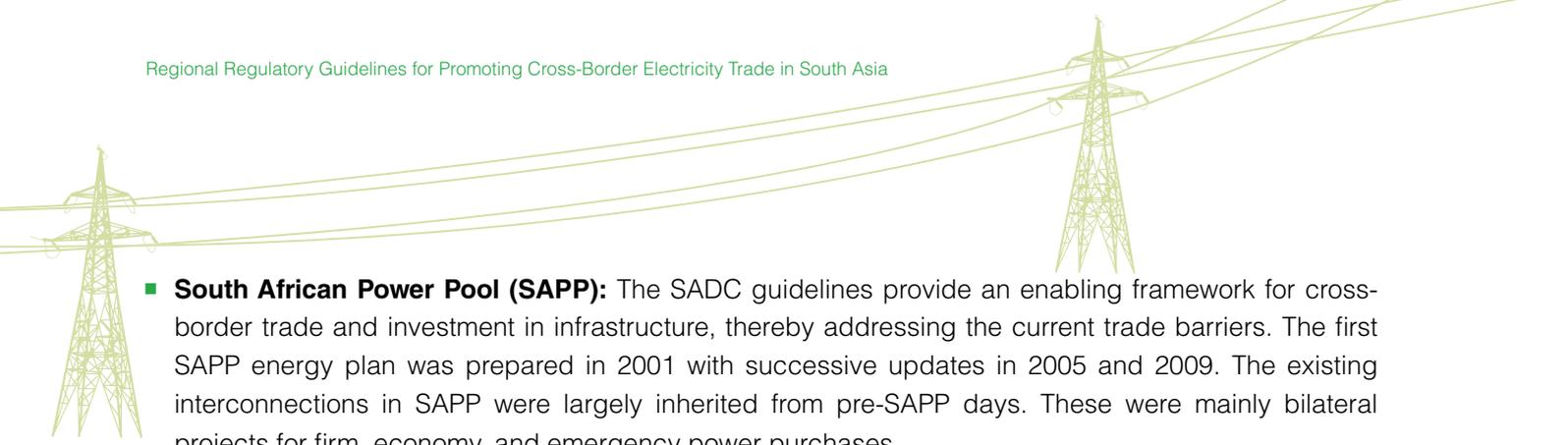
### India–Pakistan

As on date, cross-border interconnections for electricity trade between India (or any other South Asian Country) and Pakistan do not exist. However, discussions between India and Pakistan to establish power trade relations are in process. The World Bank has offered to finance a feasibility study for the installation of a transmission line to import 1,200 MW of power from India. A draft MoU has been prepared by the Government of Pakistan and is under review.

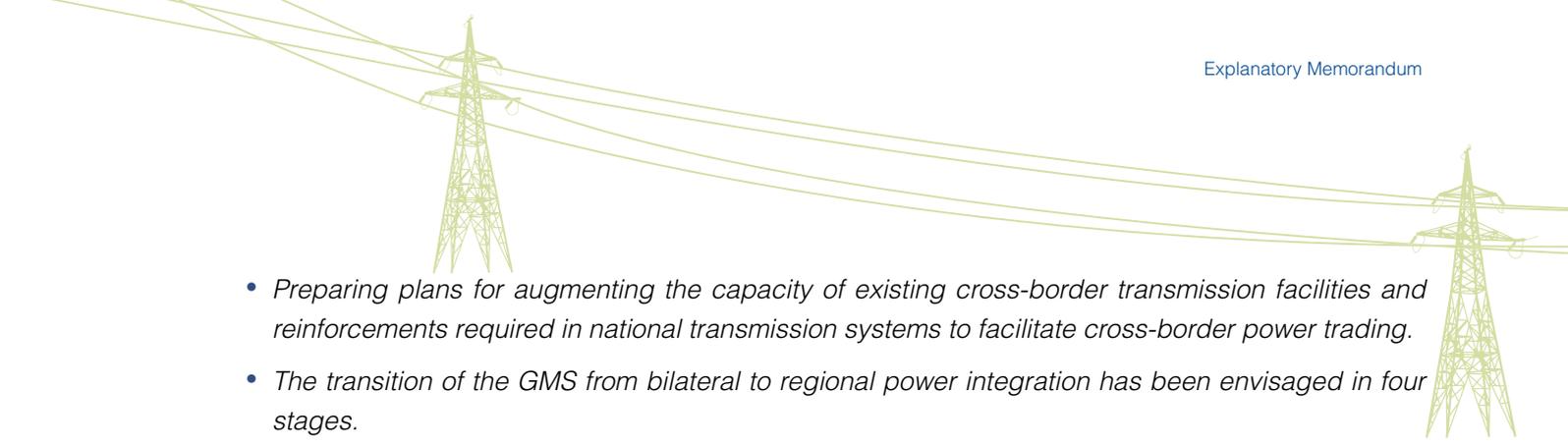
## 2. International Practice

Almost all countries have transmission plans either separately or as a part of their power-sector master plans. In most of the countries, the master plans recognize CBET and have prioritized their transmission projects (this practice is similar to most of the power pools; for instance SAPP, WAPP, and GMS). These master plans are revised periodically to identify and re-assess the priority projects.

- **In Central America, the process of making decisions on issues such as transmission planning is focused on achieving a resolution that is optimal for every member country. The decision-making processes in Central American Electrical Interconnection System (SIEPAC) combines actions from the regional system operator, the regional regulator, a high-level government steering committee, and a three-person Expert Panel. However, the regional regulator is empowered to make final and binding decisions, looking at the issues from the perspective of the region as a whole and can make changes to what market participants propose (after consultation). The transmission plan identifies the national transmission systems necessary for the regional transmission system. The governments facilitate the transfer of the relevant transmission assets to the regional transmission owner.** Additionally, an expansion plan is formulated for generation and regional transmission, envisaging the establishment of regional reserve margins and allocating reserve responsibilities within the regional system.

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- **South African Power Pool (SAPP):** The SADC guidelines provide an enabling framework for cross-border trade and investment in infrastructure, thereby addressing the current trade barriers. The first SAPP energy plan was prepared in 2001 with successive updates in 2005 and 2009. The existing interconnections in SAPP were largely inherited from pre-SAPP days. These were mainly bilateral projects for firm, economy, and emergency power purchases.
    - **Generation and Transmission projects of regional importance are prioritized, and majority of them are developed together with the private sector. Export-oriented projects are identified, and their development is linked with the development of the transmission lines.**
    - In SAPP, the prioritization of transmission projects<sup>17</sup> is done on the following basis:
      - i. **Category A:** *Transmission Projects for alleviating congestion caused due to the regional trade and development of the Day Ahead Market.*
      - ii. **Category B:** *Transmission projects to ensure interconnection of all non-operating members: Outstanding transmission interconnectors whose aim is to interconnect non-operating members of the SAPP.*
      - iii. **Category C:** *Transmission projects related to new generation capacity: New transmission interconnectors aimed at evacuating power from generating stations to the load centers.*
  - **West African Power Pool:** The WAPP investment program is derived from the Economic Community of West African States (ECOWAS) Master Plan for the Generation and Transmission of Electrical Energy developed in 1999, with subsequent revisions in 2005 and 2012.
    - The Master Plan defines priority projects in the region (as identified by the Secretary General in collaboration with funding/donor agencies) for development.
    - The Master Plan focuses on the interest of developing the hydroelectric resources in Western Africa and to build a reliable transmission network to share the resources in the whole region. For this purpose, the WAPP states were divided into two zones, and 14 major priority interconnections were identified. **The projects are identified as national projects for production, regional projects for production, and regional projects for interconnection.**
    - WAPP has focused on a smaller number of projects and identified placing **less emphasis on technical feasibility and a greater focus on political acceptability and implementation.**
  - In **GMS**, the **Planning Working Group (PWG)** was established to perform the functions of the operational and system planning working groups, identified in the draft Regional Power Trade Operating Agreement (RPTOA). The PWG's membership comprises a senior-level representative from each Member Country's transmission system operator with the responsibility for national transmission planning. Its main objectives include identifying priority interconnection projects and establishing common regional performance standards and database. The functions of PWG cover the following:
    - *Preparing a plan for developing a regional network with facilities that are dedicated to cross-border transactions but are not linked to specific PPAs.*
    - *Planning and prioritizing the addition of new transmission capacity, including recommendations regarding ownership and financing.*
    - *Defining excess transmission capacity that is available on a non-firm basis to support short-term opportunity exchanges of power.*

<sup>17</sup> [http://www.icafrica.org/fileadmin/documents/Knowledge/Energy/ICA\\_RegionalPowerPools\\_Report.pdf](http://www.icafrica.org/fileadmin/documents/Knowledge/Energy/ICA_RegionalPowerPools_Report.pdf)

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- *Preparing plans for augmenting the capacity of existing cross-border transmission facilities and reinforcements required in national transmission systems to facilitate cross-border power trading.*
  - *The transition of the GMS from bilateral to regional power integration has been envisaged in four stages.*
- i. **Stage 1:** *Bilateral trade through surplus capacity available in an existing cross-border transmission system (specific to a PPA) between countries. Identification of priority interconnectors.*
  - ii. **Stage 2:** *Grid-to-grid power trading between any pair of GMS countries, eventually using transmission facilities of a third regional country. During this stage, trade will continue using largely interconnector capacity constructed under bilateral arrangements.*
  - iii. **Stage 3:** *Interconnectors developed exclusively for cross-border power trading, and third parties (other than national utilities) will be permitted to begin trading over these. Most of the GMS countries are connected through HV lines with increased capacity to accommodate the cross-border transactions. The regional transmission network was developed on the basis of recommendations on regional planning put in place during Stage 1 and implemented during Stage 2. A regional system operator centrally operates the regional transmission network.*
  - iv. **Stage 4:** *Establishment of a regional power market. The development of an efficient regional transmission system that is not linked to a specific PPA. The timing of Stages 3 and 4 is uncertain, and different countries may move to these stages at different times, depending on the extent of liberalization of their national electricity market.*

GMS is currently at Stage 1 and in process of transitioning into Stage 2.

### 3. Recommendations for South Asia

CBET in South Asia is presently being undertaken on a case-by-case basis with selective planning for future trade. Development of a regional transmission plan for the region will facilitate coordinated development. For a comprehensive regional transmission plan, it is imperative for all the member countries to have their individual and comprehensive national transmission plans with the identified cross-border interconnections. The following needs to be undertaken to facilitate transmission planning at the regional level:

- Set up of a regional coordination forum to which identified central/national utility from every Member Country shall be a member. The suggested activities and functions are as follows:
  - Gather and collate information about existing and new projects and capacities (Each country to provide individual Generation and Transmission Master Plan for export-oriented projects).
  - Undertake studies on integration of new generation projects in the region by using software for detailed transmission modeling.
  - Planning for the reliable operation of the interconnected system and determining interconnection limits (e.g., **Enhancement of India–Bhutan interconnection limits and transfer capacity to cater to future trade requirements as envisaged by the two countries**).
  - Tracking of Generation and Transmission projects to ensure that timelines/milestones are met (e.g., **Fast-track development of the Muzaffarpur–Dhalkebar link between India and Nepal**).

## E.

## IMBALANCE SETTLEMENT

An imbalance settlement mechanism addresses the issue of mismatch between scheduled and actual delivery of power in the grid. It provides for a commercial mechanism that manages such deviations and hence, is essential for ensuring consistency in supply and grid discipline.

## 1. Current Practice in South Asia

Settlement of energy imbalances is an important aspect with respect to CBET in South Asia where a common set of principles to settle imbalance across different countries would be needed. However, currently, there is no standard mechanism in place.

**In bilateral trade arrangements between India–Bhutan, there is no standard mechanism to undertake scheduling and accounting as well as no designated entity for monitoring the same.** Presently, power is being imported from the generating stations of Chukha, Tala, and Kurichhu in Bhutan. PTC is the nodal agency for the import of power from these stations. Beneficiaries of these power stations are located in Eastern and Northern Regions. These generators are not covered under the commercial settlement mechanism applicable in India, and the payment of energy charges are based on actual injection. Deviations from schedule with respect to these stations are adjusted by giving credits/debits to their beneficiaries as per their shares from these stations. However, transactions with Dagachhu Hydropower Corporation would be settled on the basis of the schedule.<sup>18</sup>

**In case of the import of electricity by Nepal and Bangladesh from India, there are no known issues (at present) in the settlement of deviations. Scheduling, energy accounting, and deviation settlement with respect to power imported by Nepal and Bangladesh is done on the basis of the terms mutually agreed by the Governments of India, Nepal, and Bangladesh on a bilateral basis for particular bilateral agreements.** Scheduling, energy accounting, and settlement of deviations with respect to the power supplied to Nepal through the Tanakpur–Mahendranagar line is done as per practices prevailing in India. Since the quantum of power (currently coming from Bhutan) is insignificant as compared to a large Indian grid, the impact is less; however, going forward, when imports would increase, the deviations can have serious implications on the grid security. **There is also some form of commercial mechanism in place for trade between Afghanistan and Central Asia; however, it is contract specific.**

## 2. International Practice

In most of the developing power pools, including SAPP, WAPP, and GMS, the settlement of inter-utility power transactions under long-term bilateral trading agreements is governed by the conditions that are attached to such bilateral agreements. **In SAPP, procedures for imbalance settlement under short-term transactions have been defined (being handled based on hourly average power system frequency at different blocks of pool generation costs. The settlement happens in cash).** Other regions including GMS and WAPP have no standard mechanism to deal with imbalances on a regional basis, primarily because these regions are still in the early stages of transition to short-term transactions and trade arrangements are based on bilaterally negotiated PPAs.

<sup>18</sup> <http://www.cercind.gov.in/2014/ROP/ROP187.pdf>

For trade between Georgia–Turkey, possible solutions to address imbalances with Turkey are as follows: (i) allocate costs to the responsible parties; (ii) dispatch generation and disconnect customers if necessary to ensure that the export schedule is met; (iii) add Turkish imbalance costs to ESCO’s monthly settlement costs; (iv) volumetric settlements; and (v) in Europe, CBET has specific provisions of imbalance settlement, for instance, the Balance Responsible Mechanism.<sup>19</sup>

- i. **Allocate costs to the responsible parties:** It is possible to allocate imbalance costs to the responsible parties by knowing how much each party contributed to the imbalance. However, metering at all generators, distribution companies, and direct customers is required to make an exact allocation. If hourly metering is not available to determine each party’s contribution to imbalances, then some hourly generation and load approximations would be needed. There was reluctance in discussions with ESCO about using approximations since it would lead to disputes that would not be easily resolved. Approximations would be minimized if hourly metering is available at all required locations.
- ii. **Dispatch generation and disconnect customers if necessary to ensure that the export schedule is met:** Dispatching generation to eliminate imbalances at the interconnection is certainly the preferred solution. If there is no imbalance at the interconnection, imbalances can be settled internally in Georgia. If there are hours when internal generation is not sufficient to meet the export schedule, disconnecting customers is a potential solution to maintaining an export schedule. However, a financial settlement of imbalances is likely to be preferable to shedding load.
- iii. **Addition of imbalance costs to ESCO’s monthly settlement costs:** Socializing the cost of Turkish imbalance costs by adding these costs (the portion that is not directly attributable to exporters) to ESCO’s monthly settlement costs is a potential solution to allocating imbalance costs. The question is whether the problems associated with this solution are more or less than the problems associated with allocating costs to responsible parties by using some estimated values.
- iv. **Volumetric settlements:** The Turkish approach to imbalance settlements with Bulgaria and Greece is to repay imbalance megawatt hours with energy rather than using financial settlements. If there are under deliveries to one country’s electricity system, a megawatt hour repayment schedule is established to bring the two countries into balance. There is a procedure in place to determine when megawatt hour should be repaid so that one country does not under-deliver in high cost hours and over-deliver in low cost hours.
- v. **Balance responsible mechanism:** *The “balance responsible” mechanism is mandated by law in France, Belgium, and the Netherlands. In most of the European countries, the system operator acts as the Balancing Responsible Party (BRP) on behalf of the incumbent utilities (generators or a group of generators). The French electricity market mandates the use of the balance responsible mechanism for players/entities (acquiring the balance responsibility entity status) engaging in commercial transactions in the market.*<sup>20</sup>

**STEP 1: Balance Responsible Entity (BRE) submits details of all the injection and withdrawal resources that comprise its balance perimeter to Réseau de Transport d’Électricité (RTE) – the transmission system operator of France and Distribution System Operators (DSOs).**

- Minimize its exposure to the cost of settling imbalances between the supplies and the deliveries by netting all the local imbalances attached to its perimeters

<sup>19</sup> [http://hydropower.ge/user\\_upload/4.Transaction\\_Scheduling\\_and\\_Settlement\\_Changes\\_June\\_2012.pdf](http://hydropower.ge/user_upload/4.Transaction_Scheduling_and_Settlement_Changes_June_2012.pdf)

<sup>20</sup> [http://www.ceer.eu/portal/page/portal/EER\\_HOME/EER\\_ACTIVITIES/EER\\_INITIATIVES/ERI/France-UK-Ireland/Meetings1/SG\\_meetings/1st\\_France-UK-Ireland\\_SG/DD/Imbalances%20settlement%20France\\_2.pdf](http://www.ceer.eu/portal/page/portal/EER_HOME/EER_ACTIVITIES/EER_INITIATIVES/ERI/France-UK-Ireland/Meetings1/SG_meetings/1st_France-UK-Ireland_SG/DD/Imbalances%20settlement%20France_2.pdf)

- Elements registered on the balancing perimeter of a BRE are sites of measurement (consumption or production), connected to the transportation or distribution networks; bilateral purchases or sales; exports and imports of energy between the French Network and the nearby networks
- Compensates RTE financially for negative imbalances and vice versa.

**STEP 2: Imbalance between injection and withdrawal is calculated for every BRE for a half-an-hour time block**

**STEP 3: Imbalances are calculated by determining the difference between the submitted injection and withdrawal details and the actual injection and withdrawal**

**STEP 4: RTE then consolidates and calculates the imbalance from the BREs on the system by using a formula:** Production + Purchases Powernext + Purchases European Energy Exchange + Bilateral purchases + Importations] – [Consumption + Sales Powernext + Sales European Energy Exchange + Bilateral sales + Exportations]

**STEP 5: The net imbalance is compensated by RTE, by using bids/offers from balancing actors (who engage in bilateral contracts with RTE to offer their available capacity) on the French balancing mechanism. All the balancing actors to be commercially involved actors must be attached to the BRE**

**STEP 6: The net imbalance cost is transferred to the BREs via the imbalance settlement prices directly bound to the bids/offers activated by the RTE on the balancing mechanism.**

### 3. Recommendations for South Asia

Settlement of energy imbalances is an important aspect with respect to CBET in South Asia where the common set of principles to settle imbalance across different countries would be needed. However, currently, there is no standard mechanism in place and imbalance settlement happens in accordance with the terms negotiated in the respective bilateral agreements.

Settlement of physical imbalances would ensure both contractual commitment and grid stability. **The above would entail changes/amendments in regulations and in provisions related to system operation and roles/functions of the appropriate agencies.**

For bilateral small-scale transactions (say less than 1 GW), there is no major harmonization requirement, particularly if the interconnections are DC. As the member countries plan and prepare for further integration, it is essential for South Asian countries to adopt common balancing and settlement arrangements to mitigate deviation risks. This will depend on the type of interconnection and the scale of transactions.

## F.

## MODE OF INTERCONNECTION AND HARMONIZATION OF CODES

### 1. Key Features – Mode of Interconnection and Harmonization of Codes

- Power systems that are asynchronous (operating at different frequencies) or that require power to be transmitted over large distances are interconnected through HVDC systems. Such HVDC systems entail significant costs.
- AC interconnections where two or more systems are synchronous (operating at the same frequency) require harmonization of codes and system standards. This necessitates coordination and consensus among countries on differing standards and codes.
- Besides the type of interconnection (synchronous or asynchronous), other basic technical issues that need to be taken into consideration and addressed in the early phases of the planning process for grid interconnection are as follows:
  - Magnitudes and direction of anticipated flow
  - Physical distance and terrain where interconnection will span
  - Key operating and technical differences among the systems to be interconnected.

### 2. Current Practice in South Asia

Currently, South Asia has both types of interconnections among the member countries. While countries such as India and Bhutan have AC interconnections (systems in the two countries are synchronous), India and Bangladesh have a DC interconnection (systems in the two countries are asynchronous). The table below indicates the different trade scenarios possible under CBET in South Asia and requirements with respect to grid code harmonization:

**Table 2: Different Trade Scenarios Possible under CBET in South Asia and their Requirements**

Sr. No.	Trade Combinations	Type of Interconnection (AC/DC)	Requirement
<b>Bilateral</b>			
1.	India–Bhutan	AC	Harmonization of grid codes and system standards; however, additional upgrades may be required. The existing project (Tala) is not subject to scheduling; however, future assets might be subject to imbalance settlement.
2.	India–Nepal	AC	Harmonization of grid codes and system standards.
3.	India–Bangladesh	DC	Installation of HVDC system. System may operate at disparate standards.

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Sr. No.	Trade Combinations	Type of Interconnection (AC/DC)	Requirement
4.	India–Pakistan	DC	Installation of HVDC system. Respective systems may operate at disparate standards.
5.	India–Sri Lanka	DC	Installation of undersea HVDC. System may operate at disparate standards.
6.	Pakistan–Afghanistan	DC	Installation of HVDC system. Respective systems may operate at disparate standards.
Multilateral			
1.	Nepal–India–Bhutan	AC	Harmonization of grid codes and system standards.
2.	Nepal–India–Bangladesh	AC and DC	—
3.	Bhutan–India–Bangladesh	AC and DC	—
4.	India–Pakistan–Afghanistan	DC	Harmonization of grid codes and system standards
5.	India–Nepal–Bhutan–Bangladesh		—
6.	Pakistan–Afghanistan	DC	Installation of HVDC system. Respective systems may operate at disparate standards.

### 3. International Practice

Currently, regional power systems of SAPP, WAPP, Nord Pool, North American power system, etc., are **operating as large synchronous alternating current (AC) power grids, in which all the interconnected systems maintain the same precise electrical frequency and the network operates as a single synchronized system.** Here, all the countries follow the same operating codes (regional grid codes) to ensure system stability. Power systems that are asynchronous (operating at different frequencies) or that require power to be transmitted over large distances are interconnected through the HVDC system. **For instance, in SAPP and WAPP, despite systems being synchronous, HVDC links are used to transmit power over a large distance.**

In Afghanistan–Central Asia trade, there exist technical issues in terms of interconnections. **Afghanistan is surrounded by four electrical systems operating asynchronously but feeding parts of the Afghanistan network.** Without a means for synchronization or using back-to-back stations, it is not possible to establish a unified Afghan power grid. Similarly in the Gulf, Phase I of the GCC interconnection includes a **back-to-back HVDC interconnection between Saudi Arabia (operating at 60 Hz) and five other countries of Bahrain, Kuwait, Oman, Qatar, and the UAE (all operating at 50 Hz).**

### 4. Recommendations for South Asia

- Sharing of technical characteristics and requirements of respective power systems is essential from the outset of an interconnection project in South Asia. Hence, an **exchange of data between the owners/operators of the systems in South Asian countries is essential.**

- Non-binding guidelines on technical standards for interconnection of synchronous systems (*India–Bhutan, India–Nepal, and Nepal–India–Bhutan*) to be framed by the regional forum of regulators “SAFER” in consultation with the empowered entities in the respective countries.

## G. DISPUTE RESOLUTION

Strong and clearly defined dispute resolution procedures are an absolute necessity as they govern and affect the existing and future trade relations between two countries. Repercussions of such disputes could result in a discontinuation of the electricity supply temporarily or permanently, leading to high financial losses and demand–supply imbalance.

### 1. Current Practice in South Asia

India has a well-established dispute resolution mechanism, and the same has been incorporated in the bilateral contracts with Bhutan, Nepal, and Bangladesh.

- As agreement with Bhutan is part of the Umbrella agreement executed in July 2006 between the Ministries, the first leg of dispute resolution is between the two ministries.
- Contracts with Nepal and Bangladesh have arbitration and local courts for dispute resolution.
- The draft PPA for the import of power from Turkmenistan to Afghanistan includes the following dispute resolution provisions: “any dispute is to be settled (i) mutually or (ii) through appointment of an independent expert or (iii) through the Turkmenistan–Afghanistan Commission on Economic Cooperation (“Commission”) or (iv) through international arbitration.

### 2. International Practice

The review of various power pools/regions (*SAPP, WAPP, GMS, Central America, and Georgia–Turkey*) shows that dispute resolution and settlement procedures are part of the inter-country agreements and treaties. Further, dispute resolution procedures are part of PPAs, which are bilaterally negotiated. **Across pools, the most preferred method of dispute settlement is an amicable settlement between the parties. In case the parties fail to resolve disputes amicably, then it is further referred to the governments/ ministries of the parties. The last resort of settlement is through international arbitration as per UNCITRAL rules/procedures as mentioned in the agreements/treaties.**

### 3. Recommendations for South Asia

Clearly defined and standardized dispute resolution procedures are an essential element of CBET. In case of any dispute with respect to CBET, the member countries should primarily try for an amicable settlement of such disputes by using the dispute resolution procedures mentioned in their contracts. In case the disputes remain unresolved, the Member Countries should reach out to the SAARC Arbitration Council, which is governed by SAARC Arbitration Rules.



**H.**

## **TAXES AND DUTIES**

### **1. Current Practice in South Asia**

Presently, there are no duties and taxes that are applicable to cross-border electricity trade in the region. However, in Nepal, the provision for payment of export/import duty (under the Electricity Act) exists although the currently applicable export/import duty is zero. As per the Act, the exporter of electricity shall have to pay export duty to the Government of Nepal.

Initially, in India as well, the Indian Directorate General of Foreign Trade applied an import duty on electricity and classified electricity as a “Restrictive Commodity” for trade, which was later changed to “Free Commodity.” Such uncertainties with respect to tax implications mean that investors have no protection against sudden applicability/increase in tax, thereby impacting the final project costs.

### **2. International Experience**

In many cases, differences in the countries’ commercial frameworks with respect to the export/import of electricity present a hurdle to the development of trading. Examples of this are the taxation issues. Taxes on importing and exporting electricity often become a deterrent to CBET and prevent optimal utilization.

In SAPP, the energy taxes factor in the pricing of electricity, and the countries are charged VAT for the electricity they import; however, this money is claimed back at the end of the financial year. SAPP follows the principle of National Treatment, which means that imported electricity shall not be subjected to internal taxes greater than those for similar electricity of a domestic origin.

### **3. Recommendations for South Asia**

Member Countries should modify the existing regulations to ensure a zero tax regime for CBET.

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## Acknowledgements

The Preparation of this Report “Regional Regulatory Guidelines for Promoting Cross Border Electricity Trade in South Asia” would not have been possible without the valuable inputs, suggest and support provided by various stakeholders.

We are grateful to United Sates Agency for International Development (USAID) for its generous support. We would like to express our sincere thanks to Mr. Colion Drezin, Director, Clean Energy and Environment Office USAID/India and Ms. Monali Zeya Hazra, Regional Energy Manager and Clean Energy Specialist, USAID/India for their valuable inputs and suggestions.

We sincerely thank Dr. Kirit S. Parikh, Former Member, Planning Commission, India, and Chairman, IRADe and Dr. Jyoti Parikh, ED, IRADe for their valuable suggestions and guidance all along.

We also like to thank Mr. Rajiv Ratna Panda, Head-Technical at SARI/EI/IRADe project Secretariat for all his valuable inputs and suggestions in preparation of the report.

We also acknowledge and express our appreciation for all those individuals whose names cannot be penned here but who offered invaluable insights and generous support throughout this exercise. We hope this document will serve as a valuable resource for coordination/harmonisation of regulations and developing a regional regulatory framework for promoting CBET in South Asia.

## **ABOUT SARI/EI**

Over the past decade, USAID's South Asia Regional Initiative/Energy (SARI/E) has been advocating energy cooperation in South Asia via regional energy integration and cross border electricity trade in eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Pakistan, Nepal, Sri Lanka and the Maldives). This fourth and the final phase, titled South Asia Regional Initiative for Energy Integration (SARI/EI), was launched in 2012 and is implemented in partnership with Integrated Research and Action for Development (IRADe) through a cooperative agreement with USAID. SARI/EI addresses policy, legal and regulatory issues related to cross border electricity trade in the region, promote transmission interconnections and works toward establishing a regional market exchange for electricity.

## **ABOUT USAID**

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IRADe is a fully autonomous advanced research institute, which aims to conduct research and policy analysis and connect various stakeholders including government, non-governmental organizations (NGOs), corporations, and academic and financial institutions. Its research covers many areas such as energy and power systems, urban development, climate change and environment, poverty alleviation and gender, food security and agriculture, as well as the policies that affect these areas.



For more information on the South Asia Regional Initiative for Energy Integration (SARI/EI) program, please visit the project website:

[www.sari-energy.org](http://www.sari-energy.org)

