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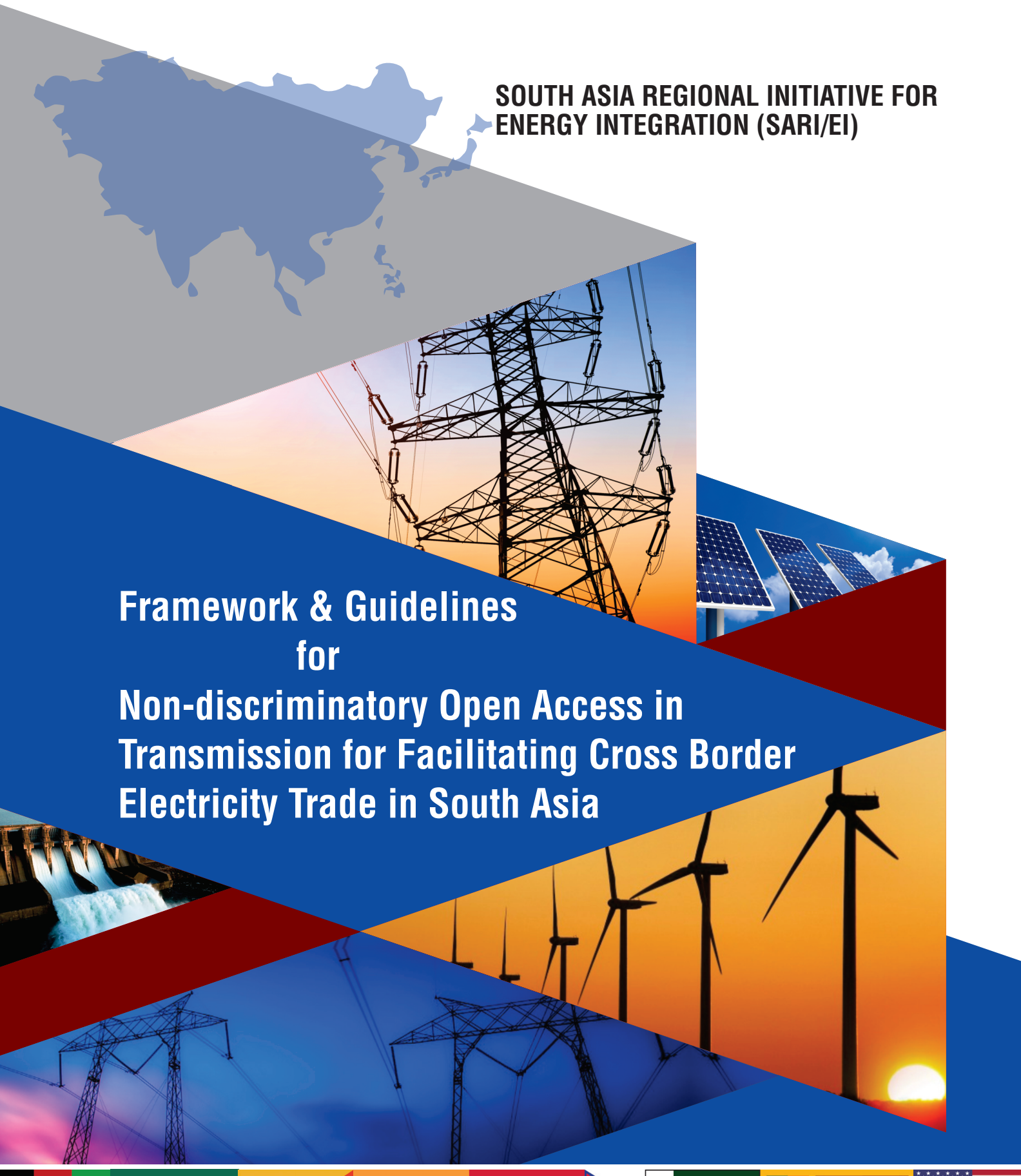
SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY INTEGRATION (SARI/EI)



Framework & Guidelines for Non-discriminatory Open Access in Transmission for Facilitating Cross Border Electricity Trade in South Asia

List of Contributors

SARI/EI Project Secretariat

Study and Research by

Mr. V.K. Kharbanda, Project Director
Mr. Rajiv Ratna Panda, Program Coordinator
Mr. Nikhil, Research Assistant

SARI/EI Task Force-1 (Coordination of Laws, Regulations and Policies)

Members

Afghanistan

Mr. Mohammad Humayoon Kohistani
Energy Programming Director, Ministry of Energy and Water

Bangladesh

Mr. Mohammad Hossain
Director General, Power Cell, Power Division,
Ministry of Power, Energy & Mineral Resources

Bhutan

Mr. Karma P. Dorji
Chief Engineer/Head, Planning and Coordination Division,
Ministry of Economic Affairs

Nepal

Mr. Raju Maharjan
Senior Divisional Engineer, Ministry of Energy

Pakistan

Mr. Syed Safeer Hussain
Registrar, National Electric Power Regulatory Authority

Sri Lanka

Mr. Sulakshana Jayawardena
Director, Ministry of Power and Energy

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Preface

Reliable power supply and access to energy are critical for economic development of any nation. Sustained poverty reduction is possible through electricity as it supports industrialization, especially through small and medium-sized enterprises. It is encouraging that South Asian nations are working together towards greater energy and economic cooperation and have shown commitment by signing the “SAARC Framework Agreement for Energy Cooperation (Electricity)” -on theregional level.On the sub-regional level, the cooperation agreements among BBIN countries (Bangladesh, Bhutan, India and Nepal) on water resources management, power, and regional connectivity are noteworthy.

Thus, through electricity trade, the region looks forward to harness regional resources such as Coal, Gas, Hydro and Renewable energy potential for efficient power generation. For instance, presently, India is having bilateral power trade agreements with Bangladesh, Bhutan, Myanmar and Nepal to the extent of 2200 MW through Government to Government negotiations while laudable initiatives, time consuming they are not efficient.

Through its work IRADe shows that in addition to Government to Government channels,market based power tradeis necessary to accelerate andexpand power trade to bring further investments from the government as well private investors.However,to promote power trade regulatory frameworks within the countries are required for an OpenAccess policies.Pricing framework that only India has so far. Moreover, the countries need to agree on operational framework. Power trade agreements among the regional partners help to build trust.Such cooperation can bring peace and prosperity within the region.

In the past six years, SARI-IRADe program sponsored by USAID has rigorously analysed the policy, inter-regional interconnection, market-mechanisms and economic aspects of power trade within the SAARC region. In doing so, we have created a consensus among the key stakeholders of the region such as policy makers, technical experts and the civil society. Over the years, we have published around 30 reports and organised more than 83 events focussing on various aspects of power trade within the region.

All these activities helped the stakeholders in working together to achieve greater synergies.

Professor Jyoti Parikh, PhD
Executive Director, IRADe

FOREWORD

The U.S. Agency for International Development (USAID) has been working since 2000 to enhance regional energy cooperation in South Asia through its South Asia Regional Initiative for Energy (SARI/E) program. The program covers eight countries: Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka and the Maldives. The first three phases of the program focused on awareness raising, building trust and assessing potential transmission interconnections. The fourth phase of the program, called South Asia Regional Initiative for Energy Integration (SARI/EI), which was launched in 2012, focuses on promoting regional energy integration through cross-border power trade.

The region is experiencing rapid transformation and growth, which is leading to significant increases in energy demand. Cross-border power trade presents a viable and long-term solution to meet this increasing demand. Countries in the region are already trading power bilaterally, with overall cross-border power trade expected to increase significantly in the coming years. One of the critical issues that needs to be addressed for enabling increased power trade is the availability of sufficient transmission interconnections, as well as open and easy access to these networks. In most of the South Asian countries other than India, open access to transmission lines is in a nascent stage.

Non-discriminatory and open access to the power grid is an essential element of introducing competition in the electricity market and increasing its efficiency. In cross-border power trade where power systems of different countries are interconnected, open and non-discriminatory access to the transmission systems increases opportunities for all parties to sell/buy electricity at a cost-reflective fee. Through open access, multiple sellers (generating companies) and buyers (trading companies, distribution companies, and final consumers) interact in the market, relying on the services of the power grid. In an integrated regional market, open access will provide multiple options to sellers/buyers, leading to a more efficient operation, improved quality of power, and lower tariffs.

The report, "Framework & Guidelines for Non-discriminatory Open Access in Transmission for Facilitating Cross-Border Electricity Trade (CBET) in South Asia" presents a model framework for non-discriminatory open access regime. It will act as a reference document for the governments, policy makers and regulators to help develop open access frameworks in their own respective power markets.

I would like to take this opportunity to acknowledge the excellent work done by the SARI/EI Technical Team at IRADe and Deloitte India in developing the report. I also thank the members of Task Force 1 for their inputs and time in preparing this quality report. I hope the findings of this report will be considered and used by the governments of South Asian countries.

Thank you

Julia Kennedy
Director (A)
Clean Energy & Environment Office
USAID/India

Abbreviations

AERA	Afghanistan Electricity Regulatory Authority
AESO	Alberta Electric System Operator
ANEEL	Agencia Nacional de Energia Eletrica
BEA	Bhutan Electricity Authority
BERC	Bangladesh Energy Regulatory Commission
BPC	Bhutan Power Corporation
BPDB	Bangladesh Power Development Board
CAISO	California ISO
CAMMESA	Compania Administradora del Mercado Mayorista Electrico
CBET	Cross Border Power Trade
CCEE	Câmara de Comercialização de Energia Elétrica
CEA	Central Electricity Authority
CEB	Ceylon Electricity Board
CERC	Central Electricity Regulation Commission
CMSE	Comitê de Monitoramento do Setor Elétrico
CNPE	Conselho Nacional de Política Energética
CPPA-G	Central Power Purchasing Agency (Guarantee) Limited
CPUC	California Public Utility Commission
CRIE	Comisión Regional de Interconexión Eléctrica
CTU	Central Transmission Utility
DABS	Da Afghanistan Breshna Sherkat
DAM	Day Ahead Market
DESC	Dhaka Electric Supply Company Limited
DGPC	Druk Green Power Corporation
DHPC	Dagchu Hydro Power Corporation
DISCO	Distribution Company
DISCOM	Distribution Company
DPDC	Dhaka Power Distribution Company
ECOWAS	Economic Community of West African States
ENRE	El Ente Nacional Regulador de la Electricidad
ENTSO-E	European Network of Transmission System Operators for Electricity
EOR	Ente Operador Regional
EPACT	Energy Policy Act
EPE	Empresa de Presquisa Energetica
ERCOT	Electric Reliability Council of Texas (ERCOT)
ERERA	ECOWAS Regional Electricity Regulatory Authority

ERO	Electric Reliability Organization
ESP	Electric Service Provider
ETFC	Electricity Tariff Fixation Commission
FDI	Foreign Direct Investment
FERC	Federal Energy Regulatory Commission
FOLD	Forum of Load Dispatchers
FOR	Forum of Regulators
FPC	Federal Power Commission
FPM-M	Forward Physical Monthly Market
FPM-W	Forward Physical Weekly Market
GAU	Grid Access Unit
GENCO	Generation Company
GoI	Government of India
GoN	Government of Nepal
GoP	Government of Pakistan
GW	Giga Watt
GWh	Giga Watt Hour
HVDC	High Voltage Direct Current
IDM	Intra-day Market
IEGC	Indian Electricity Grid Code
IESO	Independent Electricity System Operator
IPP	Independent Power Producer
IRADE	Integrated Research for Action and Development
ISO	Independent System Operator
ISO-NE	ISO New England
ISTS	Inter State Transmission System
JERC	Joint Electricity Regulation Commission
KESC	Karachi Electric Supply Company
kWh	Kilo Watt Hour
LECO	Lanka Electricity Company (Private) Limited
LTA	Long Term Access
MEW	Ministry of Energy and Water
MISO	Midcontinent ISO
MME	Ministério de Minas e Energia
MoP	Ministry of Power
MOPE	Ministry of Power and Energy
MP	Madhya Pradesh
MPEMR	Ministry of Power, Energy and Mineral Resources
MPP	Mega Power Policy
MTOA	Medium Term Open Access
MW	Mega Watt
MWP	Ministry of Water & Power
NDS	Non Domestic Supply
NEA	Nepal Electricity Authority
NEC	National Environment Commission
NEP	National Energy Policy
NEPRA	National Electric Power Regularity Authority
NERC	North American Electric Reliability Corporation
NHPC	National Hydro Power Corporation
NTDC	National Transmission and Dispatch (Grid) Company
NTPC	National Thermal Power Corporation
NYISO	New York ISO
OA	Open Access
OASIS	Open Access Same-Time Information System
ONS	Operador Nacional do Sistema Elétrico
OTC	Over the Counter
PGCB	Power Grid Company of Bangladesh
PGCIL	Power Grid Corporation of India Limited

PGE	Pacific Gas and Electric
PJM	Pennsylvania-New Jersey-Maryland Interconnection
POC	Point of Connection
POSOCO	Power System Operation Corporation
PSMP	Power System Master Plan
PTC	Power Trading Corporation
PUCSL	Public Utilities Commission of Sri Lanka
REMR	Regional Energy Market Regulations
RERA	Regional Electricity Regulators Association
RGOB	Royal Government of Bhutan
RLDC	Regional Load Dispatch Center
ROW	Right of Way
RPC	Regional Power Committees
RTO	Regional Transmission Organization
SA	South Asian
SAARC	South Asian Association for Regional Cooperation
SAC	South Asian Countries
SADC	Southern African Development Community
SAPP	Southern African Power Pool
SARI/EI	South Asia Regional Initiative for Energy Integration
SERC	State Electricity Regulation Commission
SFAEC	SAARC Framework Agreement for Energy Cooperation
SIEPAC	Electric Interconnection System for Central Americal Countries/Sistema de Interconexión Eléctrica de los Países de América Central
SIN	National Interconnected System
SLDC	State Load Dispatch Center
SPP	Southwest Power Pool
SPV	Special Purpose Vehicle
STEM	Short-term Energy Market
STU	State Transmission Utility
T&D	Transmission and Distribution
TSA	Transmission Service Agreement
TSP	Transmission Service Provider
UMPP	Ultra Mega Power Project
USA	United Sates of America
USAID	United States Agency for International Development
WAPDA	Water and Power Development Authority
WAPP	West African Power Pool
WEC	Water and Energy Commission
WECS	Water and Energy Commission Secretariat
WZPDCL	West Zone Power Distribution Company Limited

Executive Summary

1.1 Context and Objectives

The cross border electricity trade (CBET) in South Asia has gradually increased in terms of quantum and in terms of number of countries, though the overall power trade arrangements are of bilateral nature. For some countries, CBET has become a crucial revenue source to aid in the overall economic growth of the country; while for some other countries, CBET has become a necessary tool to tide over energy shortages.

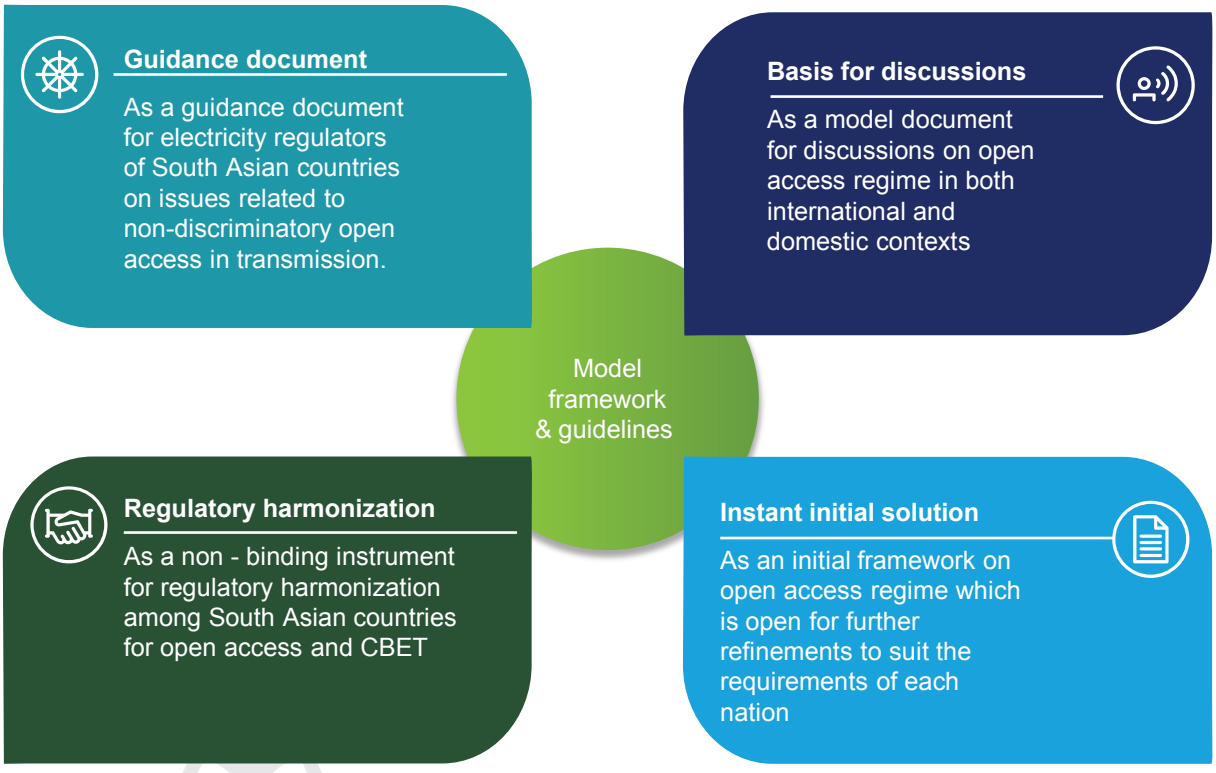
In the future, more generation capacity is expected to come up in South Asian region which will mainly cater to cross border sales. The overall cross border trade is also expected to increase. However, very few of the countries have non-discriminatory open access regimes for transmission network. This may result in adhoc arrangements or building of dedicated transmission lines up to the border which may be uneconomical. Therefore developing a non-discriminatory regime for transmission open access is a necessary condition for development of cross border electricity trade in South Asia. Such a regime also has potential for the development of generation capacity in the private sector within the countries, which might play a role in reducing the energy deficit of some of the South Asian countries.

Considering the nascent stage of open access to transmission lines in the South Asian region (except India), it might be beneficial to have a model framework for non-discriminatory open access regime developed for all the South Asian countries, which can then act as a reference point for the governments, policy makers and regulators to build open access frameworks in their respective power markets. Thus a model framework and guidelines are hereby proposed for non-discriminatory open access regime in transmission and grant of open access in South Asian countries to initiate power trading and facilitate Cross Border Electricity Trade (CBET) in the region.

This framework and guidelines builds upon the earlier recommendations of a regional level task force constituted under the South Asia Regional Initiative for Energy Integration (SARI/EI) program for the “Coordination of policies, legal and regulatory frameworks”.

The model framework and guidelines are expected to serve the following purposes:

Figure 1: Purpose of model framework and guidelines



The objective of the guidelines is to ensure a consistent, common course of action in the decision-making and conduct of CBET transactions in SA countries. Non-discriminatory Open access to the power grid is an essential element of introducing competition to electricity markets and increasing their efficiency. It is also key to free and fair electricity market and facilitates better integration of two or more power systems[1]. In CBET, wherein power systems of more than one country are interconnected, non-discriminatory open access to their respective transmission systems increases opportunities for any party to sell/buy electricity at a cost-reflective fee. 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[2]. 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[3]. In CBET, non-discriminatory open access to their respective transmission systems increases opportunities for any party to sell/buy electricity at a cost-reflective fee and to take advantage of the load and time diversity and contribute to better utilization of resources. Cross-border transmission interconnections with freedom of access is a critical instrument of integration of the national electricity markets. This study originates from the deliberations of SARI/EI-TF -1 on “Coordination of policies, legal and regulatory frameworks”, aims to take forward/implement the Guideline-2 of the regional regulatory guidelines[4] that have been developed under SARI/EI/. The brief summary of the guideline-2 on Non- Discriminatory open access is given in figure-2.

[1]https://openknowledge.worldbank.org/bitstream/handle/10986/17457/789770REVISED000Power0Grids0KS16013.pdf
[2]http://documents.worldbank.org/curated/en/687851468147866316/pdf/789770REVISED000Power0Grids0KS16013.pdf
[3]https://sari-energy.org/wp-content/uploads/2016/07/SARI_RFP-Open-Access28.07.pdf
[4]http://irade.org/IRADe-SARI-EI-Regional%20Regulatory-Guidelines%20(July%202015)-.pdf

Figure 2: The brief summary of the Guideline-2 on Non- Discriminatory open access of the Regional Regulatory Guideline

Task Force-1 Study: Regional Regulatory Guidelines

Guldeline 2: *Provision of Non-discriminatory Open Access to Transmission Network*

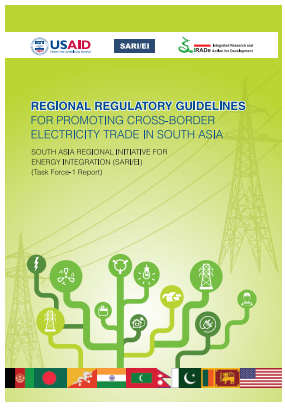
Rationale

Open Access makes it possible to sell or buy electricity, irrespective of location of buyer/seller in the grid; subject to transparently formulated **system-security constraints without discrimination and against payment of adequate fees** for accessing the system.

1. Member countries shall coordinate setting of **fair rules and procedures** for non-discriminatory open access. **Notification of enabling regulations in respective SAC, by working along with the national regulators and/or other empowered** entities

2. Explicitly defined through amendment of regulations or enactment of separate regulations/orders and eventually, in the long-term legislative enablement of open access

3. The enactment of various provisions/regulations inter alia shall include
   - ***Nominating nodal agency for grant open access-*** *Responsible for undertaking scheduling and dispatch operation as well as processing of applications filed by the applicants*
   - ***Procedure for filing applications, application fee-*** *Customers shall have to apply to seek access on a format to be prescribed by nodal agency giving necessary details such as capacity raquirad, point of injection, point of drawal, duration, type of service raquirad, average load, peak*



4. The enactment of various provisions/regulations inter alia shall include
   - ***Processing or applleatlons, priority order and criteria for grant or access-*** 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 servced with reasonable reliability. Subject to Available Transmission Capacity (ATC), the long-term customers shall have priority over short-term customers
   - ***Principles with regard to non-discriminatory and transparent charges for network use-*** The objective in the design of the open access charges should be to recover the sunk cost of the transmission system. Further, open access customers to compensate the nodal agency for scheduling, system control and dispatch services rendered by them.

5. Enabling provisions for the system operators in respective countries to **coordinate scheduling and dispatching of cross border flows**

6. Eventually, in the **long-term legislative enablement of open access may be considered** through inclusion of **non-discriminatory open access provisions in the relevant laws.**

1.2 Existing Open Access Regime in South Asian Countries

In 2014, the SAARC member countries signed the SAARC Framework Agreement for Energy Cooperation (Electricity) which laid a formal foundation for cooperation among South Asian countries in the electricity industry. As per the agreement, the member countries 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.

Multiple provisions in the agreement makes it clear that while the agreement supports regional co-operation, it is up to individual countries to come up with laws and policies that support such regional co-operation. Thus it becomes important to analyze the legal, regulatory, operational and institutional framework for non-discriminatory open access in transmission in the South Asian countries.

The summary of analysis, provided in Table 1, reveals that other than India, none of the South Asian countries have a properly developed regulatory and operational framework for non-discriminatory open access in transmission.

Table 1: Open Access pre-requisites availability in South Asia power sector

Country	Transmission Unbundling	ISO	Independent Regulator	OA Policies	OA Regulations	Pricing framework	Operational Framework - CBET
Afghanistan	×	×	×	×	×	×	×
Bangladesh	●	×	✓	×	×	×	×
Bhutan	●	×	✓	×	×**	×	×
India	✓	×	✓	✓	✓	✓	✓
Maldives	×	×	✓	×	×	×	×
Nepal	×	×	●*	×	×	×	×
Pakistan	✓	×	✓	×	×	×	×
Sri Lanka	×	×	✓	×	×	×	×

✓ - *Yes* × - *No* ● - *Partial*

**Nepal - The Electricity Regulatory Bill for setting up of an independent regulatory commission has been passed by the Parliament. As on end of November 2017, the Regulatory Commission has not been set-up.*

***Bhutan – The Bhutan Power Corporation (BPC), which undertakes power transmission in Bhutan allows the cross border export projects owned by DGPC and DHPC to wheel their power through BPC's grid by paying separate wheeling charges.*

The above analysis clearly points out the inadequacy of existing framework for non-discriminatory transmission open access in South Asian countries, other than India.

1.3 International Experience and Best Practices for Open Access

While designing model framework and guidelines, lessons can be drawn from open access regimes elsewhere. A study of the open access regimes in the respective domestic power sectors and the manner of their integration with cross border trade arrangements can offer learnings to all the South Asian countries. While India offers the best reference, considering its matured trading market and similarity in industry structure with those of other South Asian countries, lessons can also be drawn from countries such as USA and regional arrangements such as South African Power Pool (SAPP).

Some of the key ingredients that were identified for smooth implementation of transmission open access, and corresponding practices adopted by the countries are listed in Table 2:

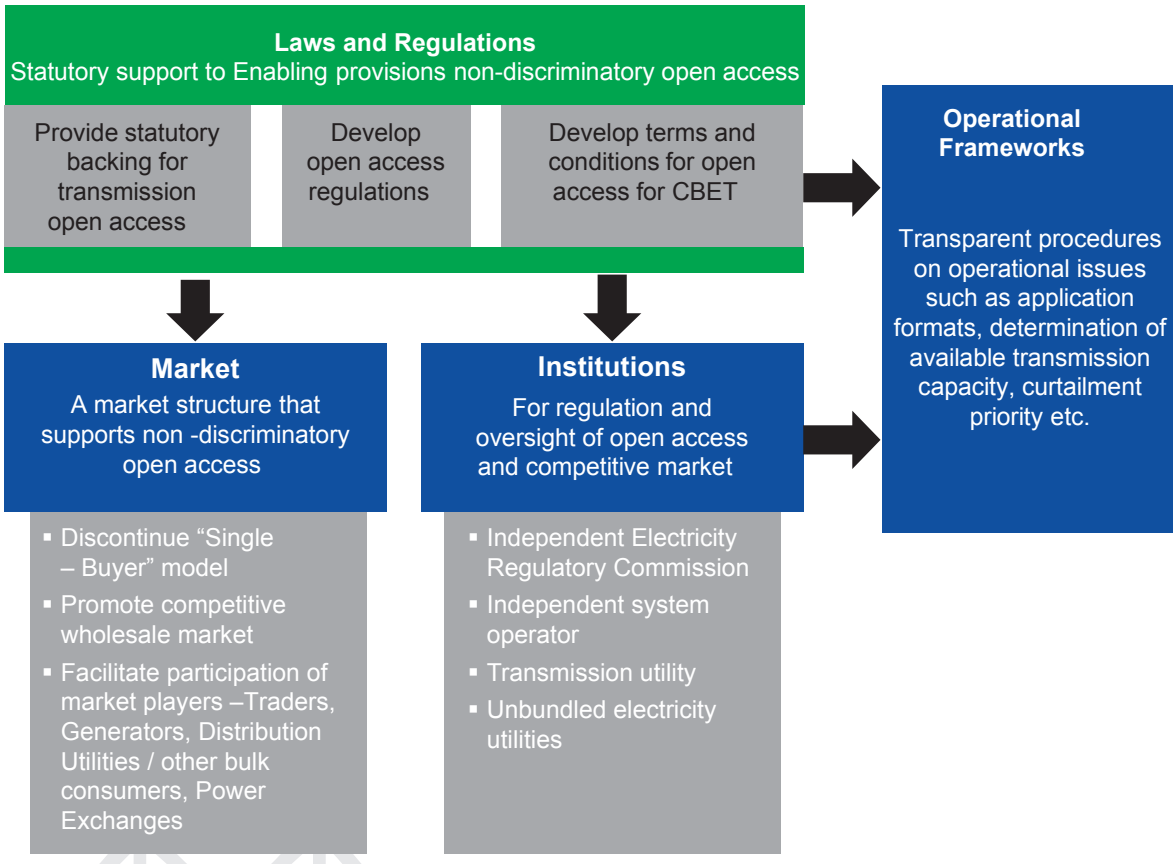
Table 2: International experience in institutionalization of open access regime

Key ingredients of open access regime	Lessons from other countries and power pools
Power market structure	• USA realized the issues associated with lack of an institution to control the rates of transaction between states in 1927 and came up with Federal Power Commission which was renamed to Federal Regulatory Commission (FERC) in 1977. Subsequently, FERC played a key role in defining the market structure for electricity in US, and undertook the regulation of Regional Transmission Operators. • In India, Electricity Act 2003 laid out a new power market structure, with unbundled utilities, independent system operators and independent regulatory commissions.
	• Brazil's power market gradually opened up for open access. It initially allowed only big players to participate in open access and later on reduced the requirement of system size to allow even small players to participate. In 1996, ANEEL was formed as the independent system regulatory, and in 1998, ONA was formed as a non-profit system operator.
Legal and policy provisions	• In 1973, USA Supreme Court ruled that one of the utilities' denial of transmission open access as an anti-competitive practice. • In USA, the Energy Policy Act of 1992 amended the Federal Power Act (FPA) to allow generators and other market participants, selling or buying electricity for resale, to apply to FERC for an order to access utility transmission assets if they have been denied access to transmission utility.
	• In India, National Electricity Policy 2005 stipulated that open access in transmission has been introduced to promote competition. • In India, the Electricity Act 2003 mandated that the transmission utilities need to provide non-discriminatory open access to their transmission system for any generation company or consumer on payment of transmission charges. • In Brazil, Law no. 9074 which was enacted in 1995 gives right to consumer having certain load to become "Free Consumer" or open access consumer.
Regulatory Framework	• In India, CERC framed open access Regulations, along with supporting regulatory framework for transmission pricing, power exchanges etc. • In USA, FERC Order 888 required established the requirements and conditions for Independent System Operators (ISO).
Operational Framework	• USA has ISO/ RTO wise open access operational procedure. In places where there is no ISO / RTO the utilities serving can have their own process within the regulations prescribed by the FERC • India has detailed procedures for non-discriminatory open access at central and state level under long term, medium term and short term open access. • South African Power Pool at regional level has detailed operationally process for energy accounting, planning and energy exchange with their procedures

1.4 Model Framework

Based on the study of non-discriminatory transmission open access regimes in India, other countries and regional power pools, a model framework with four basic elements have been identified to form the basis for deriving guidelines for open access regime in South Asia.

Figure 3: Model framework for open access regime in South Asia



Once such a framework is put in place, it may be expected that the interaction between the basic elements of the framework will result in further development, evolution and improvement of the open access regime. As open access is more of an evolutionary process rather than a discrete event, the market can be expected to evolve further through the interaction between these four elements and the market players.

1.5 Model Guidelines

Considering the guiding principles and the model framework, guidelines for non-discriminatory open access regime have been proposed, the summary of which has been provided Table 3.

Table 3: Summary of guidelines for open access regime in South Asia

No.	Guideline	Components
1	Introduce enabling provisions for open access	• Introduction of open access in the legislative framework for electricity • Treatment of open access for cross border trade • Introducing changes in the power market structure to aid and enable open access • Enable system operators to co-ordinate cross border power flows
2	Define features and eligibility criteria for connectivity and open access	• Types of open access • Tenure and priority of various types of open access • Eligibility criteria for connectivity and open access
3	Fixation of open access charges	• Segregation and fixation of transmission and system operation charges • Application fees • Relinquishment charges for open access

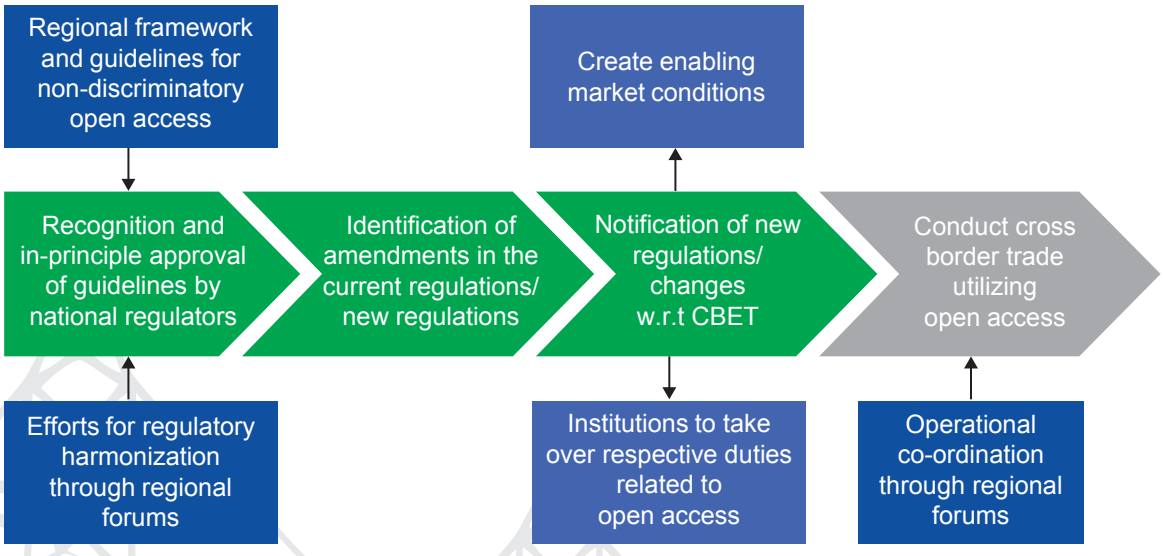
No.	Guideline	Components
4	Terms and conditions, and information system for open access	• Terms and conditions for open access • Open access register and other information systems
5	Procedure for grant of connectivity and open access	• Procedure for connectivity • Procedure for STOA, MTOA and LTOA • Nodal agencies, processing time lines, required documents etc.
6	Establishing the operational and commercial mechanisms	• Approval of detailed procedures for open access • Committee to prepare monthly energy accounts • Standard agreements
7	Encouraging regional mechanisms for co-ordination in CBET	• Ensuring co-operation and support in the operationalization of regional forums for collaboration in CBET

1.6 Roadmap

The following roadmap is proposed for implementation of the model guidelines for non-discriminatory open access in transmission in South Asia. This primarily consists of the following efforts at national level, backed by regional efforts for regulatory harmonization for open access:

- National governments and regulators to confer in principle approval to the guidelines, while maintaining the right to deviate, if necessary.
- National regulators shall identify changes required in the national regulations for enabling the CBET open access guidelines
- National governments and regulators to notify amendments and new legislations, regulations and procedures for implementation of the CBET open access guidelines

Figure 4: Roadmap and action plan for non-discriminatory open access regime in South Asia



The roadmap can be viewed to constitute three major phases:

1. **In principle approval for the guidelines**
   The federal / central governments and regulatory commissions in South Asian countries may confer in-principle approval for the guidelines, after discussions in regional forums / regional meetings. This will pave the way for setting up legal and regulatory framework for open access in the respective countries.

2. Putting in place legal and regulatory framework

The countries may set up the legal, regulatory and institutional frameworks required for open access, including:

1. Make provision in laws, defining open access, and requiring the transmission utilities to provide non-discriminatory open access to the transmission network
2. Define the institutions for handling regulatory and operational aspects of open access
3. Notify regulations for open access, including specification of additional requirements for obtaining open access for cross border trade
4. Notify regulations and orders to create enabling market conditions, such as unbundling of utilities to carve out a separate transmission utility and granting autonomy to the system operator.

These require an initial identification of amendments and new laws / regulations that are required, and subsequent drafting and notification of the same. As amendment of laws could take time, subject to legal feasibility, option of commencement of open access through regulatory changes may also be explored.

However, in case the countries are reluctant to introduce reforms in domestic market including unbundling of integrated utilities, but is keen to explore cross border trade opportunities, they may choose to limit their reforms to having an independent system operator, and allowing transmission open access for cross border transactions.

3. Conduct Cross Border Trade

Once the legal, regulatory and institutional mechanisms are in place, and the market has been restructured, open access can be commenced, in both domestic and cross border contexts.

Once open access is operationalized, the framework can be further refined and improved, based on the operational feedback and discussions at regional and national levels. Some of the areas wherein regional coordination may prove to be beneficial include:

1. Allowing entities set up in other countries to apply and obtain open access to the transmission network in another country
2. Planning for long term market reforms such as wheeling of power through more than two countries
3. Sharing of information to assist in timely compilation of energy accounts

However, it may be noted that the roadmap is not perfectly sequential with respect to the South Asia region, as countries that have already completed some of the stages above, can start with the implementation of subsequent stages. Also, even without a wider regional coordination, cross border trading can continue to be conducted through Government to Government agreements and treaties.

Background

2.1 Introduction to the Study

In 2000, USAID initiated the SARI/EI program aimed towards promoting energy security through energy cooperation and integration, in the South Asian (SA) region. In its current fourth phase, the SARI/EI program, implemented by Integrated Research & Action for Development (IRADe) is focused on advancing Cross-Border Electricity Trade (CBET) through a consultative process that involves three distinct Task Forces (TF) of member SA countries engaged in the following:

i. TF1: Coordination of policies, legal and regulatory frameworks.

ii. TF2: Advancement of transmission system interconnections.

iii. TF3: South Asia regional electricity markets.

This study **'Developing the Model Framework Guidelines for Non-Discriminatory Open Access Regime in Transmission and Grant of Open Access in South Asian Countries'** is part of TF1: Coordination of policies, legal and regulatory frameworks.

The objective of the guidelines is to ensure a consistent, common course of action in the decision-making and conduct of CBET transactions in SA countries. This study focuses on Open Access (OA) in the transmission sector only and though the Indian example also highlights the distribution of OA that is not the objective of this study, considering the preparedness of the other SA countries.

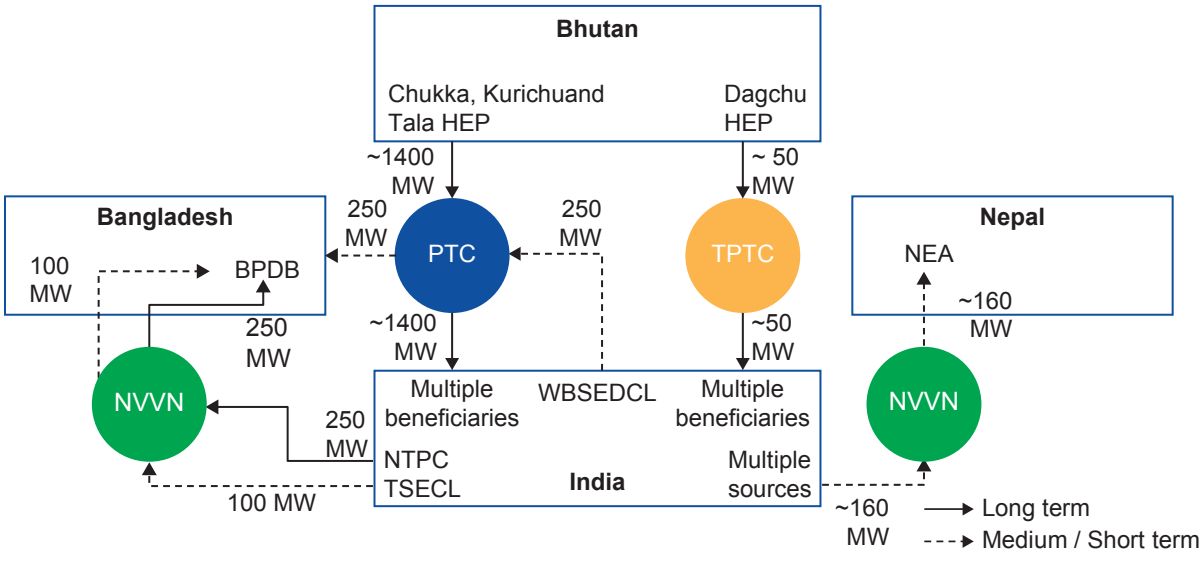
2.2 Objective of the Study

The objective of the study is to develop the model framework and guidelines for the non-discriminatory OA regime in transmission and grant of OA in South Asian countries, to initiate power trading and facilitate CBET in the region.

2.3 Context of the Study: CBET in South Asia

CBET in South Asia has evolved through bilateral arrangements, with India being the central figure by virtue of its geographical location and by being the largest economy in the region. The bulk of the CBET in the SA region happens in the Bangladesh, Bhutan, India, Nepal (BBIN) sub-group. The bilateral arrangements between India-Bhutan, India-Bangladesh and India-Nepal are well established now and are being further strengthened.

Figure 5: Snapshot of Key Cross-Border Electricity Trade in South Asia



Bhutan exports power to India, through Indian power trading entities, from large hydro stations. The present power transfer capacity between Bhutan and India is around 2,500 Mega Watt(MW), made available through the following interconnections between India and Bhutan.

- Chukha: Birpara 220 kilovolt (kV) three circuits.
- Kuruchu: Geylegphug (Bhutan)–Salakati (NER) 132 kV single circuit (S/c).
- Tala: Siliguri 400 kV 2xdouble circuit (D/c) line.

Nepal has been importing power from India since 1971. The power from India has played a crucial role in the dry months of December to April, when the hydropower generation in the country falls very low. Imports from India accounted for nearly 34 percent of the annual electricity supply of the country in FY 2015–16. Most of the power supply is through the state of Bihar. There are 21 interconnections for power exchange through 11 kV, 33 kV and 132 kV transmission lines.

The electricity grids of Bangladesh and India are connected through the Bheramara-Baharampur 400 kV back-to-back High Voltage Direct Current (HVDC) link with a capacity of 500 (MW). In addition, a 100 MW link (Eastern Interconnection) from Tripura's state grid at Suryamaninagar to South Comilla of Bangladesh, through a 400 kV transmission line (to be operated initially at 132 kV) in radial mode, has been commissioned in 2016. Currently, the power import by Bangladesh is to the tune of 350 MW.

There is also a very insignificant level of power trade (~3 MW) from India to Myanmar, mainly to provide supply to Tamu town in Myanmar, which is not connected to the rest of the Myanmar grid.

In the future, more generation capacity is expected to come up in the SA region, which will mainly cater to cross border sales. The overall cross border trade is also expected to increase. However, very few of the countries have non-discriminatory OA regimes for transmission network. This will necessitate either adhoc arrangements or the building of dedicated transmission lines up to the border, which may be uneconomical. Therefore, developing a non-discriminatory regime for transmission OA is a necessary condition for the development of cross-border electricity trade in SA. Such a regime also has potential for the development of generation capacity in the private sector within the countries, which might play a role in reducing the energy deficit of some of the SA countries.

2.4 Scope of Study

The study covers the following scope of work[5]:

1. Review and analysis of the prevailing framework, regulations, and procedures relating to OA to transmission systems in SA countries. This is from the perspective of developing model framework guidelines for a non-discriminatory OA regime in Transmission in SA countries (other than India) both for domestic as well as CBET.
2. Review and analysis of the prevailing institutional structure/arrangements for granting OA in SA countries.
3. Review and analysis of the international best practices (with particular focus on the Indian experience) on OA in transmission, in the context of the domestic power sector as well as from the perspective of CBET, particularly focusing on:
    a. Key drivers, enabling factors, and barriers to OA in transmission.
    b. Challenges associated with designing and implementation of OA in transmission and key learnings.
    c. Key ingredients/prerequisite for open access in transmission, particularly for CBET.
    d. Type of OA consumer licenses (long, medium, and short term), eligibility, tenure, priority order, application process, nodal agency, conditions for grant of access, connectivity, relinquishment of access rights, information system and applicable charges and so on, related to grant of OA.

2. Development of proposed model framework guidelines for a non-discriminatory OA regime in transmission and grant of OA, road map and action plan for the design and implementation of OA guidelines for SA countries to advance CBET. This would include but not be limited to:
    a. Terms and conditions, connectivity, eligibility, tenure, priority order, relinquishment of access rights, information system, applicable charges and nodal agencies.
    b. Procedure for grant of open access and other key aspects of the grant of OA and so on, both for domestic and CBET.
    c. The above suggested model framework guidelines should also include various standard formats such as i) Application Form ii) Grant of Connectivity Agreements iii) Grant of Long-Medium-Term Open Access Agreements and other required formats.

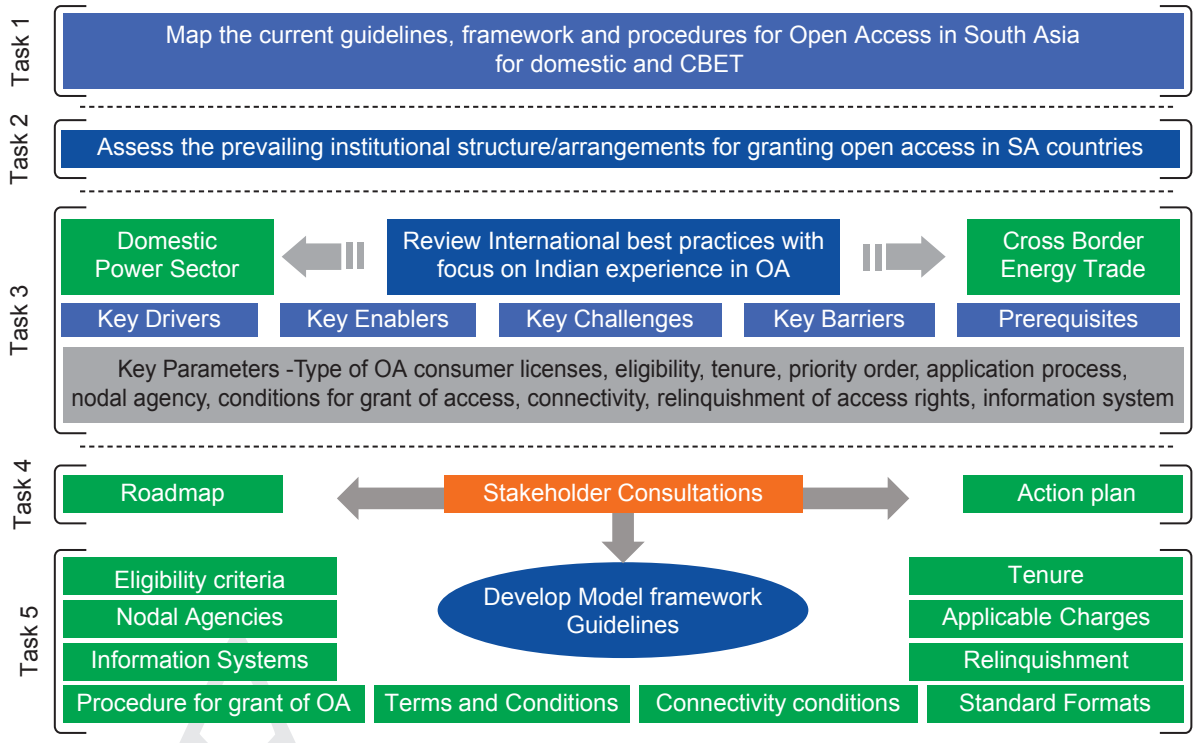
2.5 Overall Approach and Methodology

The adoption of the non-discriminatory OA framework would create options for the utilities and bulk customers to buy power from different sources within the domestic market and would also facilitate competition in the cross border energy trade. The various countries in SA are at different stages of evolution as far as the power sector is concerned. For a project that is complex in nature and is to be formulated for a vast geographic span of the SA countries, it is important to have an approach that is open to extensive stakeholder discussions, adaptive to local conditions and comprehensive to achieve sustainable solutions.

The figure 6 provides an overview of our understanding of this assignment and the approach we would follow to undertake this activity:

[5]https://sari-energy.org/wp-content/uploads/2016/07/SARI_RFP-Open-Access28.07.pdf

Figure 6: Overall Approach to the Study



The various tasks and detail approach has been outlined below:

Task 1: Map the Current Open Access Framework in South Asia

Open Access is a model that brings choices to the customer and introduces competition in the market, thus leading to greater efficiencies. There have been arguments for those in favor and against for the adoption of OA in transmission. Thus, it become imperative to understand and review the functioning and structure of regulatory aspects of generation, transmission and distribution in each of the SA countries. A literature review of the following has been done to assess the status of OA in SA countries – Afghanistan, Bhutan, Bangladesh, Nepal, Pakistan, Sri Lanka, and the Maldives:

- National rules, regulations, policies, and acts pertaining to electricity transmission such as the Electricity Act, Tariff Policy and so on.
- Relevant rules and regulations of OA mechanism, if it exists.
- Relevant policy, thought papers or draft documents that can lead to OA in transmission.
- Stand of regulatory bodies on the acceptability or inhibition in adopting OA.
- Cross subsidy mechanism and charges, surcharge and charges on interconnections and so on.

The status of an OA framework is identified in SA countries and their preparedness was assessed to move towards a regional cross border OA framework.

Task 2: Assess the Prevailing Institutional Arrangements

Market designs and power-traded products continuously evolve across the globe. The institutional arrangements supporting electricity trade are evolving as well. The central roles in establishing a level playing field for market participants to access the power grid usually belong to the regulator, the transmission system operator (TSO), the wholesale market operator, and the sector planning

agency. It requires all of them to work in collaboration to ensure that access to the national grid is non-discriminatory.

The countries in South Asia are at different levels of evolution as far as OA market structure is concerned. The stage of the power sector reforms determines the prevailing institutional structure and arrangements that guide the OA framework. Countries such as Nepal and Afghanistan have not undertaken any power sector restructuring or market reforms and hence do not have any policy or regulatory mechanism for OA in transmission or distribution segment. Countries such as Bangladesh and Sri Lanka have gone through one stage of reforms and hence have a bifurcation of transmission and distribution segments. However, the OA institutional arrangements have not been developed. India, on the other hand, has a very well defined and operational institutional arrangement functioning at various levels. The transmission sector policies have been developed by the Ministry of Power/ state governments as mandated under the Electricity Act 2003. These become the governing blocks for the sector and, based on these policies, various rules and regulations are issued by the respective authorities.

The institutional framework in all the countries is reviewed and their interdependencies analyzed in light of their preparedness to undertake the various tasks required for the OA regime. A comparative analysis across countries is presented in the Gap Analysis section.

Task 3: International Best Practices in Open Access

Review of International Best Practices

A detailed review of international best practices on policy and regulatory provisions relating to OA framework in domestic and CBET projects is presented here. The OA frameworks in the USA, India, Southern African Power Pool (SAPP), European Network of Transmission System Operators for Electricity (ENTSO-E), and South America have been covered. India is reviewed both from the domestic and CBET perspective. Brazil and the USA have been considered for domestic OA. ENTSO-E, SAPP and South America are reviewed and analyzed for OA in CBET. The objective was to identify the key policy and regulatory provisions such as, Type of OA consumer licenses, eligibility, tenure, priority order, application process, nodal agency, and conditions for grant of access, connectivity, relinquishment of access rights, and information system. These were analyzed to assess the significance for implementation in the SA region.

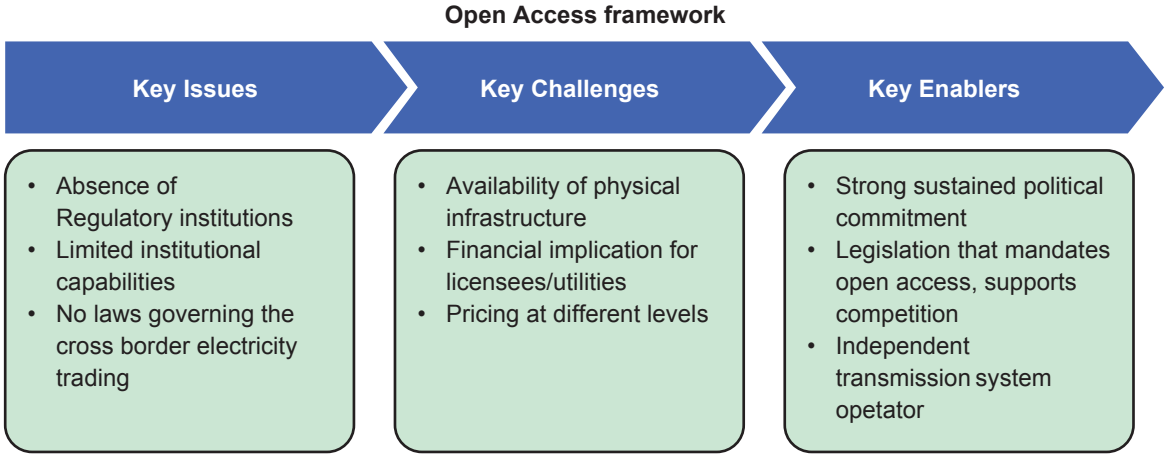
Open Access frameworks have been analyzed in America, Africa and in the European context. The USA has been a pioneer in introducing OA with the North American Electric Reliability Corporation (NERC) and the Federal Energy Regulatory Commission (FERC). Similarly in the European Union, cross-border transmission interconnections have been an essential instrument of integration of the national electricity markets using market coupling. The experience of coupled markets, bids, and offers across linked power exchanges are matched by taking into account available cross-border transmission capacity; thus showing that demand is met by the cheapest supply, regardless of where the energy is produced. The integration of Germany's TSO with the European Network led to downward price pressure on its neighbors with a decline in German wholesale power prices. SAPP, on the other hand, provides OA to member participants and is the best suited example that can be followed by SA countries.

India Context: Regional Benchmarking

In India, the OA framework has evolved since 2003 and has facilitated in bringing in competition in the sector. The Indian system, both at the central and state level, has well-established regulations and operational procedures for implementing various aspects of non-discriminatory OA.

Based on the international and regional benchmarking, the following key issues have been identified; challenges and enablers have led to the development of OA frameworks across the globe.

Figure 7: Enablers of Open Access



Task 4: Stakeholder Consultations

Inputs from the various stakeholders are critical for developing model guidelines for non-discriminatory OA to customers. Various inputs and suggestions from stakeholders involved as customers, generators, system operators, traders,and so on,were taken in order to access the viewpoints and dependencies that need to be taken care of in order to develop guidelines to encourage fair functioning of power market operation and minimize system-wide risks.

Task 5: Develop Open Access Model Framework Guidelines

Based on the international experience and Indian context, the development of policy and regulations for the OA framework, an OA model framework is prepared with key recommendations.

The following key ingredients have been proposed for a non-discriminatory OA framework in the region:

- **Eligibility Criteria:** The various categories of consumers and users such as generators (thermal, hydro, and gas), distribution licenses, captive generators, consumers, traders, and power exchange.
- **OA Terms and Conditions:** Allotment priority, such as between existing and new OA consumers, and various categories of consumers.
- **Applicable Charges:** The applicability of various costs such as transmission, wheeling, load dispatch fees, and transmission losses.
- **Procedure for Grant and Revocation of Open Access:** Grant of various OA (short, medium, and long term) including timelines.
- **Standard Formats:** Application form for Long-term Access (LTA), Medium-term Open Access (MTOA), Short-term Open Access (STOA), Connectivity Agreement, and so on.
- **Institutional Arrangements:** The nodal agencies in different countries for the open access framework.

Open Access in Electricity: An Overview

3.1 Definition

Non-discriminatory OA refers to the possibility of any entity, be it a buyer or seller of electricity, to connect to and make use of the transmission and/or distribution system on the payment of cost-reflective service charges. This is subject to system availability and constraints, regardless of the ownership of the power system.

In an OA condition, the transmission owner has to ensure that he provides the consumer/generators access to the network and non-discriminatory treatment to all parties, even if one of the consumers has his own generation or consumer business.

Open Access can be defined in several ways. For instance, the Indian Electricity Act 2003 [Section 2(47)] defines OA as:

'Non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulation specified by the Appropriate Commission'.

3.2 Salient Features of Open Access

The salient features of an OA framework in electricity include:

- Open Access to the power grid, which is an essential element of introducing competition to the electricity markets and increasing their efficiency.
- Increased competition leads to more efficient sector operation, improved quality of power supply, and downward pressure on tariffs.
- The flexibility permitted by OA allows for multiple and diverse power supply contracts that take advantage of the load and time diversity and contribute to better utilization of resources.

The following are the key benefits of introducing OA:

- Increase in reliability of power supply for bulk consumers such as industries.
- Provides alternate options for sourcing cheaper power by the consumers.
- Builds more generation capacity,thus furthering power generation competition.

3.3 Key Enabling Features

The introduction of OA requires the existence of enabling factors such as:

- **Legislation that mandates** OA and allows separate contracting for energy and network services.
  - Legal provisions to allow generators and wholesale buyers the right to non-discriminatory access to the grid.
  - Additional legislation and oversight may be needed to prevent grid companies from abusing their natural monopoly.

- A market structure that:
  - Supports **ownership separation** (legal unbundling) or, at a minimum, functional unbundling of transmission and distribution facilities from generation.
  - Allows introduction of competition in supply through multiple generation companies.
  - Includes a competitive wholesale market component.
  - Develops a power market structure that allows power traders and power exchanges to be participants.
  - A strong and autonomous **regulatory authority**, which is empowered to promote and protect competition.
  - An independent and efficient **transmission system operator** that is neutral to all sellers and buyers.
  - Transmission and distribution **pricing that is cost reflective**, efficient, transparent, and separate from the cost of energy being transported.
  - A transmission system planning process that is transparent and open and allows access to information by the constituents.
  - Strong sustained political commitment to liberalization and competition in the electricity sector.

Other key concepts of non-discriminatory OA regime:

- **Transmission Open Access:** OA to transmission lines.
- **Distribution Open Access:** OA to distribution lines.
- **Non-discriminatory open access:** Equal rights for applicants to obtain OA, irrespective of ownership. (*However, priorities for scheduling and curtailment may be made in terms of open access duration, time of application, and so on.*)
- **Wheeling:** The process of using electricity network/grid as a medium for conveying electricity, as part of the OA transaction.

Open Access Framework in South Asia

Open Access is an evolutionary process and it is in constant need of improvement and support to keep it relevant as the market matures. Improving the market competition and providing transparent access to the system to all the constituents, are the key drivers of OA. It provides the power consumer and generator various options of buying and selling to multiple entities, thus increasing competition. There are various provisions required for the introduction of OA in both, domestic and CBET, across countries in South Asia. In order to evolve an OA framework for the electricity market, it is necessary to have a robust institutional structure and framework, as well as guidelines.

4.1 Evaluation Framework for Open Access

To assess the preparedness and progress of an OA regime in the South Asian Countries (SAC), the following evaluation framework has been used:

Figure 8: Evaluation Parameters for Open Access Framework

Institutional Framework	Power market structure allowing for • Competitive suppliers • Independence of Transmission Operation • System Operator - Neutral and unbiased • Competitive and Transparent Trading - Trading as a distinct activity
Legal and Policy Framework	National and State Laws allowing • Non-discriminatory open access in transmission and distribution • Delicensing of genetation, promoting Captive Generation • Promoting open and non-discriminatory access to transmission and distribution system
Redulatory Framework	Independent regulator with powers to develop • Technical standards - Grid Code, connectivity standards etc. • Commercial guidelines - Transmission Tariff, Available capacity etc. • Procedures for obtaining open access • Removing operational hurdles
Operational Framework	Guidelines, process and procedure to implement open access by defining the following: • Mapping of open access process • Procedure for applying and awarding the open access • Guideline for managing open access, relinquishment process

Institutional Framework

To establish a non-discriminatory OA regime in SACs, there needs to be a strong institutional framework both at the country level and at the regional level. The power market structures in the SACs have to eventually move towards a competitive one, which allows multiple suppliers to supply through the transmission network owned by an independent transmission operator and operated by an independent system operator. In case the transmission operator is not independent, it might not do justice to the non-discriminatory part of OA. Similarly, functional independence of the system operator is imperative to perform the load dispatch function and system operations in a neutral fashion. Trading as a distinct activity would further the market competition by allowing power surplus and deficit entities to trade power in the short term.

Legal and Policy Framework

The enabling of transmission and distribution of OA in the policy and legal system of a country, at the national and state level (if applicable), is important. The framework needs to be enabled through appropriate legislative provisions and backed by relevant policies, which needs to be constantly reviewed and improvised with the changing requirements.

Operational Framework

The operational framework for the implementation of OA requires specific guidelines, processes, and procedures. The countries that have an elaborate OA mechanism would have well-established processes for the various types of OA such as long term, short term, and so on. Similarly, the process of obtaining OA from application stage to award is well mapped.

The following sections provide an assessment of the power sector status at the regional level and in SACs, based on the above given evaluation framework.

4.2 South Asia: Regional Assessment

Signed in 2014, the South Asian Association for Regional Cooperation (SAARC) Framework Agreement for Energy Cooperation (Electricity) laid the foundation for cooperation among South Asian countries. Article 12 of the agreement provides for Transmission Access, *'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'.*

The SAARC Framework Agreement for Energy Cooperation (SFAEC) was signed by the Foreign Ministers of the eight member states at the eighteenth SAARC Summit in Kathmandu in 2014. This agreement emphasizes the need for greater cooperation among the member nations to realize the common benefit of CBET for the economic development of member countries in a sustainable manner by optimal utilization of regional electricity resources. This agreement set the outlines for the coordinated approach for development and promotion of the CBET projects in SAC.

The key articles of this agreement are as follows:

Article 6: Promoting Competition	Member states will encourage the process of opening up of the electricity sector, guided by the respective national priorities with the aim of promoting competition.
Article 7: Planning of Cross-Border Interconnections	Member states may enable the transmission planning agencies of the governments to plan the cross-border grid interconnections through bilateral/trilateral/mutual agreements between the concerned states based on the needs of the trade in the foreseeable future, through studies and sharing technical information.

Article 8: Build, Operate, and Maintain	Member states may enable the respective transmission agencies to build, own, operate, and maintain the associated transmission system of cross-border interconnection falling within the respective national boundaries and/or interconnected at mutually agreed locations.
Article 9: Transmission Service Agreements	Member states may facilitate authorized Buying and Selling Entities to enter into transmission service agreements with the transmission service providers for the purpose of cross-border electricity trade.
Article 11: System Operation and Settlement Mechanism	Member states will enable the national grid operators to jointly develop coordinated procedures for the secure and reliable operation of interconnected grids and to prepare scheduling, dispatch, energy accounting, and settlement procedures for cross-border trade.
Article 12: Transmission Access	Member states will, 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 13: Facilitating Buying and Selling Entities	Member states will enable Buying and Selling Entities to engage in cross-border electricity trading, subject to the laws and regulations of the concerned member states.

It is evident from the above provisions of the agreement that SAARC member nations have to develop the OA framework for their respective systems in order to coordinate its evolution for the cross-border electricity trade market in the region.

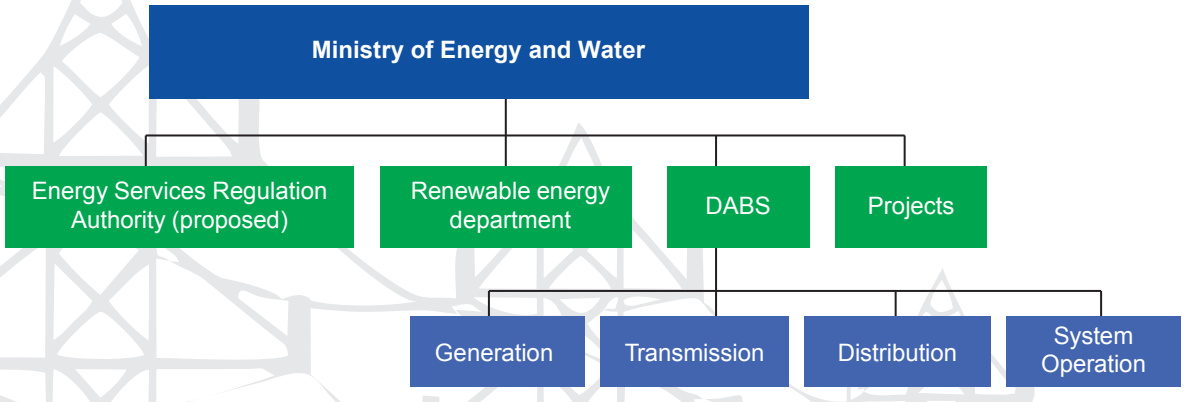
4.3 South Asia: Country-wise Assessment

4.3.1 Afghanistan

4.3.1.1 Institutional Framework

The Ministry of Energy and Water (MEW) is the governing body for the electricity sector in the country. At present, the policy and regulatory framework governing the electricity sector in Afghanistan is in a nascent stage of development. The generation, transmission, and distribution of electricity are carried out by the vertically integrated utility Da Afghanistan Breshna Sherkat (DABS). The Afghanistan Electricity Regulatory Authority (AERA) is the proposed system regulator, which will carry out functions enabling and ensuring OA in the domestic and CBET power markets. Figure 5 illustrates the arrangement of the power sector in Afghanistan.

Figure 9: Afghanistan Power Sector Institutional Framework



The electricity market was previously dominated by the vertically-integrated state utility, Da Afghanistan Breshna Moassesa (DABM). Since 2003, the electricity sector has undergone

considerable technical, commercial, and institutional reform. These reforms are designed to support market-oriented operations that are cost-recoverable, to protect consumers and to develop sustainable power. DABS was created in 2008, as part of a strategy to commercialize the power sector and build a new electricity market structure.

DABS is an independent and autonomous limited liability company and is owned by the Government of Afghanistan. It was incorporated in May 2008 and is responsible for operating and managing electric power generation, import, transmission, and distribution throughout Afghanistan on a commercial basis. Power imported from Tajikistan and Uzbekistan is also managed by DABS.

Afghanistan has CBET with nearby countries such as Iran, Tajikistan, Turkmenistan, and Uzbekistan under bilateral arrangements. It also plans to trade power with Kyrgyzstan and Pakistan under the CASA-1000 project. The master agreement on the transmission system in the CASA-1000 project provides for OA and imbalance settlement, which are critical ingredients required for non-discriminatory OA in CBET projects. Going forward, Afghanistan needs to introduce OA in CBET projects with SAC countries as well, which is presently non-existent in the country.

A draft law on electricity services was issued in 2009, which included setting up of the regulator Afghanistan Electricity Regulatory Authority (AERA). The President of Afghanistan has approved the regulation law of electrical energy services but its English version was yet to be approved by the Ministry of Justice, Afghanistan,according to the information received at the SARI/EI project secretariat on 14 February 2016.

The draft law required the proposed AERA to determine tariff methodologies, grid code, distribution code, metering code, licensing for domestic power trade, and the export/import of electricity. The draft law also endorses non-discriminatory OA by stating that the licensee operating the transmission system must grant access to connection seekers on equal and fair terms and also at the fair tariff. These provisions need to be further elaborated for the smooth functioning of OA in the domestic market and in CBET once AERA comes into existence.

4.3.1.2 Legal and Policy Framework

In Afghanistan, the electricity legal, policy and regulatory framework is in the early stages of development. A draft law on electricity services was issued in 2009 and is under finalization.

The draft Electricity Law in Afghanistan recognises international power trade and specifies the responsibilities of the MEW for coordinating the same. Under articles 10 and 11 of the law, five kinds of licenses for energy services are proposed:

- Electricity generation license for a maximum of 25 years.
- Electricity transmission license for a maximum of 25 years.
- Electricity distribution license for a maximum of 20 years.
- Electrical energy import license for a maximum of 15 years.
- Electrical energy export license for a maximum of 21 years.

Under Chapter 6 of the Electricity Law, a license holder is obliged to provide interconnection of the electricity network with regard to the provision of this law. A permit holder who has a dominating force in the market will effectively and non-discriminately ensure interconnection in possible technical areas, among other permit holders. The Electricity Law provides the provisions for the non-discriminatory interconnection to the electricity network.

The power sector in Afghanistan is still to evolve, both in terms of physical infrastructure and institutional set up, for implementation of the OA framework. The cross-border energy trade has been enabled in parts, based on the connectivity available with the neighboring countries.

4.3.1.3 Regulatory Framework

The draft law includes the setting up of AERA and defines its power and duties. It also covers aspects on licensing, technical standards, network interconnection, access and so on. The draft law requires AERA to regulate cross-border exchanges of electricity, subject to provisions of the law and to conditions of international agreements. Also, the licensee operating the transmission system must make available to any person who seeks use of such a system, on equal terms to any other person, at fair tariffs and terms of access.

The proposal to set up an independent regulator, AERA is under consideration. There are no specific regulations or guidelines that would provide for OA on the transmission and distribution networks under the current framework. The enabling provisions for the OA mechanism, such as a metering code, energy accounting and settlement regulations, transmission pricing for OA customers, a procedure for application of OA, technical specifications for connectivity,such as grid code, and so on, have not been specified.

4.3.1.4 Operational Framework

While the domestic power sector in Afghanistan is vertically integrated and lacks an OA framework, the CASA 1000 Master Agreement on transmission system,under which power is to be traded with Central Asia and Pakistan, provides for procedures for the provision of access to and use of the transmission system by member countries during the term of the agreement. There is a provision of OA during a non-supply period where all transmission capacity available during a non-supply period can be allocated in accordance with the OA rules. Parties can also evaluate market demands for OA and appropriate prices for OA use.

4.3.2 Bangladesh

4.3.2.1 Institutional Framework

The Ministry of Power, Energy and Mineral Resources (MPEMR), Government of the People's Republic of Bangladesh, is responsible for the overall planning, development, and management of different types of commercial energy resources and the overall power supply value chain.

The Power Division under MPEMR is responsible for formulating power sector policies and supervising, controlling, and monitoring the developmental activities in the power sector of the country. The power cell provides assistance to the power division in implementing the reform measures being taken by the Government, along with performance monitoring of the utilities.

The Bangladesh Power Development Board (BPDB) is responsible for the major portion of generation and distribution of electricity, mainly in the urban areas, except for Dhaka and the West Zone of the country. The Board is under the Power Division of MPEMR. The power generation utilities – Ashuganj Power Station Company Ltd. (APSCL), North West Power Generation Company Ltd. (NWPGCL) and Electricity Generation Company of Bangladesh Ltd. (EGCB), are established as corporatized commercial entities, unbundled from BPDB.

The Independent Power Producer (IPP) cell within BPDB is primarily responsible for contracting, power procurement/bid process management, and subsequent monitoring of the IPP contracts. This

cell has three divisions, namely IPP Cells 1, 2 and 3. Cell 1 and 3 oversee contracting with IPPs and the Power Purchase Agreements (PPAs) for cross-border power purchase. IPP Cell 2 takes care of procurement from Rental Power Plants (RPPs), Quick Rental Power Plants (QRPPs), and other commercial power generating entities, such as, NWPGCL, APSCL, and EGCB.

The Planning and Development (P&D) division within BPDB is responsible for the overall power system planning and procurement for the whole country. The division is also in charge of procurement planning covering the quantum of power purchase, catering base, and peak load demands, grid support, and so on.

The generation sector is open for private sector participation and Bangladesh has several IPPs ranging from large Combined Cycle Power Plants (CCPP), Rental Power Plants (RPP), Quick Rental Power Plants (QRPP), and other coal fired IPPs (awarded or under award stage). The Bangladesh-India Friendship Power Company (Pvt.) Ltd. (BIFPCL), a Joint-Venture (JV) between NTPC Ltd., India and BPDB, and the Coal Power Generation Company Bangladesh Ltd. (CPGCBL), established as an enterprise of the Government of Bangladesh, are the two other generation utilities presently under pre-construction stage. The Rural Power Company Limited (RPCL) was the first IPP of Bangladesh and the first non-BPDB entity to be licensed to take up power generation.

Bangladesh has one transmission utility namely, the Power Grid Company of Bangladesh Ltd. (PGCB), which is responsible for transmission network, operation and maintenance, and the development of transmission network.

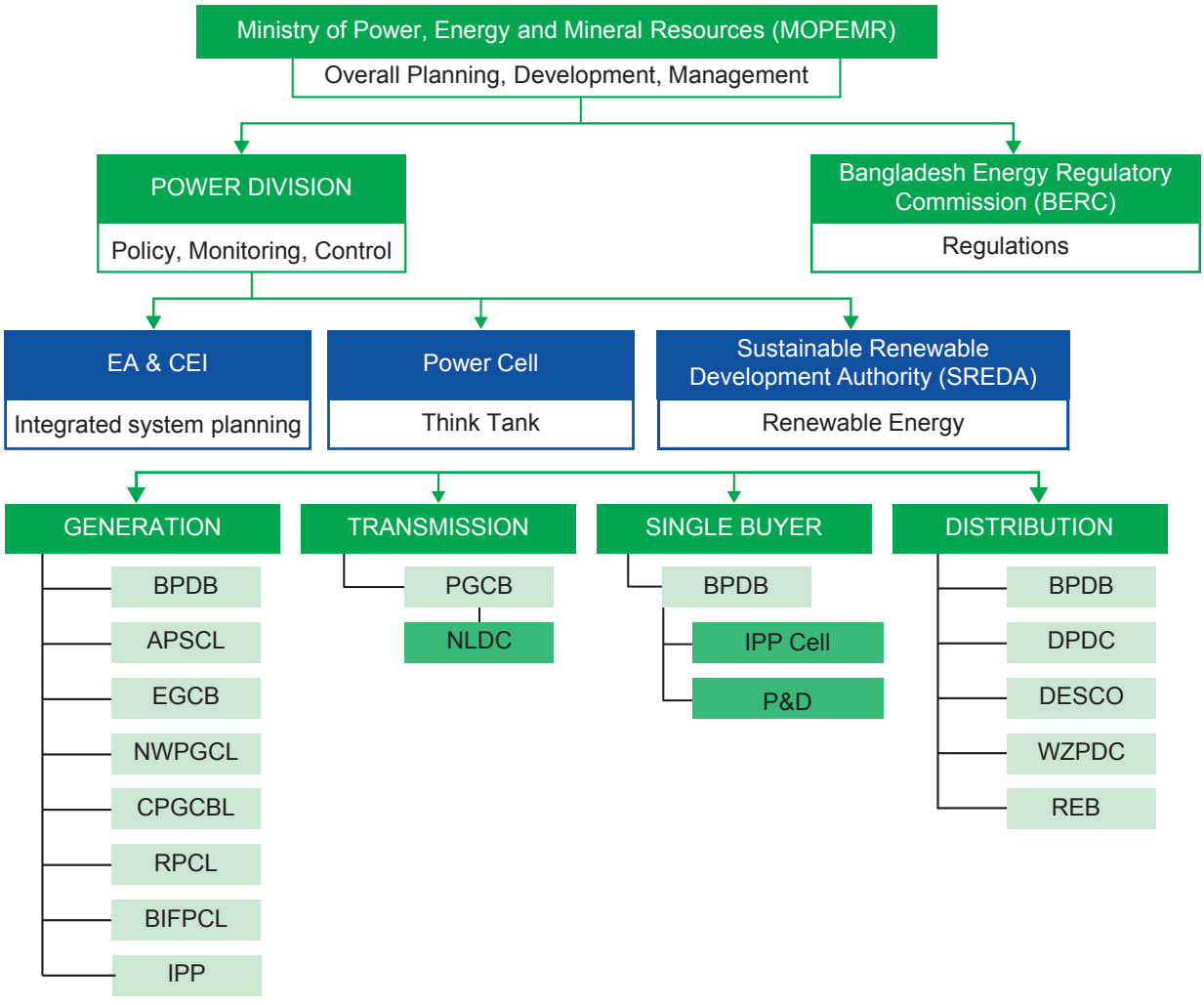
There are five distribution companies (DISCOMs), namely BPDB, Dhaka Power Distribution Company (DPDC), Dhaka Electricity Supply Company (DESCO), West Zone Power Distribution Company Ltd (WZPDCL), and Rural Electrification Board (REB), which own and operate the country's distribution network and supply electricity to the end users.

The Bangladesh Energy Regulatory Commission (BERC), formed in 2003 and effective since April 2004, is an independent commission with a mandate to regulate the energy sector (gas, electricity, and petroleum products) in Bangladesh, including the fixation of electricity tariffs, pricing of gas and petroleum products, and the drafting of regulations, codes and standards.

The Bangladesh power sector operates under a single buyer model. BPDB acts as the single buyer of all the electricity generated in Bangladesh and sells bulk electricity to all the distribution utilities. There is no separate power trading entity and the role is being performed by BPDB. PGCB is responsible for the wheeling of energy from BPDB to the distribution entities. PGCB recovers its energy wheeling charge from distribution entities at the tariff that is fixed by BERC. The system operator National Load Dispatch Centre (NLDC) dispatches electricity from generating entities, following the merit order dispatch principle and is part of PGCB. Figure 6 illustrates the administrative arrangement of the power sector in the Bangladesh.

The power sector's structure has not changed significantly after that in order to reduce market barriers. BERC and the power division of MoPEMR are the licensing and nodal authorities for the sector. The Electricity Act 1910 and subsequent amendments in 2012 have provision for OA. The Act directs transmission utility to provide non-discriminatory OA to any licensee or generator seeking connection to the transmission system. The National Energy Policy 2004 allows for CBET with neighboring countries.

Figure 10: Bangladesh Power Sector Institutional Framework



4.3.2.2 Legal and Policy Framework

Bangladesh's Electricity Act 1910 (amended in 2012) has provided for the development of the power market with the introduction of an open market for power business in Bangladesh (Part 2, Clause 6). The Electricity Commission has been given powers to take necessary steps to undertake a detailed study to examine the feasibility of the introduction of an open market for power business in Bangladesh. It is within the Commission's powers to frame regulations in consultation with the Government, utilities, and so on, to operationalize the new structure of the power market.

The Act defines the functions of the transmission utility [Part 2, Clause 7, 2(d)], which provides for non-discriminatory OA for any licensee or generating company, on payment of the transmission charges.

'BPDB and/or the single buyer may import or export electricity to any foreign state using the transmission system of the country with the previous sanction of the Government at such a rate as may be determined by the Government'.

The Act specifies that the transmission utility has to provide non-discriminatory OA to its transmission system for use by any licensee or generating company or any person under the regulations framed by BERC. Clause 1.2 of the Electricity Grid Code 2012 states that it seeks to avoid any undue

discrimination between users while covering the technical aspects relating to connections and operation and the use of the transmission system.

The Electricity Act 1910 (and subsequent amendment in 2012) states that the Government will update and issue the national electricity policy, including the tariff policy, in consultation with BERC.

To promote private sector participation in the Bangladesh power sector, the Government issued policy guidelines for the enhancement of private participation in the power sector in 2008. The guidelines aim to introduce the competition in the power sector and enhance the public-private-partnership. One of the objectives of the guideline document is that the transmission and distribution lines of the Power Grid Company of Bangladesh (PGCB) and the distribution licensees should provide access to their system on a non-discriminatory basis, for wheeling of power produced by the existing and new commercial power plants.

4.3.2.3 Regulatory Framework

The Bangladesh Energy Regulatory Commission, created under the BERC Act 2003, regulates energy pricing, issuing of licenses, and the protection of consumers' rights. The Act, under Clause 28, empowers it to issue licenses for power generation, energy transmission, distribution, and marketing of energy for the supply and storage of energy. BERC is empowered to take the necessary steps to operationalize the power market in Bangladesh in consultation with the Government (under Clause 6 of Part II of the Electricity (Amendment) Act 2012).

BERC has put in place the Grid Code and various other regulations that are required for the OA framework, though it is yet to notify regulations for non-discriminatory OA for the transmission and distribution system. Non-discriminatory distribution OA for CBET to the consumer is necessary to give eligible consumers options to procure power from CBET.

At present, the charges for the transmission licensee, PGCB, are computed, based on a cost plus basis and factoring in the total investments incurred as well as the total energy wheeled.

4.3.2.4 Operational Framework

Bangladesh has a few provisions with reference to the operational aspects of OA in the Private Sector Investment Guidelines (2007) as well as in the policy on sale of excess power from captive power plants (2006). However, there is no specific OA case that allows for the transfer of power by a private generator or consumer, across the transmission network. The regulator, BERC, has yet to come out with a detailed operational framework, assigning various tasks of setting eligibility, grant of OA, and so on, for enabling an OA market in Bangladesh.

4.3.3 Bhutan

4.3.3.1 Institutional Framework

The Department of Hydropower and Power Systems (DHPS), reports to the Ministry of Economic Affairs. DHPS is the Government body that leads and coordinates the activities of the various RGoB organizations involved in the planning and development of the country's large hydropower resources (> 25 MW). Its role includes the formulation of national policies and guidelines related to hydropower development, implementing institutional reforms for efficient planning, and management of the sector. It also helps in providing an enabling environment for the participation of public and private sectors in the development of hydropower resources and ensuring that hydropower exports generate maximum revenue for the nation.

DHPS consists of three divisions: Planning and Coordination, Hydropower Development, and Transmission and Power Systems. It also has a mandate to develop and enhance professionals in hydropower development and management. It was set up when the previous Department of Energy was unbundled in 2011, creating at the same time the Department of Renewable Energy and Department of Hydro-met Services.

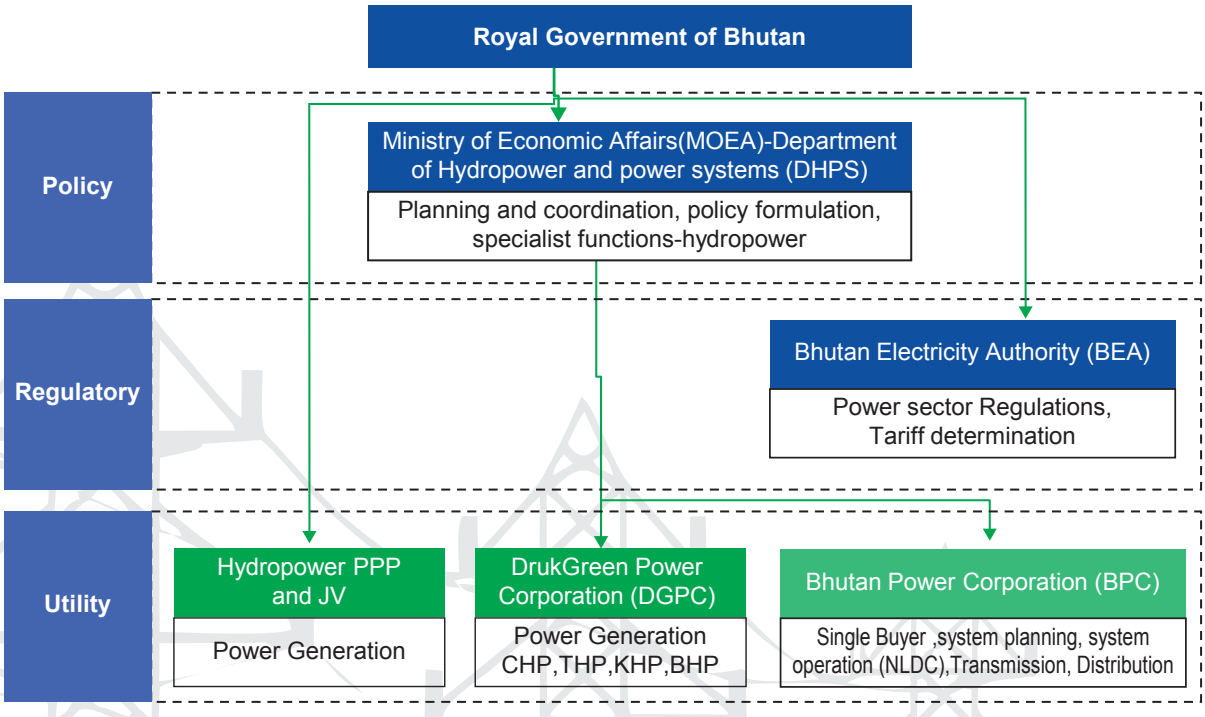
The Bhutan Electricity Authority (BEA) is the electricity regulator. This is as an autonomous agency established under the Electricity Act of Bhutan (2001) to:

- Restructure and regulate the electricity supply industry.
- Govern private sector participation in the electricity supply industry, based on the RoGB Policy.
- Empower RGoB to create companies for carrying out all or any of the purposes of the Electricity Act.

The Bhutan Power Corporation Limited (BPC) was formed as a public utility in July 2002. Its role is to distribute electricity throughout the country and to provide transmission access to generating stations for domestic supply as well as export. BPC has to ensure that a reliable and adequate electricity supply is available to all consumers within Bhutan.

The Druk Green Power Corporation (DGPC) is a wholly-owned corporate entity of the RGoB. It is an autonomous body that operates and maintains the large hydropower assets of the nation. At present these include the Chukha, Kurichhu, Basochhu, and Tala projects, with an aggregate installed capacity of 1,606 MW that includes the 126 MW Dagachhu-I hydropower plant. DGPC also has a mandate to promote and develop new hydropower stations using the public-private partnership (PPP) mode, and in this capacity it is currently the lead sponsor for the development of two projects – the 126 MW Dagachhu project (59 percent equity) and the 118 MW Nikachhu project.

Figure 11: Bhutan Power Sector Institutional Framework



4.3.3.2 Legal and Policy Framework

The Electricity Act 2001, under Article 39, provides for the designation of a system operator and licensing it to coordinate the power supply system to maintain instantaneous balance between generation and the consumption of electricity. It is also to be responsible for dispatching power generated to coordinate transmission line outages and to monitor the export and import of power. BPC, as the system coordinator, is responsible for the development and operation of the NLDC, established in 2011, to function efficiently and maintain a reliable power system in the country, including power export coordination with India.

In the policy related to the transmission facility, Clause 10.1 of the hydro development policy 2008, specifies that the project developer needs to have a power evacuation agreement with the Bhutan Power Corporation and the developer will be responsible for laying transmission lines and connecting these to the nearest grid sub-station of the Bhutan Power Corporation. Further, BPC will provide transmission facility for domestic supply and connectivity till the international border, in case of export. The developer will need to pay the transmission and wheeling charges to BPC as determined by BEA.

The policy related to the off-take of electricity is dealt with in the Bhutan Hydro Sustainable Hydro Power Development Policy 2008. As per the Clause 9.1 of this policy, the project developer can contract and export the electricity generated after complying with licensing regulations and adjusting the requirements for the royalty power/energy. Clause 9.2 of this policy states that the Royal Government of Bhutan has the first right to purchase any power/energy that it requires at the off-take rate applicable at the generating station bus bar.

4.3.3.3 Regulatory Framework

As per the Electricity Act 2001 of Bhutan, BEA is responsible for ensuring non-discriminatory OA to the transmission and distribution system as per Clause 11.2 of the Act. BEA is also responsible for developing regulations, standards, codes and procedure for performance standards, technical and safety requirements for construction, O&M for generation and transmission, and distribution facilities.

The Act mandates that the holder of the transmission license will provide access to all existing and potential users of the transmission grid on the payment of fees and other approved charges (as per Clause 38.1 of the Act).

Licensing is the mandatory requirement as per the Act, which states: ‘No person or entity will engage in construction, generation, transmission,system operation, distribution, sale, export or import of electricity without a license issued under this Act’.Under Clause 18.1 of the Act, BEA can grant a license to:

- Generate electricity.
- Transmit electricity.
- Supply in bulk.
- Distribute electricity.
- Supply electricity.
- Trade in electricity.
- Acquire a license from another party.

As per Clause 3.3.2 of the Bhutan Electricity Authority Grid Code Regulation 2008,’Authority (BEA) shall ensure non-discriminatory access to the transmission and distribution’. In Clause 3.4.2, the

regulation suggests that the system operator will not discriminate against any person. As per Clause 3.5.3,the transmission licensee will provide access to all existing and potential users of the transmission system on the payment of fees and other charges. BEA is required to develop 'terms and conditions for provision of access to the transmission system and distribution networks', as per Clause 3.3.1.

The system operator can carry out grid planning studies as per Clause 4.5.1, for which it will be provided data from the licensees and users. As per Clause 4.7.1, all licensees and users will provide all data required by the system operator to execute the coordinated planning of the operation and expansion of the system. This data will include load forecasts, technical and economical characteristics of generation units, and the transmission and distribution system. As per Clause 4.8, the transmission licensee will prepare the investment program to install new transmission lines, reactors, and capacitors in consultation with the concerned agencies, and by the approval of authority.

In Bhutan, tariff determination for power projects is governed by the Tariff Determination Regulation 2007 (updated as of 2013), which determined tariff for all power transactions except the following, according to Clause 1.5 of the regulation:

- Import of electricity from other countries.
- Export of electricity to other countries.
- Sale of electricity under PPAs, which are governed by the license terms of the licensee.

4.3.3.4 Operational Framework

Bhutan does not have any well established guidelines, processes and procedures for availing the OA by the generators or the consumers. However, export projects are allowed access to the grid on payment of wheeling charges.

4.3.4 India

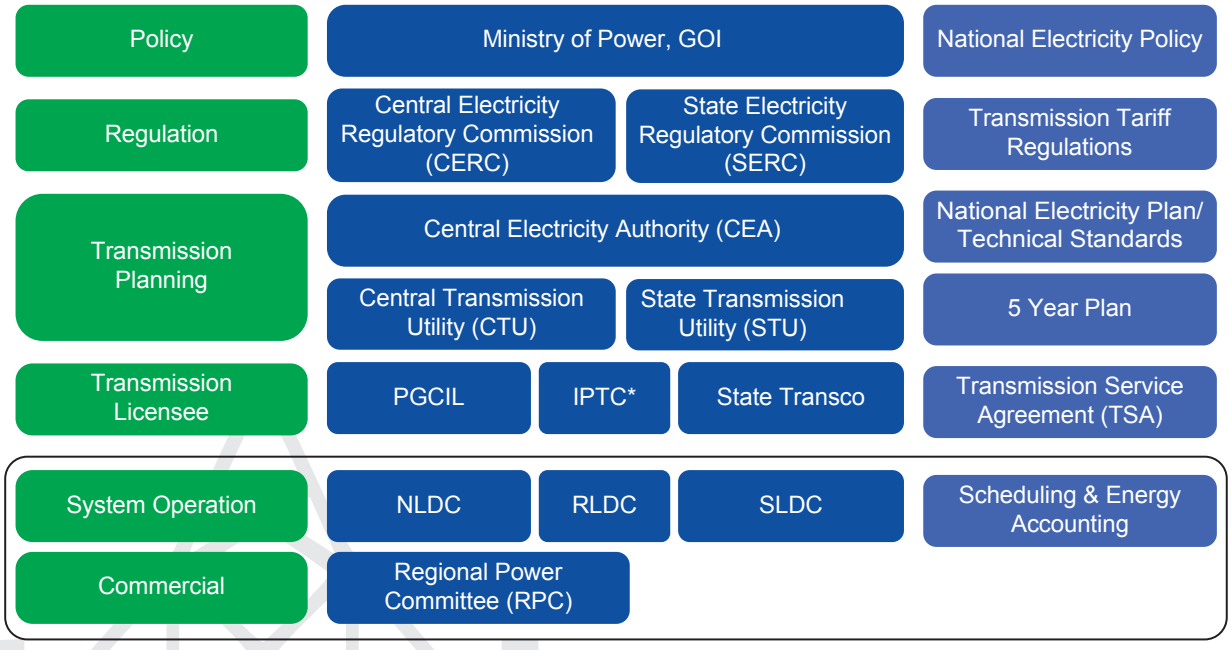
4.3.4.1 Institutional Framework

The Indian power sector has a federal structure where both, the centre and the state, have the power to make rules in their respective jurisdictions. The MoP is the apex body for decision-making in the Indian power sector. At the central level, the Central Electricity Authority (CEA) and BEA are responsible for formulating the policy and act as planning advisor to the MoP. The Power Finance Corporation (PFC) looks after financing for Ultra Mega Power Projects (UMPP), while the Rural Electrification Corporation (REC) looks after financing of power projects in the rural areas. The Central Electricity Regulation Commission (CERC) and the State Electricity Regulation Commission (SERC) are regulators at the central and respective states level. The central level has both, the power generation and power transmission, but it does not have any distribution player under it. The States have separate transmission, generation, and distribution entities as shown in Figure 12, depending on the level of unbundling. Private players also have their presence in the transmission, generation, and distribution sectors.

The power sector policies are developed by the Ministry of Power at the central level and the state energy ministries at the state level. These policies become the governing blocks for the sector. Based on them, various rules and regulations are issued by the respective authorities, including the CEA, CERC, SERCs, and so on. The power sector is subjected to the rules and regulations formulated by the appropriate authority at every level. The Ministry of Power/state governments, formulate the policies that cascade down the hierarchy. Figure 8 illustrates the institutional framework for the Indian power sector.

India has the best functioning OA framework in the SAC, which was mandated by the Electricity Act 2003 and further detailed by various acts, regulations and policies. The Electricity Act required the Central Transmission Utility (CTU) to provide non-discriminatory OA to its transmission system on payment of transmission charges. Further, the Inter-state Transmission Regulation 2004 provides regulation for OA. The Tariff Policy 2006 and the Sharing of Inter-state Transmission Charges and Losses Regulation 2010, define the transmission pricing for OA.

Figure 12: Indian Power Sector Institutional Framework



- PGCIL – Power Grid Corporation of India Ltd
- IPTC Independent Power Transmission Company
- NLDC – National Load Despatch Centre
- RLDC – Regional Load Despatch Centre
- SLDC – State Load Despatch Centre

India already has a CBET arrangement with its neighboring countries such as Bhutan, Nepal, and Bangladesh. CBET primarily happens through Government Memorandum of Understanding (MoUs) or power trade agreements. India needs to introduce OA in CBET. The country has already introduced the 'Guidelines for CBET 2016', which allows for CBET with certain conditions. CERC has yet to come up with the detailed regulations for this.

4.3.4.2 Legal and Policy Framework

India has the most evolved policy and legal framework for the OA regime among the South Asian countries. Under Section 2.47 of the Electricity Act 2003, it defines OA as:

'Open Access means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission'.

Section 9.2 of the Electricity Act 2003 makes a provision for OA as it states, 'Every person, who has constructed a captive generating plant and maintains and operates such a plant, shall have the right to Open Access for the purposes of carrying electricity from his captive generating plant to the destination of his use'.

Further, the Act mandated by the CTU under Section 38.2.d of the Electricity Act 2003, states that it needs to provide non-discriminatory OA to its transmission system for any generation company

or consumer on payment of transmission charges. Section 40 of the Electricity Act 2003 makes the same conditions on the other transmission licensees as well.

The Electricity Act 2003 enables competing generating companies and trading licensees, besides the area distribution licensees, to sell electricity to consumers when OA in distribution is introduced by the State Electricity Regulatory Commissions. Distribution in OA is also mandated by Part VI, Section 42 of the Electricity Act 2003. It required the state commission to introduce OA with conditions such as cross-subsidies, wheeling charges, and other operational constraints. Also, Section 42.3 mentions that the 'State commission and the duties of the distribution licensee with respect to such supply shall be of a common carrier, providing non-discriminatory Open Access'.

Clause 5.3.2 of the National Electricity Policy 2005 refers to the fact that the 'Network expansion should be planned and implemented keeping in view the anticipated transmission needs that would be incident on the system in the Open Access regime'.

According to Clause 5.3.3 of the National Electricity Policy 2005,'Open Access in transmission has been introduced to promote competition among the generating companies who can now sell to different distribution licensees across the country'.

Clause 5.3.4 of the National Electricity Policy 2005 states that,'Non-discriminatory Open Access shall be provided to competing generators supplying power to licensees upon payment of transmission charge to be determined by the appropriate commission'.

According to Clause 5.3.6 of the National Electricity Policy 2005, the necessary regulatory framework for providing non-discriminatory OA in transmission, as mandated in the Electricity Act 2003, is essential for signalling efficient choice in locating generation capacity and for encouraging trading in electricity for optimum utilization of generation resources and, consequently, for reducing the cost of supply.

In Clause 5.4.2 of the National Electricity Policy 2005, the Act provides for a robust regulatory framework for distribution licensees to safeguard consumer interests. It also creates a competitive framework for the distribution business, offering options to consumers, through the concepts of OA and multiple licensees in the same area of supply.

Clause 8.5 of the National Tariff Policy 2006 sets the provision for determination of cross-subsidy surcharge and additional surcharge for OA with the intent that these charges should not be so onerous that they eliminate competition. It further states that 'The computation of cross subsidy surcharge, therefore, needs to be done in a manner that while it compensates the distribution licensee, it does not constrain introduction of competition through Open Access'.

4.3.4.3 Regulatory Framework

The Electricity Act 2003 was introduced to promote competition in the Indian power sector and triggered a process of change in the Indian power sector to change it from a vertically integrated power market to an unbundled power market. Open Access is an important step to introduce the power transmission network as shared infrastructure to promote the number of participants in power trading. As per Act, the definition of open access is as follows:

"Open access" means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission.

As specified in the Act, different agencies such as the Central Transmission Utility, the state transmission unit, the system operator (load dispatch center), the Power System Operation Corporation (POSOCO) and the regulatory commission, need to perform respective functions, as mentioned in the Roles and Responsibility table, to enable OA in India. Well placed OA mechanism facilitates power trading among the power generator and consumer and introduces the competition in the electricity market, which leads to optimum pricing of various functions.

The Central Electricity Regulation Commission sharing of the Inter-state Transmission System (ISTS) Charges and Losses Regulation 2010, repealed CERC (terms and conditions of tariff) Regulations 2009, and CERC (OA in Inter-state transmission) Regulations 2008. The Central Electricity Regulation Commission sharing of ISTS charges and losses regulation 2010 describes in detail the intent and process for calculating and sharing of charges and losses for OA.

Section 5.4 of Chapter 3 of CERC, Sharing of ISTS Charges and Losses Regulation 2010, states: 'The Point of Connection transmission charges will be computed in terms of rupees per MW per month. The amount to be recovered from any designated ISTS customer towards ISTS charges shall be computed on a monthly basis as per these regulations. The Point of Connection transmission charges for short-term Open Access transactions shall be in terms of rupees per MW per hour and shall be applicable for the duration of short-term Open Access approved by the RLDC/NLDC'.

Further, Section 13, Chapter 6 of CERC Sharing of ISTS Charges and Losses Regulation 2010, provides for Transmission Service Agreement (TSA), which would give details of various arrangements such as sharing of charges, metering, billing, accounting, treatment of injection/ withdrawal, and so on.

4.3.4.4 Operational Framework

The Indian power sector has a well established and elaborate operational framework for managing OA. The operational framework for OA has been discussed in detail in Section 4.3.

4.3.5 Maldives

4.3.5.1 Institutional Framework

The Maldives is composed of geographically separate islands. Currently, all the islands have their own power systems. Each is effectively a mini-grid with a diesel-based generation system, while very few islands have the PV systems feeding electricity directly into the grid. Today, no interconnection between the islands exists and the electricity service is provided by utilities or managed by themselves in the islands.

The inhabited islands in the Male' (capital) region is provided by the State Electric Company Ltd. (STELCO), while the outer islands are done so by the FENAKA Corporation (majority) and the Island Community/Council. The resorts have their own electricity supply and distribution.

The Maldives Energy Authority (MEA) is an independent regulatory body affiliated to the Ministry of Energy and Environment and operates under the guidance of a Governing Board, appointed by the President. The institutional framework for the Maldives power sector is shown In Figure 13.

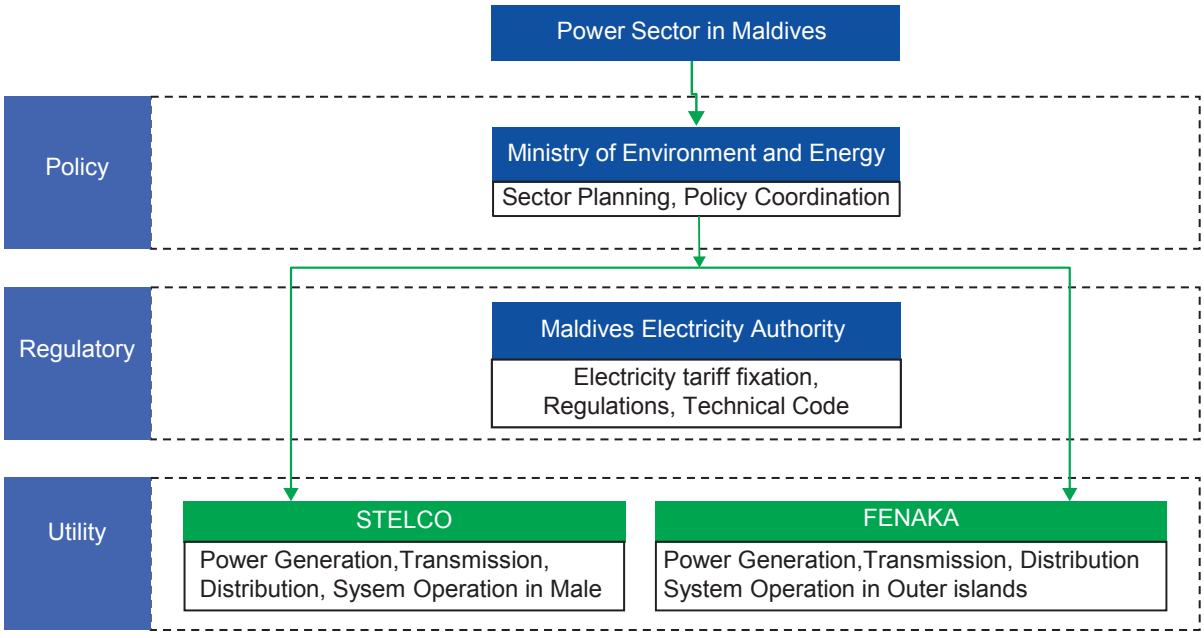
4.3.5.2 Legal and Policy Framework

There are no explicit provisions for OA in the Maldives power sector.

4.3.5.3 Regulatory Framework

There are no explicit provisions for OA in the Maldives power sector.

Figure 13: Maldives Power Sector Institutional Framework



4.3.5.4 Operational Framework

The Maldives currently does not have any operational framework, which can support the OA provisions in the system.

4.3.6 Nepal

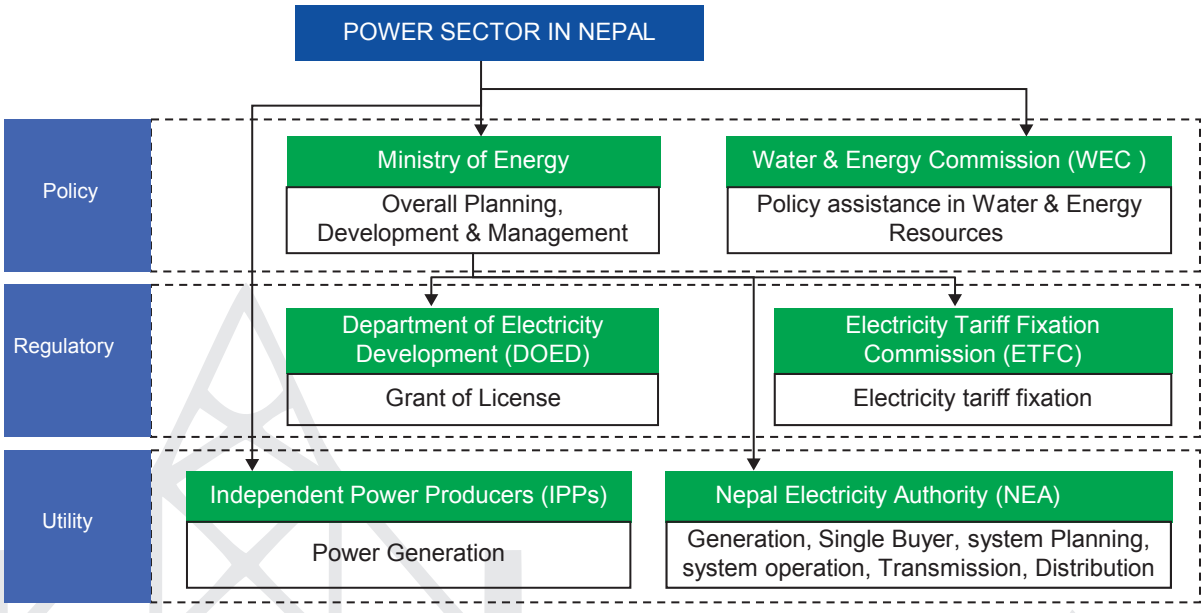
4.3.6.1 Institutional Framework

The power sector in Nepal is under the jurisdiction of the Ministry of Energy (former Ministry of Water and Resources, or MOWR). The Department of Electricity Development (DoED) was formed in 1992 under the MOWR as the Electricity Development Center. The Water and Energy Commission (WEC), which was established to develop water and energy resources in an integrated and accelerated manner, primarily assists the Government of Nepal, the Ministry, and other related agencies in the formulation of policies and planning of projects in the water resource and energy sectors.

The Department of Electricity Development, currently under the jurisdiction of the Ministry of Energy, is responsible for all matters relating to bilateral and multilateral dialogues, agreements, and understandings regarding electricity. The consumer tariffs are regulated by the Electricity Tariff Fixation Commission (ETFC), which was formed in 2011. ETFC includes representatives from the Nepal Electricity Authority (NEA), the Ministry of Water Resources, the Nepal Rastra Bank, consumer forums, and independent experts, to fix the electricity tariffs to be charged and collected by NEA. The Ministry is the licensing as well as the regulatory authority for the power sector in Nepal. There is currently no independent electricity regulator, though the draft Nepal Electricity Regulatory Commission Act, which is pending before the Nepal Parliament, proposes to establish an electricity regulator for the country.

The Nepal Electricity Authority is a government institution and is responsible for the generation, transmission, and distribution of electricity in Nepal. It undertakes system planning studies, including demand forecasts and generation planning. The power trade department of NEA is responsible for trading of electric power, both in terms of domestic and cross border markets. It is a single window interface of NEA with IPPs for processing their application for PPAs. NEA is in the process of unbundling its vertically integrated structure to improve operational efficiency. Nepal is also characterized by private sector participation in electricity generation. Figure 14 illustrates the power sector arrangement in Nepal.

Figure 14: Nepal Power Sector Institutional Framework



4.3.6.2 Legal and Policy Framework

The Electricity Act 1992 provides the legal framework for the power sector. The Water and Energy Commission (WEC) formulates the policies and planning of projects in the water resources and the energy sector. The Electricity Tariff Fixation Commission (ETFC), set up under the Electricity Tariff Fixation Rules 1994 as per Section 40 of the Electricity Act 1992, discharges functions related to tariff determination. Nepal already has power trade arrangements with India and is currently trading power with India on a Government MoU basis. It needs to introduce OA in CBET.

While there is no direct reference to non-discriminatory OA in the Nepal Electricity Act 1992, Article-II (b) of the agreement between the Government of Nepal and the Government of India on electric power trade, cross-border transmission interconnection, and grid connectivity, talks about the same and states that, 'The Parties shall allow non-discriminatory access to the cross-border interconnection(s) for all authorized/licensed participants in the common electricity market'.

The following clauses of the Nepal Electricity Act 1992, addresses the transmission pricing framework:

- Clause 16: Electricity charge and other charges to be realized.

- Clause 17: Assessment of electricity tariff and other charges.
- Clause 18: Separate tariff and other charges may be assessed.

The survey, generation, transmission, and distribution are licensed activities under the Nepal Electricity Act 1992. A license is not required for the production of electricity up to 1 MW and information needs to be shared for the generation, transmission, and distribution of 0.1 MW to 1 MW of power. As per Clause 40 (f) of the act, the Nepal Government has the power to frame rules concerning 'matters relating to electricity tariff, service charge or other charges'.

Nepal Electricity Regulatory Commission Act 2017

In September 2017, the President of Nepal gave his assent to the 'Nepal Electricity Regulatory Commission Act, 2017'. The Act proposes a comprehensive overhaul of the regulatory framework for the power sector in Nepal with the proposed establishment of an independent electricity regulatory commission.

The new Act has the following provisions(based on unofficial English translation) with respect to Open Access:

- The Electricity Regulatory Commission has been established as a regulatory body to regulate the generation, transmission, distribution or trade of electricity
- The Electricity Regulatory Commission shall make provision of Open Access in the electricity system
- The Electricity Regulatory Commission shall determine the process for the establishment of a wholesale market for electricity

The Electricity Regulatory Commission has not been constituted and the chairperson and members have not been appointed as on 22 November 2017. Once the commission becomes operational, it can be expected that a regulatory framework for Open Access in Nepal will also evolve.

4.3.6.3 Regulatory Framework

As per Clause 17 of the Nepal Electricity Rules 1993, the secretary will issue the license for production, transmission, and distribution to the applicant after completion of the procedure mentioned in Clause 15 (Examination of application) and Clause 16 (Public notice to be published). The secretary may issue a license for production, transmission, and distribution of electricity at the same time as per Clause 18 of the Nepal Electricity Rules 1993.

As per Clause 23 of the Electricity Rules 1993, if the licensee who has obtained a license for the production, transmission and distribution of electricity wants to import electricity into Nepal then it should apply for this with details of import arrangements. The Government of Nepal, after consideration, may grant permission.

In a recent development, the Electricity Regulatory Commission Bill for the setting up of a regulatory commission in Nepal has been passed by the Nepal Parliament. The new commission will be responsible for developing regulations relating to tariff, grid code, performance standards, and so on.

4.3.6.4 Operational Framework

Nepal currently does not have any operational framework that can support the OA provisions in the system.

4.3.7 Pakistan

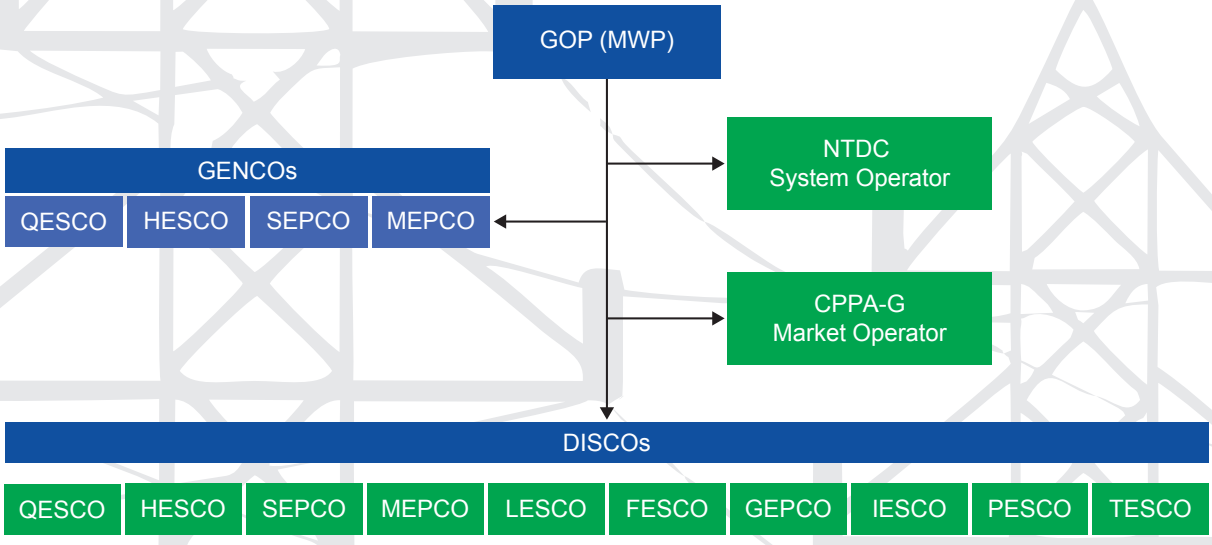
4.3.7.1 Institutional Framework

The Ministry of Water & Power (MWP) operates according to the mandate provided by the Rules of Business, 1973. Any relevant business falling under MWP includes matters relating to the development of water and power resources of the country, the Water and Power Development Authority (WAPDA), the regulatory body, and to electric utilities.

Pakistan's power market (except IPPs) mainly comprises Government-owned companies. The following prime entities are part of its power sector:

- Four Government-owned generation companies (GENCOs).
- Ten Government-owned distribution companies.
- One National Transmission and Dispatch (Grid) Company (NTDC), which until recently comprised:
  - Central Power Purchasing Agency.
  - System Operator.
  - Transmission Network Operator.
  - Contract Registrar and Power Exchange Administrator.
  - One Central Power Purchasing Agency (Guarantee) Limited (CPPA-G).

Figure 15: Pakistan Power Sector Institutional Framework



CPPA-G has been recently authorized to conduct market operations under the National Electric Power Regularity Authority (NEPRA) (Market Operator Registration, Standards and Procedure) Rules, 2015 (Market Rules). The following departments of NTDC have been handed over to CPPA-G:

- Central Power Purchasing Agency.
- Contract Registrar and Power Exchange Administrator.

Established in 1997, as per the NEPRA Act, the National Electric Power Regularity Authority is responsible for functioning as an independent regulator of power sector operations, including financial and technical compliance. Distribution Companies (DISCOs) are incorporated entities and are governed by the Companies Ordinance.

The Regulation of Generation, Transmission and Distribution of Electric Power Act 1997, subsequently amended in 2011, states that the national grid company is responsible for operating and providing safe, reliable transmission and interconnection services on a non-discriminatory basis. As per Grid code 2005, NTDC is required to operate the transmission system by providing fair and equitable treatment to all participants without any discrimination or prejudice.

Pakistan is undertaking a CBET connection with Afghanistan under the CASA-1000 project. It needs to have CBET connections with other SAC countries and a provision for OA in CBET as well.

4.3.7.2 Legal and Policy Framework

There is a provision for OA in Pakistan under the Electric Power Act 1997. As per Clause 18.1 of Pakistan's Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, 'The national grid company shall be responsible to operate and provide safe, reliable transmission and interconnection services on a non-discriminatory basis, including to a bulk-power consumer who proposes to become directly connected to its facilities'.

Though there is no direct reference to open access in the National Power Policy 2013, it sets out the following transmission strategy objectives:

'Wheeling charges and wholesale markets may be introduced to introduce multiple buyers and sellers in the market place'.

'Create a new business model based upon wholesale transactions, exchanges and wheeling charges'.

4.3.7.3 Regulatory Framework

Regulatory provision of Grid Code 2005 set out in its 'Clause CC3: Principles' adopts the spirit of OA. It states that NTDC should allow all prospective users and applicants to form a new connection to the network and a uniform treatment will be applied by NTDC in identifying terms and conditions for a new connection for each applicant.

The tariff determination is guided by the NEPRA (tariff standard and procedure) rules 1998, which sets out in its 'Part 3: Standards and Guidelines' the guidelines for tariff determination. These guidelines (17.v and vi) suggest that the tariff should reflect marginal cost principles and the authorities will have preference for competition rather than regulation among others.

As per Clause 3.3 of the guideline regarding wheeling of electricity from one point to another in respect of generation facilities, engagement in the business of selling of electricity to bulk power consumers, under Section 22 of the NEPRA Act,'For direct sales, the power producers shall be required to pay "Wheeling Charges" or "Use of System Charges", determined by NEPRA, for the use of transmission and/or distribution grid network employed, to transport power from the plant to the purchaser'.

4.3.7.4 Operational Framework

There are operational parameters with respect to wheeling charges and the use of system charges but no agency is responsible for granting OA, setting eligibility, and carrying out a technical study to check the grid capacity for new OA applicants. There is no pure play OA case in Pakistan. Being participants of the CASA-1000 project, it is party to shared transmission infrastructure with three other countries. Thus, it has operational framework for OA in CBET.

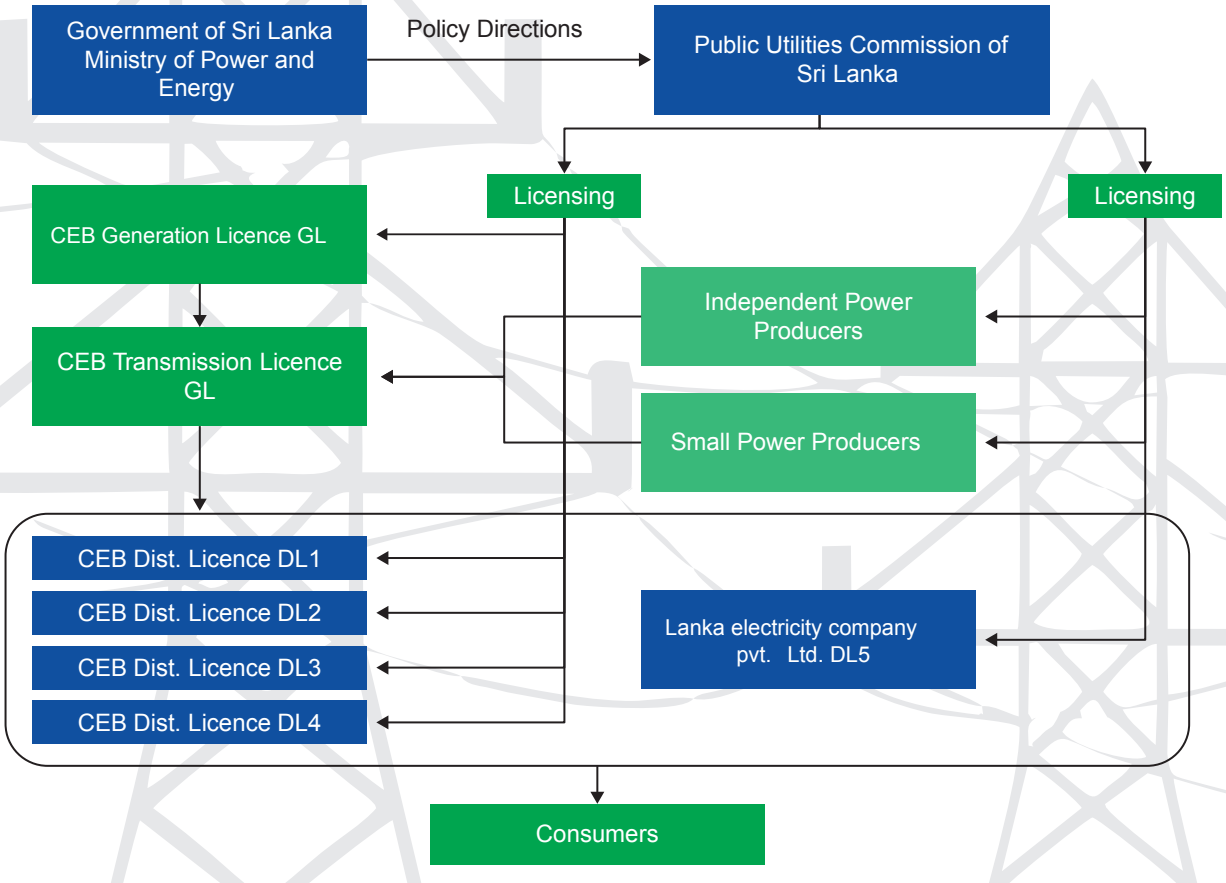
4.3.8 Sri Lanka

4.3.8.1 Institutional Framework

The power sector in Sri Lanka is composed of a mix of large, small, public, and private entities. The Ministry of Power and Energy (MoPE) oversees the publicly-owned Ceylon Electricity Board (CEB), which is involved in power generation, transmission, distribution, and revenue collection. MoPE is responsible for the formulation of the energy policy, project implementation and monitoring, and the supervision of state-owned electricity utilities. The Ministry of Petroleum and Petroleum Resource Development (MOPPRD) looks after the petroleum industry project implementation and monitoring, supervision of state-owned petroleum corporation, petroleum resource development and exploration, and the supply of fuel for the thermal power projects.

The Public Utilities Commission of Sri Lanka (PUCSL) is the Infrastructure Regulatory Commission presently empowered to regulate (i) electricity industry, and (ii) bunker and lubricating oil industries. The following is the power sector landscape in Sri Lanka:

Figure 16: Sri Lanka Power Sector Institutional Framework



The Sri Lanka Electricity Act No. 20 of 2009 (subsequent amendment in 2013) mandates the PUCSL to promote competition and determine transmission pricing such that it provides efficient service possible to the customers. Currently Sri Lanka does not have CBET with any country.

4.3.8.2 Legal and Policy Framework

There is no direct reference to OA in the Sri Lanka legal framework. PUCSL has to notify the regulation/order to promote competition and enable non-discriminatory access to the transmission system as there is no direct reference to OA in the Electricity Act 2009. However, it mentions that the commission should work to promote competition as one of the commission's objectives.

4.3.8.3 Regulatory Framework

There is no direct reference to OA in the Sri Lanka regulatory framework.

According to the Regulatory Manual, PUCSL 2014, the Commission will exercise, perform, and discharge the powers, functions, and duties conferred on it to promote competition.

4.4 Summary of Open Access Framework in South Asian Countries

A summary of the country-wise assessment of the current status across South Asian countries is provided in Table 4.

Table 4: Institutional Framework for OA in South Asia

Country	Summary
Afghanistan	• Unbundled power sector. DABS is vertically integrated. • Absence of separate and independent transmission utility and system operator. • AERA has been proposed to function as the system regulator. • CBET provision under CASA arrangement with Pakistan.
Bangladesh	• Partially un-bundled power sector. • PGCB (76 % owned by BPDB) present as a separate power transmission company and system operator. • BERC is the electricity regulator. • Bilateral cross-border trade with India on G-to-G basis.
Bhutan	• Partially un-bundled power sector with separate generation company. • Absence of separate and independent transmission firm. • Absence of separate and independent system operator. • BEA is the system regulator. • Bilateral Cross-border trade with India on G-to-G basis
India	• Completely un-bundled power sector at central and state levels. • Presence of separate and independent power transmission company, PGCIL/STUs. • Presence of separate system operator, POSOCO. • CERC and SERCs are independent electricity regulators. • Cross-border trade with Nepal, Bhutan, and Bangladesh. • Evolved power trading market including two power exchanges. • Issued guidelines for the cross-border trade of electricity and the regulations for the same is under finalization.

Country	Summary
Nepal	• Vertically integrated NEA looks after all functions of generation, transmission, distribution, and system operation. • The regulatory body, ETFC, is responsible for the determination of consumer tariffs only. • A full-fledged regulatory commission is proposed and for this the ERC Bill has been passed by the Parliament of Nepal. • Cross-border trade is through arrangements between NEA and power trading companies in India. • Two export-oriented projects for supplying power to India are nearing financial closure.
Pakistan	• Un-bundled power sector. • Presence of separate transmission utility NTDC, which looks after system operations as well. • NEPRA is the system regulator. • CBET provisions under CASA arrangement with Afghanistan.
Sri Lanka	• Functional unbundling of the power sector while CEB as Government-owned vertically integrated board manages the generation, transmission, system control, and distribution functions. • Absence of separate and independent transmission utility and system operator. • PUSCL is the electricity regulator with powers to regulate CEB and private sector generators. • Currently no CBET with any country.

Table 5: Legal and Policy Framework for OA in South Asia

Country	Summary
Afghanistan	• Electricity laws are still in finalization stage. • Broad provisions for OA though no implementation framework exists. • CBET OA framework exists under the CASA 1000 project, which would have cross-border trading with Central Asian countries and Pakistan. • No provision for domestic transmission pricing and energy accounting for facilitating OA.
Bangladesh	• Provision is there for non-discriminatory OA though no implementation framework has been developed. • No provision for OA in CBET while the trading is being done with India on a bilateral basis. • No policy for non-discriminatory OA facilitation, institutional mechanism, technical standards, grid code, imbalance settlement, energy accounting, and transmission pricing.
Bhutan	• Legal provision exists for non-discriminatory OA framework. • No explicit provision for OA in CBET, though export projects are allowed to access the grid on payment of wheeling charges. • No policy for non-discriminatory OA facilitation, institutional mechanism, technical standards, imbalance settlement, energy accounting, and transmission pricing.
India	• Non-discriminatory OA framework in transmission network is well established in the national and state grids under the Electricity Act 2003. • Guidelines for CBET have been specified by the Government of India and draft regulations for CBET have been proposed by the central regulator. • Provision for transmission pricing and energy accounting for facilitating OA exists.
Maldives	• Provision for non-discriminatory OA is not there. • No provision for OA in CBET. • No policy for non-discriminatory OA facilitation, institutional mechanism, technical standards, grid code, imbalance settlement, energy accounting, and transmission pricing.

Country	Summary
Nepal	• Provision for non-discriminatory OA is not there. • No provision for OA in CBET. • No policy for non-discriminatory OA facilitation, institutional mechanism, technical standards, grid code, imbalance settlement, energy accounting, and transmission pricing.
Pakistan	• Legal framework has provisions for the introduction of non-discriminatory OA framework. • No provision for OA in CBET but the CASA 1000 project has the necessary framework for cross-border energy transactions.
Sri Lanka	• Provision for non-discriminatory OA is not there. • No provision for OA in CBET. • No provision for transmission pricing and energy accounting for facilitating OA.

Table 6: Regulatory Framework for OA in South Asia

Country	Summary
Afghanistan	• No regulatory framework for non-discriminatory OA facilitation.
Bangladesh	• Regulatory framework exists but the regulations for non-discriminatory OA facilitation still to be specified.
Bhutan	• Regulatory framework exists but the regulations for non-discriminatory OA facilitation still to be specified.
India	• Strong regulatory mechanism for non-discriminatory OA facilitation, institutional mechanism, technical standards, grid code, imbalance settlement, energy accounting, and transmission pricing,
Nepal	• No existing regulatory framework for non-discriminatory OA facilitation.
Pakistan	• Regulatory framework exists but the regulations for non-discriminatory OA facilitation still to be specified.
Sri Lanka	• Regulatory framework exists but the regulations for non-discriminatory OA facilitation still to be specified.

Table 7: Operational Framework for OA in South Asia

Country	Summary
Afghanistan	• No domestic OA provisions. • OA is there in CBET (CASA-1000).
Bangladesh	• BERC has yet to come up with detailed OA provisions for the domestic market. • No OA in CBET.
Bhutan	• No operational framework for OA in the domestic or CBET projects.
India	• Fairly evolved OA for the domestic power market. • OA in CBET is under discussion and the operational procedures are likely to be aligned with the domestic OA provisions in India.
Nepal	• No operational framework for OA in domestic or CBET project.
Pakistan	• No domestic OA provisions. • OA is there in CBET (CASA-1000).
Sri Lanka	• No operational framework for OA in domestic or CBET projects.

4.5 Gap Analysis

The countries in the South Asian region are at various stages of readiness for the implementation of OA framework for CBET. Some of the countries are yet to institutionalize the framework for enabling OA. These gaps are represented in Figure 17, where 'high' is given to the countries who have the best provision in the region on that parameter, while 'very low' is assigned to the country that is least prepared on that parameter to adopt OA.

Figure 17: Assessment of Open Access Framework in South Asian Countries

	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Institutional Framework								
Power Market Structure	○	◑	◑	●	○	○	◑	◔
Independent Transmission Operator	○	◕	◑	●	○	○	◑	◔
Independent System Operator	○	◕	◑	●	○	○	◔	◔
Legal and Policy Framework								
Legal Provision	○	◑	◔	◕	○	○	◔	○
Policy Intent	○	◑	◔	◕	○	○	◔	○
Regulatory Framework								
Independent regulator	○	◑	◑	●	◔	○	◑	◑
Technical Standards	○	◑	◔	●	◑	○	◑	◔
Commercial – Tariff, etc.	○	◔	◔	◕	○	○	◕	◑
Operational Framework								
Detailed Process for open access	○	○	○	●	○	○	◔	○
Open access in domestic	○	○	○	●	○	○	○	○
Open access in CBET	◕	○	○	○	○	○	◕	○

○ Very low ◔ Low ◑ Moderate ◕ High ● Very High

International Experience

5.1 Evolution of Open Access Framework

The international experience in the evolution of OA framework shows that it is a continuous process rather than a discrete event. During this evolution, public utilities generally move from being vertically integrated entities to segregated ones, where the transmission, system operation, and regulation functions are handled by separate bodies. From the power market viewpoint, the OA evolution starts with the bilateral contracts and evolves to short-term power trade, and finally culminates in real time power trades.

Figure 18: Evolution of Open Access Framework

Open Access Market Evolution	Initial Phase	Intermediate Phase	Mature Phase
Transmission Sector	Bundled	Functional Unbundling	Fully Unbundled
Eligible Consumer	Large captive, Distribution Companies	Commercial & small industries	Households
Contractual Framework	Long term PPAs	Short term (Day ahead,Term ahead)	Real time market

Gradual evolution works both, on the requirement of market participants and institutional arrangements. As in the case of domestic OA in Brazil, only the big consumers were allowed to participate in OA initially and the requirement to participate in OA markets was kept high, at 10 MW. As the market evolved, however, even small consumers were allowed to participate in OA and the eligibility to take part in OA was reduced to 3 MW. In another approach, adopted by CAISO, it fixed the energy (gigawatt hours or GWh) quota on power, which could be traded under OA. The Indian example is a good case for the demarcation of boundaries, when both federal and state levels are involved in decision-making at their level. Similar approaches can be explored by SACs with minimal or no OA at present.

Southern African Power Pool Open Access is one of the successful examples of regional level coordination for OA. Developing on an existing regional level body (Southern African Development

Community) has been crucial for the success of SAPP. Another important factor for this success has been the institutional structure, which includes the head of each participating utility in its executive committee. This helps in sorting out issues faced by even small utilities that may not have a market share and, in turn, may be representing a small country. The lesson from this arrangement is that there should be a platform and arrangement for deciding upon issues (such as investment planning and building new interconnection projects in a regional context) where big countries cannot exploit its market power. At the same time, it should also be ensured that any small country cannot hold an entire group dysfunctional due to its whims. Devising a balanced framework or mechanism early on would help in securing a wider acceptance from the regional participant, which will result in the smooth functioning of the group.

It can be inferred that in SACs, with no OA in place, they can start with allowing OA to big consumers and DISCOMs only. Later, these requirements can be relaxed as the system operator gets better visibility into the system with the eventual target to allow all to participate in OA in the long term. Similarly, unbundled transmission utility can be pushed for functional unbundling and later it can be fully unbundled.

Table 8: Open Access in Transmission: International Experience

Geography	Domestic/Regional Case
USA	• Well-established domestic OA framework. • Mature phase (trade through OA framework in wholesale market).
India	• Domestic OA (inter-state and intra-state OA) • Mature phase (trade through OA in long, medium and short term market).
Southern African Power Pool (SAPP)	• Regional OA framework. • Mature phase (term ahead, day ahead market or DAM).
South America	• Regional bilateral (Argentina-Brazil and Brazil-Paraguay). • Initial phase (Bi-lateral; no OA in regional pool).
Brazil	• Domestic OA. • Evolving phase.
ENTSO-E	• Market coupling. • Mature OA framework.

The international experience in OA framework in reference to the evaluation framework has been highlighted in the following section.

5.2 Global Experience (Excluding India)

5.2.1 Institutional Framework

5.2.1.1 US Market

The USA power market structure has evolved from vertically-integrated regulated monopolies, investor-owned, municipal, or cooperative, to one in which non-utility entities own over 40 percent of the generating capacity. Over the years, regulators and competition enforcers have sought to promote competition in the industry to the benefit of consumers.

The FERC Order No.888 required the generation and transmission functions to be unbundled; transmission costs were strictly segregated from other costs and transmission managers were subject to a strict code of behavior.

There are nine Independent System Operators (ISOs)/Regional Transmission Organizations (RTOs) in the USA, which act as independent system operators for their control regions.

5.2.1.2 SAPP Market

In the case of OA in a regional power trading scenario, it is important to have a regional institution as it is in the case of SAPP. This requires the participation of all member countries and ensures that OA provisions are transparent in the case of CBET. Each member country should have an institution that ensures OA to its country's transmission network.

The SAPP operating members have operating committee members looking out for setting system regulation parameters.

5.2.2 Legal and Policy Framework

5.2.2.1 USA

The Energy Policy Act of 1992 (EPACT) amended the Federal Power Act (FPA) in order to allow generators and other market participants who were selling or buying electricity for resale, to apply to FERC for an order to access utility transmission assets, if they had been denied access to transmission utility.

In 1996, the FERC Order No. 888 required transmission-owning utilities to set non-discriminatory rates for transmission access. In 2011,the FERC came up with Order No. 1000, to clarify the cost allocation for transmission infrastructure and transmission planning for the transmission infrastructure. The rule established three requirements for transmission planning.

5.2.2.2 Brazil

Federal Law No. 9074 (Power Concessions Law)has granted free consumers and electricity suppliers OA to all distribution and transmission systems.

5.2.2.3 ENTSO-E

The Third Energy Package of the European Union, proposed by the European Commission and adopted by the European Parliament and the Council of the European Union, has the following key objectives for cross-border open access:

- Unbundling energy suppliers from the network operators.
- Strengthening the independence of the regulators.
- Cross-border cooperation between the transmission system of operators and the creation of the European Networks for Transmission System Operators.

5.2.2.4 SAPP

The operations in SAPP are guided by agreements rather than law. In SAPP, all operating members are obliged to wheel power, except where technical problems prohibit such a trade. SAPP has the governing documents, which are the foundation of regional participation in power trade. These documents provide technical standards for operational/technical parameters for the operation and maintenance among member countries. They ensure equitable treatment to all participating nations. Among its values it has:

- Honesty, complete fairness and integrity in dealing with issues.
- Encouragement of openness and objectivity.

5.2.3 Operational Framework

5.2.3.1 South America

In Brazil, there is the detailed process of non-discriminatory OA in domestic power trade.

5.2.3.2 SAPP

For regional interconnection, the SAPP member countries facilitate mutual monitoring.

Every member country has to ensure non-discriminatory OA in its country, for instance, ESKOM (South Africa) has a detailed process for OA.

5.2.4 Key Learnings for South Asian Regional Framework

The development of the OA framework for cross-border electricity trade shows that the respective domestic markets in the constituent countries need to be aligned in terms of the evolutionary stage, institutional framework, policy and regulatory mechanism, operational processes, and so on. Some of the key learnings for the South Asian region, in terms of establishing and institutionalizing the OA framework,are:

5.2.4.1 Institutional Framework

- For the regional OA framework to be effective, the countries need to develop a competitive power market structure that allows multiple buyers and sellers to access the transmission system. The country-specific institutional framework for OA needs to be identified and coordinated in order to ensure transparency while granting OA.
- SACs would need to undertake the power market restructuring in order to ensure independence of the transmission systems. At the very minimum, the functional independence of the transmission utility would ensure transparency and facilitate the determination of the available and future capacity additions in an objective and fair manner.
- A regional agency would be necessary to manage the OA process at the regional level. This institution should be transparent in its approach to ensure OA for member countries. All member countries would be responsible for the independent transmission operation in their respective geographies. The SAARC Framework Agreement 2014 states in Article 13, Facilitating Buying and Selling Entities, that 'Member states shall enable Buying and Selling Entities to engage in cross-border electricity trading subject to the laws and regulations of the concerned member states'.
- The power sector structure in almost all the South Asian countries except India lacks a system operator, which can be independent in functions related to the scheduling, dispatching, market pricing, and so on. The South Asian power market structure would require a regional system operator for the seamless flow of electricity across national grids and while ensuring reliability and safety of the power grid.

5.2.4.2 Legal and Policy Framework

The long-term implementation of a non-discriminatory and independent OA framework in the region would be dependent on the strengthening of the respective country's legal and policy mechanism for OA. International experience shows that enforcing OA through appropriate provisions in the country's legislation would make the implementation easy.

The development of guidelines for cross-border trade in electricity by the Government of India is a step intended to institutionalize the cross-border bilateral trades.

The SAARC Framework Agreement 2014 already has provisions for solving the dispute arising from the interpretation/implementation of the agreement through i)amicably among member countries. If unresolved, then ii) by the SAARC Arbitration Council.

5.2.4.3 Regulatory Framework

The establishment of an independent national electricity regulator is very important in driving the process and strengthening the OA regime at the country level. India, for instance, already has a strong multi-tier regulatory framework, which has reinforced the establishment of the OA regime. The country has also initiated cross-border regulations to manage the bilateral initiatives between India and its neighbors in the region.

The SAARC Framework Agreement 2014 provides for the following:

- Article 15, Regulatory Mechanism:'Member states shall develop the structure, functions, and institutional mechanisms for regulatory issues related to electricity exchange and trade'.
- Article 11 System Operation and Settlement Mechanism:'Member states shall enable the national grid operators to jointly develop coordinated procedures for the secure and reliable operation of the interconnected grids and to prepare scheduling, dispatch, energy accounting, and settlement procedures for cross-border trade'.

A regional agency would need to be established in the long term to streamline the processes and specify the uniform technical and security standards applicable for cross-border trades.

5.2.4.4 Operational Framework

India already has a fairly detailed OA process in place, for domestic OA in both inter- and intra-state mechanism. This is now proposed to be extended for cross-border transactions under the CBET draft regulations.

The SAARC Framework Agreement 2014, in Article 12, Transmission Access:'Member states shall, for the purpose of cross-border trade, enable non-discriminatory access to the respective transmission grids as per the applicable laws, rules, regulations, and applicable inter-governmental bilateral trade agreements'.

The Indian regulations, though applicable for bilateral transactions, would provide a starting point for the future regional OA framework as well. The institutional mechanism and operational processes proposed to be developed under these regulations for bilateral trades could, in future, be extended for a regional framework with modifications that could be mutually agreed to by the constituents.

5.3 Indian Experience

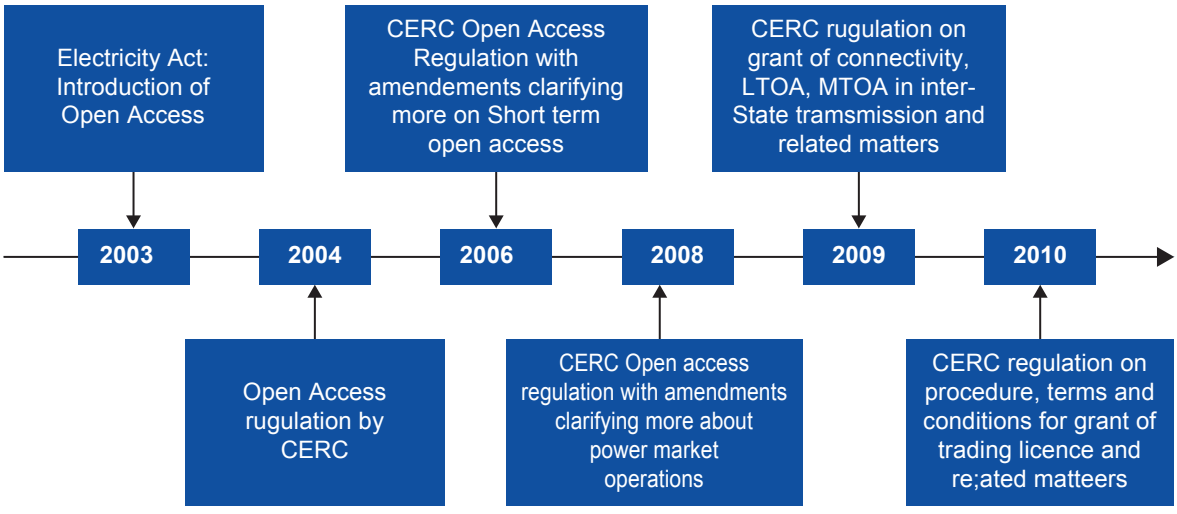
5.3.1 India Open Access Framework

In the Indian context, the Electricity Act 2003 has clearly outlined the provisions for the OA framework in transmission and distribution segments.

'Open access means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission'.

The OA framework in India has evolved since 2003 and has been strengthened by various regulations, which have been developed by the Central or State Electricity Regulatory Commissions as shown in Figure 19:

Figure 19: Evolution of Transmission Open Access Framework in India



5.3.1.1 Regulatory, Policy and Institutional Framework

Section 40 of electricity act (2003) elaborates the duties of the transmission licensee. Sub-section (C) of Section 40 stipulates that it will be the duty of the transmission licensee to provide the non-discriminatory OA to its transmission system for use by:

- Any licensee or generating company on payment of the transmission charges.
- Any consumer as and when such OA is provided by the State Commission under Sub-section (2) of Section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission,provided that such surcharge will be utilized for the purpose of meeting the requirement of current level cross-subsidy.

Section 42 of the Act has provisions for the distribution licensee and OA. This provision empowers the State Regulatory Commission to introduce OA in the state by appropriate regulations by determining the charges for wheeling and it will have due regard to all relevant factors including cross-subsidies and other operational constraints. In India, the Central Electricity Regulator Commission is responsible for the inter-state electricity transactions, while the state electricity regulatory commission looks after the electricity transaction within the state boundary. The procedure involved in OA from power generation to consumption is described in the following Sub-sections.

Table 9 describes the role and responsibility of the various entities involved in operationalizing the OA mechanism:

Table 9: Key Institutions Involved in Open Access Framework of India

Function	Sub Function	Agency
Planning	System Planning (transmission) for envisaging long-term transmission capacity among corridors.	CEA
Regulations for eligibility, controlling transaction (technical and monetary)	Deciding eligibility conditions for non-discriminatory OA.	CERC
	Deciding process and procedure for connectivity, OA, relinquishment conditions, and so on.	CERC

Function	Sub Function	Agency
	Preparing technical standards (for OA interconnection with grid).	CERC
	Metering regulation (for determining quantum of electricity under OA mechanism).	CERC
	Regulations of energy accounting.	CERC
	Determining OA charges.	CERC
Feasibility study and Construction, O&M of transmission lines	Conducting technical study to determine feasibility of accommodating capacity applied (for construction of new transmission lines).	PGCIL
	Constructing new transmission lines.	Transmission licensee
Grid monitoring and balancing	Performing scheduling and dispatch function (for carrying out day-to-day matching of demand and supply).	POSOCO (PGCIL)
	Ensuring grid stability.	POSOCO (PGCIL)
	Handling unscheduled interchanges.	POSOCO (PGCIL)

Table 10. Illustrates applicable codes, policy, and so on for OA.

Table 10: Applicable Regulations on Open Access in India

Category	Regulation
Grant of connectivity, LTA and MTOA	CERC (Grant of Connectivity, LTA and MTOA in inter-state transmission and related matters) Regulations.
Inter-connection technical study	Central Electricity Authority (technical standards for connectivity to the grid) Regulation.
Tariff determination of infirm power from a generation station other than those based on non-conventional energy sources	Central Electricity Regulatory Commission (terms and conditions of tariff) Regulations.
Construction of electric lines	Central Electricity Authority (technical standards for construction of electrical plants and electric lines) Regulations.
Interconnection standards	Central Electricity Authority (grid standards) Regulations.
Grid codes	Indian Electricity Grid Code (IEGC).
Metering	CEA (installation and operations of meters) Regulations and IEGC.
Electricity trader	CERC (procedure, terms, and conditions for grant of trading license and related matter) Regulation.

5.3.1.2 Commercial Framework

A regulatory body has to decide on the various parameters to enable transmission and distribution of OA. The norms laid out by the regulator, related to eligibility, fee, and technical standards, would enable the applicant to access the transmission grid by paying to the concerned parties for carrying out various functions. Customers need to pay various charges and losses to the DISCOM, STU and inter-state transmission licensee in order to avail the OA facility. These charges and losses are illustrated in the Table 11:

Table 11: Applicable Charges and Losses for Open Access

OA Charges	Rationale for OA charges	OA losses	Rationale for OA losses
Point of connection (PoC) charge	Inter-state transmission charges payable by the OA consumer.	Point of connection (PoC) loss.	ISTS loss
Transmission Charges or STU Charges	Payable to the state transmission utility for the use of the transmission system for availing power through OA.	Transmission loss or state loss.	Consumer to absorb apportioned energy losses in the transmission system, as per the relevant regulations.
Wheeling charges	Charge to the DISCOM for conveyance of electricity through OA as determined by the SERCs.	Wheeling loss.	Technical losses in the distribution system determined at various voltage level by the state commissions.
Cross Subsidy Surcharge	For subsidizing OA the consumer has to pay a cross-subsidy surcharge to the DISCOM.	-	-
Others (if applicable)	• Additional charges, if any • NLDC application fee, scheduling and operating charges, SLDC charges. • Power exchange transaction charges/ trading margin.	-	-

5.3.1.3 Open Access Categories

Broadly, OA is segmented into three categories and awarded by the system operator in the following priority order:

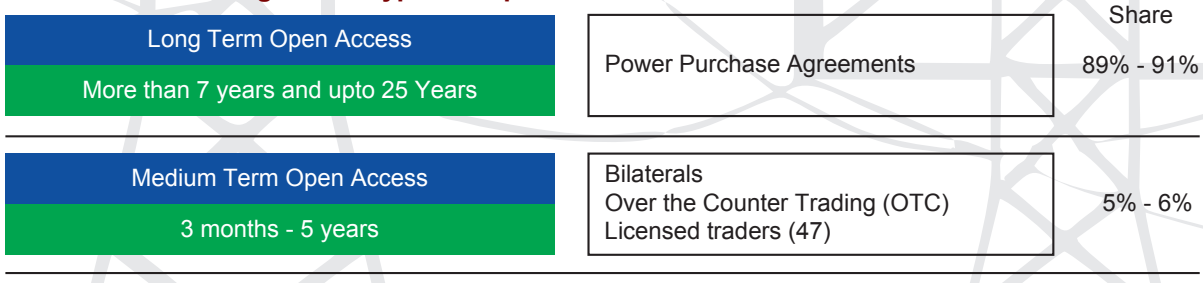
- Long-term Open Access (LTOA).
- Medium-term Open Access (MTOA).
- Short-term Open Access (STOA).

All these transaction types and their share in the Indian power market is illustrated in Figure 20:

5.3.1.4 Open Access Process and Procedures

For inter-state transmission, an applicant may be required to obtain connectivity and long- or medium-term access. The connectivity must be obtained prior to applying for LTA and MTOA. However, a person may apply for connectivity along with LTA or MTOA. Eligibility and definition for the connectivity, LTA, and MTOA are shown in Table 12:

Figure 20: Types of Open Access and Their Market Share



Short Term Open Access • Contingency Transaction • Day Ahead Transaction • Collective Transaction • Bilateral Transaction	OTC Intraday - 3 months **Power Exchanges (2)** 1. Intra - day 2. Day Ahead Market (DAM) 3. Day Ahead Contingency (DAC) 4. Daily 5. Weekly	2% - 3%
Intraday - 3 months		
Balancing Market Real Time	Deviation Settlement Mechanism (DSM)	2% - 3%

Table 12: Eligibility for Connectivity and Open Access in India

Particulars	Definition	Eligibility
Connectivity	For an applicant means the state of getting connected to the ISTS.	• Generating station of installed capacity 250 MW and above. • Captive generating plant of exportable capacity of 250 MW. • Bulk consumer availing a supply of minimum 100 MW load from ISTS.
Long-term Access (LTA)	Means the right to use the ISTS for a period exceeding 12 years but not exceeding 25 years. A long-term customer is a person who has been granted long-term access and includes a person who has been allocated central sector generation.	• Generating station including a captive generating plant. • Bulk consumer. • Electricity trader. • Distribution licensee. • State Government owning some quantum of power.
Medium-term Open Access	Means the right to use the ISTS for a period exceeding three months but not exceeding three years. A medium-term customer is a person who has been granted medium-term OA.	

The CTU acts as the nodal agency for connectivity, LTA, and MTOA to inter-state transmission. Other entities such as RLDC, NLDC, and STU will act as nodal agencies for short-term OA and intra-state LTA and MTOA as mentioned in Table 10.

Table 13: Nodal Agencies for Open Access in India

Nature of Contract	Duration	Nodal Agency	Tariff Structure
Long term	Long-term OA is available for a period of 12 to 25 years.	PGCIL for inter-state and STU for intra-state. PGCIL also for connectivity.	Two part tariff.
Medium term	Medium-term OA is available for a period of three months to three years.		Either 2 part or single tariff.

Nature of Contract		Duration	Nodal Agency	Tariff Structure
Short Term	Bilateral	For a period of up to three months.	Buyer RLDC for inter-state and SLDCs for intra-state	Single tariff
	Power Exchange- DAM	One day (corridor left after short-term bilateral).	NLDC for DAM	
	Power Exchange- Term Ahead Market	Up to 10 days in advance	RLDC for 'Term Ahead Market'.	
	Deviation Settlement Mechanism	Real time balancing mechanism for settling deviation from schedule.		

The application for connectivity, LTA, and MTOA will be made to the nodal agency, the CTU. The inter-state transmission licensee, other than the CTU, has to sign a connection agreement with the CTU. The fee that is applicable for connectivity and application is shown in Table 14.

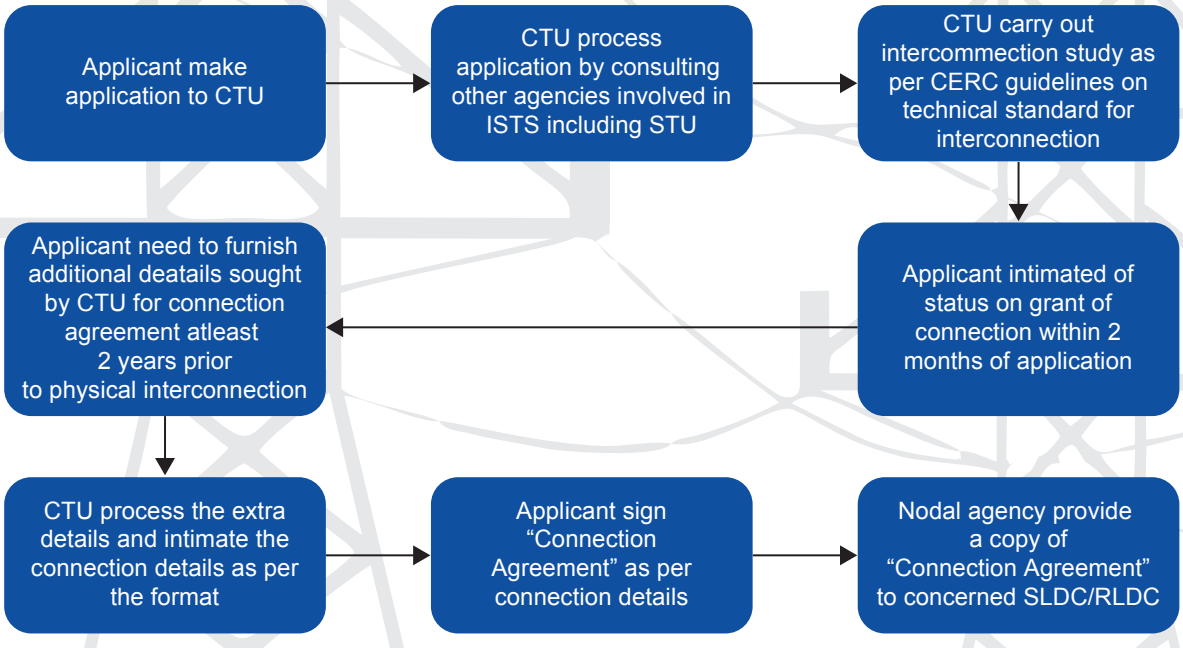
Table 14: Application Fees for Connectivity and Open Access (US$)

No.	Injection / withdrawal Capacity (MW)	Connectivity	LTOA	MTOA	STOA
1	Up to 100 MW	3,100	3,100	1,500	1,500
2	100–500 MW	4,600	4,600	3,100	3,100
3	500–1,000 MW	9,200	9,200	4,600	4,600
4	More than 1,000 MW	13,800	13,800	6,200	6,200

** Approximate values after currency conversion and rounding off.*

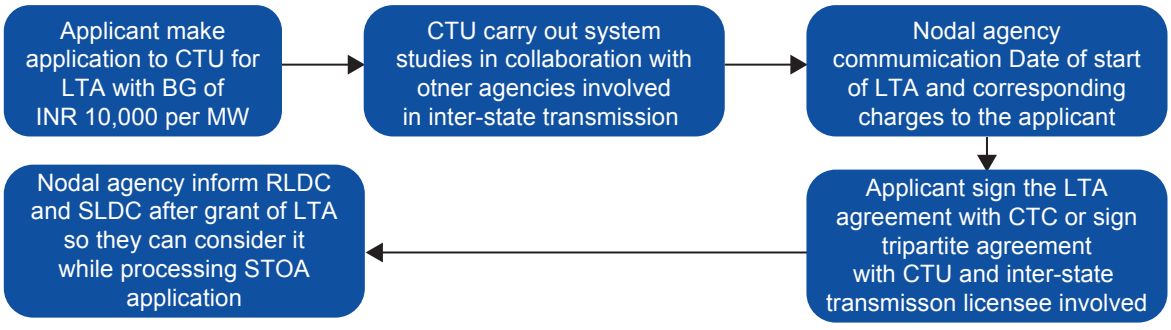
Transmission OA is sought by the power generating plant or power trader to deliver power at the agreed point to the consumer or by the captive generation plant to transmit power to the consumption point. The inter-state OA procedure is complex as compared to the intra-state OA procedure. The award of OA involves various agencies. Figure 21 shows the process mapping the diagram that presents the procedure involved in OA:

Figure 21: Process of Granting Connectivity in Transmission Open Access



The process of grant of LTA is illustrated in Figure 22:

Figure 22: Process of Grant of LTA



Renewal of Term for LTA

- LTA is extended on the expiry of the period of LTA, if a written request is made by the LTA customer to the CTU. The LTA access will stand withdrawn in case of no application.
- This request should be made to the CTU at least six months prior to the date of the LTA expiry.

Relinquishment of LTA Access Rights

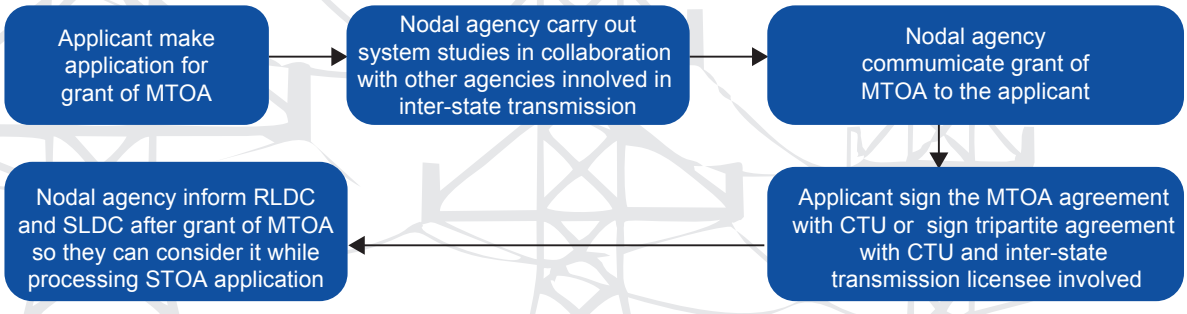
A customer can relinquish the LTA rights fully or partly before the expiry of the full term of the LTA, by making compensatory payment for the stranded capacity, depending on whether it has availed access rights for at least 12 years or not. Table 15 illustrates the charges payable by OA consumers in case of relinquishment.

Table 15: LTA Relinquishment Charges

Notice period	Long-term customer who has availed access rights for at least 12 years	Long-term customer who has not availed access rights for at least 12 years
Notice of one year	There will be no charges if the customer submits an application to the CTU at least one year prior to the date from which the customer desires to relinquish the access rights.	The customer will pay an amount equal to 66% of the estimated transmission charges or net present value (NPV) for the stranded transmission capacity for the period falling short of 12 years of access rights.
Notice of less than one year	The customer will pay an amount equal to 66% of the estimated transmission charges (NPV) for the stranded transmission capacity for the period falling short of a notice period of one year.	The customer will pay an amount equal to 66% of the estimated transmission charges (NPV) for the period falling short of a notice period of one year, in addition to 66% of the estimated transmission charges (NPV) for the stranded transmission capacity for the period falling short of 12 years of access rights.

The process of grant of MTOA is shown in Figure 23.

Figure 23: Process for MTOA



Condition for Renewal of Term for MTOA

There will be no overriding preference on the expiry of the period of the MTOA. The medium-term customer will not be entitled to any overriding preference for renewal of the term.

Relinquishment of MTOA Rights

A customer may relinquish the rights, fully or partly, by giving at least 30 days prior notice to the nodal agency. An MTOA customer relinquishing the rights will pay applicable transmission charges for the period of relinquishment or 30 days, whichever is less.

Transmission Charges

Any transmission charge policy has to evolve cost-reflective tariffs with the consideration of separating content and carriage for the transmission. Transmission charges have to evolve in phases:

- Charges dependent on distance, and quantum of power to be transmitted ex- postage stamp method.
- Charges dependent on the distance, quantum of power, and direction (that is, loss and congestion at node) ex-point of connection charge.

The power transmission charge used to be determined by the postage stamp method in India. This method has now moved to the Point of Connection (POC) charges. POC charges have components of direction, distance, and quantum of power. POSOCO determines POC charges for the Indian transmission grid by categorizing it in various nodes. POC charges can be different for the injection and withdrawal at a particular node. POSOCO determines and publishes POCi (at injection) and POC (at withdrawal) at various nodes.

5.3.2 India's Cross Border Trade of Electricity Guidelines

India has been trading in electricity with Bangladesh, Bhutan, and Nepal under bilateral MoUs/ power trade agreements. Further to the Framework Agreement for Energy Cooperation, signed on November 27 2014 among the SAARC countries, the Ministry of Power, in consultation with the Ministry of External Affairs, has issued 'Guidelines on Cross-Border Trade of Electricity' in December 2016, with the objective of harmonizing laws governing trade in electricity. The guidelines also help in facilitating cross-border trade of electricity with greater transparency, consistency, predictability, and minimize the perception of regulatory risks.

The Ministry of Power has also appointed a member (Power Systems) of the Central Electricity Authority as the 'Designated Authority' under the guidelines. Figure 24provides a concise summary of India's CBET guidelines:

Figure 24: Concise Summary of India's CBET Guidelines

1	**CBET regulation**	By CERC
2	**Project development**	Project developer submit technical information to CEA
3	**Eligibility Condition**	Decided by CERC on ownership structure of (i) Project and (ii) Traders in other countries

Cont'd...

...Cont'd

4	**Process of trade and approval for trade**	Designated authority decides
5	**Grid safety, security and operation**	Designated authority (DA) to coordinate with the nodal agency of the neighbouring country
6	**Accounting, scheduling, DSM and transmission Charges**	As per CERC regulations
7	**Tariff**	Decided by GtG negotiation or mutual agreement (for hydro) or competitive bidding or Open access (LTA, MTOA and STOA and adopted by the appropriate commission (for both export and import of power under CBET)
8	**Participate in Indian power exchanges**	Any CBET participant can participate under Term Ahead Market, Infra-day or contingency contract
9	**Dispute resolution within Indian territory**	As per provisions of electricity Act 2003
10	**Dispute resolution among countries**	By Singapore International Arbitration Centre if can not be resolved by mutually consent of the participating entities

The designated authority will coordinate with the nodal agency of the neighboring country to:

- Facilitate the process of approval.
- Plan, monitor, and coordinate the commissioning of cross-border transmission lines.
- Secure the safety and operation of the grid.
- Determine the surplus capacity from a generating station in India to export power.

The key features of the guidelines include:

- Participating entities declared as eligible to undertake cross-border trade through Indian power exchanges, subject to approval from the 'Designated Authority', (Clause 7.1 allows entities outside India to participate in India's competitive market for wholesale electricity).
- Cross-border transmission interconnections to be planned jointly between transmission planning agencies of the respective countries, with the approval of respective governments (Clause 8.1.1 enables coordinated planning and execution of cross border transmission lines).
- Indian generating stations supplying exclusively to neighboring countries may be allowed to build independent transmission systems, (Clause 8.2 states that such independent transmission systems may run counter to the concept of non-discriminatory Open Access and may also prove to be an inefficient way for development of transmission system).
- Disputes involving entities of separate countries may be settled through the Singapore International Arbitration Center or as may be mutually agreed to by the participating entities, (Clause 10.2 allows international arbitration instead of limiting jurisdiction within the Indian judicial system).

5.3.3 India's Draft CBET Regulations (February 2017)

In line with the Ministry's guidelines, CERC has come out with draft Regulations on CBET in February 2017. CERC has proposed the OA framework for CBET based on the domestic framework for OA. Therefore, there is uniformity in terms of the nodal agency for application of LTOA/MTOA/STOA,

segregation of concepts of connectivity and OA, procedure for OA, and so on. The draft CERC Regulations for Cross Border Trade of Electricity delegates the responsibility on the neighboring countries to develop their institutional and regulatory mechanism for compliance. Some of the key features of the draft regulations, which have implications on Indian as well as neighboring countries,include the following:

- Institutional framework for CBET [Clause 6(2)].
  - Identification of NLDC as nodal agency for STOA with respect to cross-border trade of electricity between India and its neighboring countries.
  - The CTU will be responsible for granting and facilitating long-term access and medium-term OA with respect to cross-border trade of electricity between India and its neighboring countries.
  - Settlement Nodal Agency (SNA) will be able to undertake energy settlement and other commercial matters related to cross-border trade. The neighbouring country has to nominate/ authorize an agency for such a purpose. The Settlement Nodal Agency of the neighbouring country will be a member of the Regional DSM pool acting on behalf of the selling/buying entity of the neighboring country.
  - Transmission Planning Agency (TPA) of each neighboring country to be responsible for the transmission system planning in the respective neighboring country, for the purpose of facilitating cross-border trade of electricity with India.
- Eligibility criteria for participating applicant [Clause 7]: Import by Indian entities from non-Indian owned private entities/projects in neighboring countries are not allowed. This restricts market choice and competition severely and creates artificial barriers of entry to privately-owned projects.
- Trade through Indian Power Exchanges allowed under the categories of Term Ahead Contracts, Intra Day Contracts and Contingency Contracts. Day Ahead Contracts are not covered. Participation through trading licensees is also allowed.
- Grant of Connectivity criteria specifies the eligibility of generators and consumers who want to avail the OA: Hydro generator of 50 MW and above; other generators of 250 MW and above; consumer of 100 MW and above.
- Specified the type of OA consumer eligible for various OA categories: For the purpose of grant of long-term access, medium-term OA or short-term OA the following entities located in India or a neighboring country: A generating station including a captive generating plant, a consumer , an inter-state trading licensee, a distribution licensee.
- Participating entities in neighboring countries to abide by policies, laws, rules and regulations in respective countries.
- The procedure for the award of OA on the transmission system along with the associated application fees and the connectivity criteria has been provided.
- The process for operationalization and monitoring of cross-border transmission network has been specified. A similar process needs to be institutionalized and mandated by neighboring countries for their respective cross-border infrastructure in order to have seamless commissioning and operation of these assets.

5.3.4 MOP Consultative Paper on Open Access (2017)

The Ministry of Power, Government of India,came out with a consultation paper on OA in August 2017. The basic premise of the paper was that the distribution utilities were not being compensated enough for OA and, therefore,a stricter OA regime needed to be implemented. The key proposals in the consultative paper and the associated impact on OA transactions are summarized here:

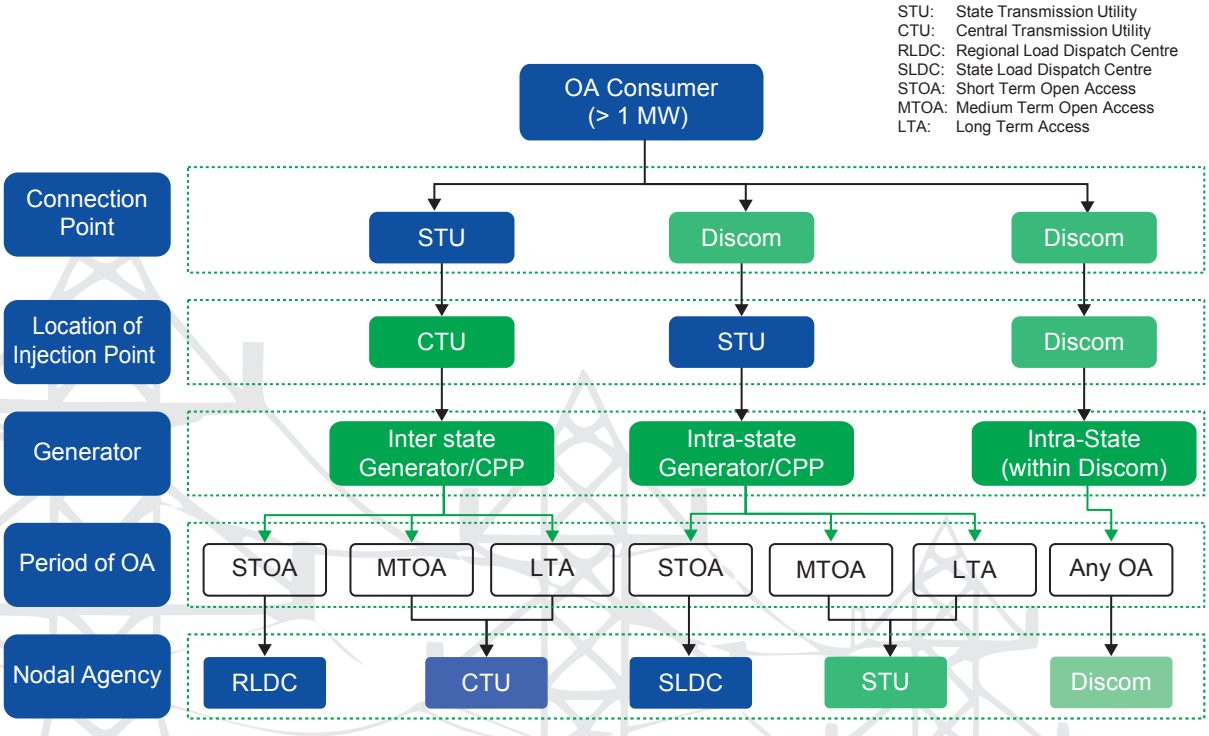
- Open Access consumers shall be required to schedule for at least 24 hours whenever they seek OA. This is intended to avoid consumers exploiting part time arbitrage in power exchanges. If the proposal is also applied to CBET, the utilities in other countries will not be able to undertake day ahead/contingency transactions, with Indian entities for a part of the day, under the bilateral mode or through (proposed) Regional Power Exchange.
- Recommends a new uniform methodology for determination of additional surcharge to compensate the distribution utilities for their stranded power purchase commitments, which have arisen on account of OA. The probability of imposition of additional surcharge would boost, thereby increasing the overall transaction cost.

5.3.5 Key Learnings from the Indian Experience

The Indian OA framework has evolved since 2003 and can provide a working template for evolving the regional OA framework in South Asia. The guidelines and draft regulations for cross-border trade for electricity has some key ingredients that are critical for the regional framework as well. For instance, the proposed bilateral framework has requirements of an institutional setup to be developed for the planning and coordination between India and its neighboring countries. Once developed, it will be consistently implemented for all cross-border trades with India and can be leveraged for developing a regional institution. Similarly, the regulations being deliberated by the central regulator in India will have inputs from other countries as well. In the long term, the scope of regulations can be expanded by leveraging similar regional regulations from other parts of the world, to evolve a set of regional regulations for South Asia. In terms of operational framework for the OA framework, the Indian system has already defined the key parameters such as the eligibility criteria, the format for application and surrender of OA, tariff, contractual arrangements, and so on.

The categorization of OA consumers for the transmission sector has been clearly defined as shown in Figure 25.

Figure 25: Open Access Framework in India



- Long-term OA customer: One who avails OA for a period of seven to 25 years.
- Medium-term OA customer: One who avails OA for a period of three months to five years.
- Short-term OA customer: One who avails OA for upto three months at a time.

The implementation of the MOP's guidelines for electricity trade and CERC's cross-border electricity trade regulations will increase the need to strengthen regulatory mechanisms in all the countries. The individual countries engaged in bilateral trading of electricity with India will need to strengthen the systems at their end in order to ensure compliance with the guidelines. Some of the initiatives that would be required include:

- Developing institutional capabilities.
  - Strong, independent regulation for providing a level playing field for investors.
  - Strengthening the institutional capabilities for the nodal agencies; system operators to match the requirements of the Indian system.
- Regulatory initiatives.
  - Transparent tariff fixation mechanism for generation and transmission assets.
  - Determination of the system operator's fees/charges.
  - Developing regulations for the open and non-discriminatory access to the grid.
- Specify operational framework for OA.
  - Determination of fees and other connectivity charges.
  - Payment security mechanism.
  - System operation fees and charges.
  - Specifications for metering and communication infrastructure.
  - Dispute resolution relating to connectivity, determination, and payment of charges.

A few case studies on OA in India are provided in 'Annexure 3: Case study – Open Access Charges in India' to illustrate the applicability of OA charges, under intra-state and inter-state OA transactions.

5.4 Recommendations for South Asia from International Examples

Table 16 discusses the learnings for South Asia from international examples.

Table 16: Recommendations for South Asia Based on International Experience

S. No.	Key Ingredients	Lessons for South Asia in Domestic Open Access	Recommendations for South Asia in Regional Open Access
1.	**Institutional Framework**		
1. a	**Power market structure**	• SACs should identify institutions that will be responsible for ensuring transparency while granting OA. • SACs should have a competitive power market structure allowing for multiple buyers and sellers to access a transmission/ distribution grid.	• There should be a regional agency formed by the participation of each member country. This institution should be transparent in its approach to ensure OA for member countries. All member countries would be responsible for independent transmission operation in their own country.

S. No.	Key Ingredients	Lessons for South Asia in Domestic Open Access	Recommendations for South Asia in Regional Open Access
1. b	**Independent transmission (unbundled)**	• SACs should have separate transmission firms so that they do not favour their own generation over others. There should be at least functional unbundling of transmission functions if it is not possible or cumbersome to separate the transmission function.	• The SAARC framework agreement 2014 states in Article 13, Facilitating Buying and Selling Entities: 'Member states shall enable Buying and Selling Entities to engage in cross-border electricity trading, subject to the laws and regulations of the concerned member states'.
1. C	**Independent system operator**	• Is required in SACs to ensure that the system operator related functions of scheduling, dispatching and so on, are handled in a non-discriminatory way, while ensuring reliability and safety of the power grid.	• Article 10, Electricity Grid Protection System: 'Member states shall enable the joint development of coordinated network protection systems incidental to the cross-border interconnection, to ensure reliability and security of the grids of the member states'.
2.	**Legal and Policy Framework**		
2. a	**Legal provision**	• The respective country should have to grant legal status of OA so it can be enforced by law.	• SA member countries should have legal provision of neutral arbitrator in cases that cannot be resolved amicably, as in the case of the SAARC framework agreement. • The SAARC framework agreement 2014 has provision for solving disputes arising from interpretation/ implementation of agreement through i) amicably among member countries. If unresolved, then ii) by the SAARC Arbitration Council.
2. b	**Policy intent**	• Though the majority of SACs have a policy intent, it is at a minimal level. SACs, other than India, do not have the thrust to convert policy intent to action.	• There should be intent of allowing non-discriminatory OA across member countries in the governing documents of the regional body.
3.	**Regulatory framework**		
3. a	**Independent regulator**	• Independent national regulators would play a crucial role in strengthening the OA regime at the domestic level.	• A regional body/regional agency would be responsible for setting a regulatory framework for member countries. It can also have governing documents defining the non-discriminatory regulatory framework as the starting point for all member countries. • The SAARC Framework Agreement 2014 also provides in Article 15, Regulatory Mechanism: 'Member states shall develop the structure, functions and institutional mechanisms for regulatory issues related to electricity exchange and trade'.
3. b	**Technical standard**	• Each member country should have technical standards supporting the OA regime in their own country.	• Regional body/ agency would be responsible for setting technical standards for interconnection among countries. This would help in harmonizing the grid codes for CBET.

S. No.	Key Ingredients	Lessons for South Asia in Domestic Open Access	Recommendations for South Asia in Regional Open Access
3. c	**Commercial aspects**	• Consumer and generator under OA should be scheduled and dispatched in a non-discriminatory manner.	• Article 11, System Operation and Settlement Mechanism: 'Member states shall enable the national grid operators to jointly develop coordinated procedures for the secure and reliable operation of the interconnected grids and to prepare scheduling, dispatch, energy accounting and settlement procedures for cross-border trade'.
4.	**Operational Framework**		
4. a	**Detailed process of non-discriminatory OA**	• Some SACs such as India have a fairly detailed OA process in place for domestic OA in both the inter- and intra-state context. Other SACs will need to develop the same detailed provisions for non-discriminatory OA.	• The SAARC framework agreement 2014 in Article 12 Transmission Access: 'Member states shall, for the purpose of cross-border trade, enable non-discriminatory access to the respective transmission grids as per the applicable laws, rules, regulations, and applicable inter-governmental bilateral trade agreements'.

Regional Open Access Framework and Guidelines

6.1 Introduction

In the last few decades, cross-border electricity trade in the South Asian region has gradually evolved from ad-hoc arrangements to a more well-established framework. For some countries, CBET has become a crucial revenue source to aid in the overall economic growth of the country; while for others, it has become a necessary tool to tide over energy shortages. CBET is viewed to be beneficial to the SA region for:

1. Availability of surplus generation and stranded assets in India, vis-à-vis power deficit in countries such as Nepal and Bangladesh.
2. Seasonal generation shortage in hydropower-dependent countries such as Nepal, which can be offset by other SACs.
3. Potential for large scale hydropower plants in countries such as Bhutan and Nepal, coupled with a demand for large scale clean power in India and other SACs.
4. Unavailability of adequate hydropower as a variable generation source for system balancing under high rates of RE penetration in India.
5. 5. Ease of access to isolated border towns from the grids of neighboring countries rather than from the domestic power grid.

Non-discriminatory OA to the transmission line is a key enabling factor for cross-border trade. It ensures that there is no need for dedicated transmission lines for cross-border evacuation of power from generation sources and that generating stations anywhere within the grid can be utilized for cross-border trade. For instance:

- Open Access within the Indian grid is utilized by the NTPC Vidyut Vyapar Nigam (NVVN) and PTC India for export of power to Bangladesh and Nepal.
- Export of power from the Dagchu Hydropower Plant. This is a PPP project in Bhutan that utilizes the Bhutan Power Corporation's transmission lines till the border.

Considering the nascent stage of OA to transmission lines in the South Asian region (except India), it might be beneficial to have a model framework for a non-discriminatory OA regime, which can act as a reference point for the governments, policy makers, and regulators to build OA frameworks in their respective power markets.

As there is some degree of similarity in the basic power sector framework of the South Asian countries, a common framework and guideline for the South Asian region can serve as a starting point for the process of institutionalization of the OA regime in South Asia.

The current status of key parameters of the power sector market structure, which impacts the implementation of OA, is shown in Table 17.

Table 17: Summary of Power Sector in South Asia

Country	Transmission Unbundling	ISO	Independent Regulator	OA Policies	OA Regulations	Pricing Framework	Operational Framework - CBET
Afghanistan	No	No	No	No	No	No	No
Bangladesh	Partial	No	BERC	No	No	No	No
Bhutan	Partial	No	BEA	No	No**	No	No
India	Yes	No	CERC/SERC	Yes	Yes	Yes	Yes
Maldives	No	No	MEA	No	No	No	No
Nepal	No	No	ETFC/ERC*	No	No	No	No
Pakistan	Yes	No	NEPRA	No	No	No	No
Sri Lanka	No	No	PUCSL	No	No	No	No

**Nepal: The Electricity Regulatory Bill for setting up of an independent regulatory commission has been passed by the Parliament. As on end November 2017, the Regulatory Commission has not been setup.*

***Bhutan: The Bhutan Power Corporation (BPC), which undertakes power transmission in Bhutan, allows the cross-border export projects owned by DGPC and DHPC to wheel their power through BPC's grid by paying separate wheeling charges.*

6.2 Purpose of Framework and Guidelines for Open Access Regime

The model framework for a non-discriminatory OA regime and guidelines for the grant of OA to initiate power trading and facilitate CBET in the SACs is expected to:

1. **Be a guidance document for regulators in the power sector of South Asian countries, on issues related to the Open Access regime.**
   This framework and guidelines will be useful to lawmakers and regulatory commissions in South Asia in their efforts to introduce non-discriminatory OA in their power markets. The guidelines provide details on the fixation of eligibility conditions, procedure for OA, terms and conditions, and so on.

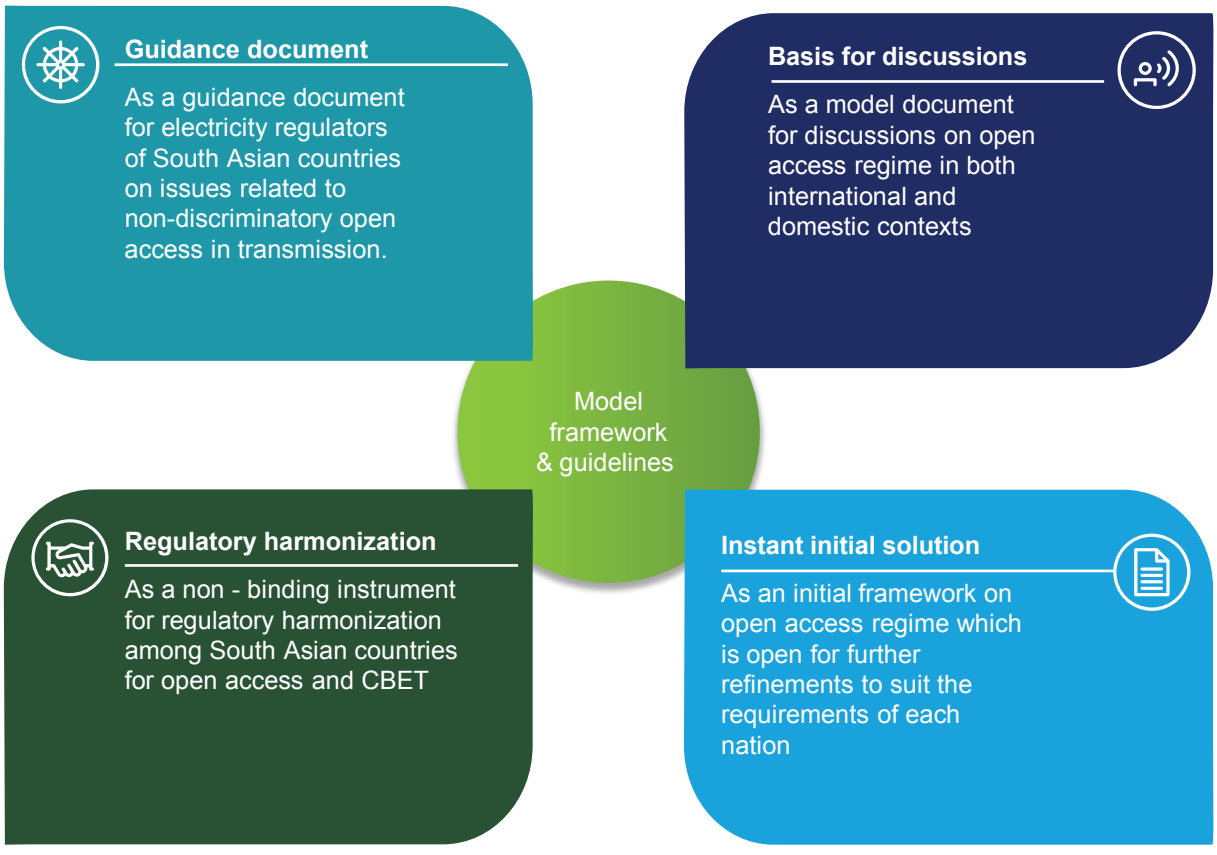
2. **Be a model document for discussions on the non-discriminatory Open Access regime in both, international and domestic contexts.**
   This framework and guidelines provide a common basis for discussions on OA in regional forums. It also allows the SACs to agree upon a synchronized roadmap and action plan to operationalize a non-discriminatory OA regime in their respective geographies.

3. **Provide an initial framework on the open access regime, which is open for further refinements to suit the requirements of each nation.**
   The framework and guidelines present an OA arrangement, which could be broadly acceptable to most of the SACs. The guidelines have been designed in such a way that member countries

can quickly initiate the process of setting up an OA regime. Further, they can improve upon them through amendments, to tailor them more in line with local and situational requirements.

4. **As a non-binding instrument for regulatory harmonization among Open Access regimes in South Asia.**
   By proposing a common framework for OA, it is expected that the evolution of OA in South Asia will be taken up in a more harmonized manner. The presence/absence of legal, regulatory, and operational inconsistencies is expected to play a key role when entities in different countries interact with each other to indulge in cross-border trade.

Figure 26: Purpose of Model Framework and Guidelines



The model framework and guidelines for an OA regime in South Asia have been developed, keeping in mind the guiding principles outlined in Table 18.

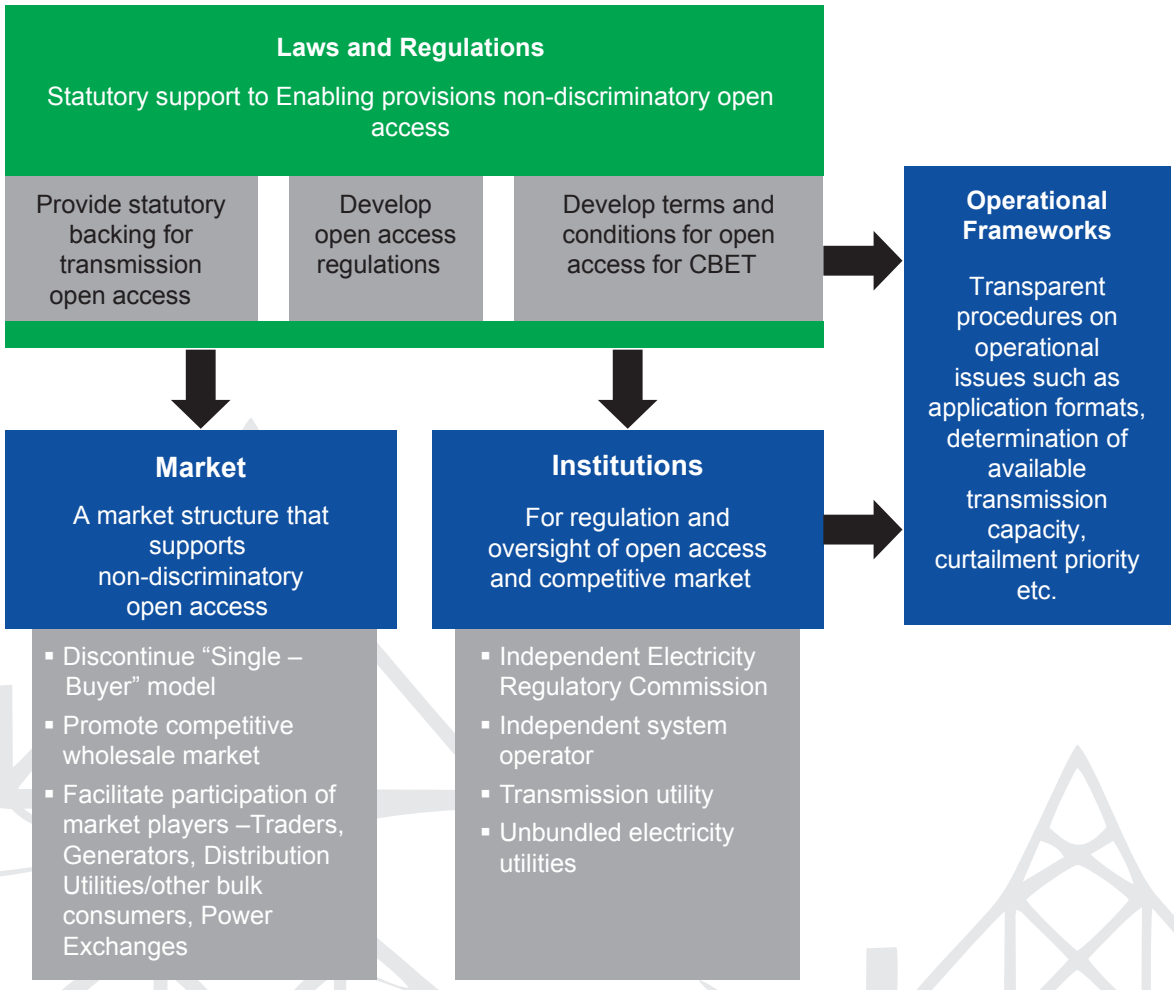
Table 18: Guiding Principles for Model Framework and Guidelines

Current scenario of Open Access regime in South Asia	The present status of non-discriminatory OA regimes in South Asia with respect to both domestic and cross-border electricity trade.
International Experience	Lessons from other countries and international power pools, such as the USA, SAPP, South America, and Europe.
Previous studies of IRADe	Previous studies undertaken by IRADe on issues related to cross-border electricity trade.
SAARC Framework	The SAARC Framework Agreement for Energy Cooperation (Electricity), 2014.
Regional experience in the context of the Indian power sector	Guidelines for cross-border trade issued by the Ministry of Power, Government of India; draft regulations on cross-border trade published by CERC of India.

6.3 Model Framework

Based on the study of OA regimes in India, other countries and regional power pools, a framework with four basic elements has been identified to form the basis for deriving guidelines for non-discriminatory OA regime.

Figure 27: Model Framework for Open Access Regime in South Asia



The framework is linked to OA in the following manner:

1. **Laws and Regulations**

   A non-discriminatory OA regime requires corresponding legal and regulatory support to be in place. Legal support is required mainly in terms of defining OA, and for the transmission utilities to provide transmission OA. In order to avoid any ambiguities, the legal framework may also explicitly allow OA and wheeling for CBET transactions.

   The regulatory framework for OA shall deal with aspects such as various types of OA, associated eligibility criteria, application fees, and determination of OA charges.

   The regulatory framework shall also specify additional eligibility criteria and terms and conditions for allowing OA for CBET transactions. This is required due to additional complexity of OA for CBET transactions, such as:

- The need for co-ordination between system operators and associated entities of different countries.
- The need for complying with statutory requirements such as grid codes and OA regulations of multiple countries.

The regulatory framework shall also strive to put in place enabling conditions for OA, including market reforms, as described here.

2. **Market Players and Enabling Conditions**
   For OA to play a meaningful role, the power market should have transitioned from a 'single buyer' model (where only the monopoly utility is allowed to indulge in power purchase and retail supply) to a competitive wholesale market (where IPPs, traders, and so on, are allowed to indulge in wholesale power sales).

   In case any of the countries are reluctant to introduce competitive markets, they may allow the market players to obtain OA for the limited purpose of cross-border electricity trade.

   The introduction of competitive market players such as power traders and power exchanges is also expected to aid in the development of the non-discriminatory OA regime. Since such entities cannot effectively function without OA, they are expected to play a key role in pushing for implementation of transmission OA.

3. **Institutions**
   The following institutions play a crucial role in OA:
   - An independent regulatory commission: for regulation, monitoring, and dispute resolution for OA.
   - An independent system operator, along with the transmission utility: to enable and providenon-discriminatory OA to electricity networks, in co-ordination with each other.
   - Unbundled electricity utilities: to avoid conflict of interest from affecting the utility's day-to-day performance on matters related to OA.

4. **Operational Frameworks**
   The operational framework refers to the development of detailed guidelines, application formats, standard templates, and procedural aspects related to OA. The procedural aspects may also deal with issues such as methodology for determination of available transmission capacity and priority of curtailment of various OA transactions.

Once such a framework is put in place, it may be expected that the interaction between the basic elements of the framework will result in further development, evolution, and improvement of the OA regime. **As Open Access is more of an evolutionary process rather than a discrete event, the market can be expected to evolve further through the interaction between these four elements and the market players.**

6.4 Regional Open Access Guidelines

Considering the guiding principles and the model framework, guidelines for the non-discriminatory OA regime have been proposed and the summary provided in Table 19.

Table 19: Summary of Open Access Guidelines

S No	Guideline	Summary
1	Introduce enabling provisions for OA	• Introduction of OA in the legislative framework for electricity. • Treatment of OA for cross-border trade. • Introducing changes in the power market structure to aid and enable OA. • Enable system operators to co-ordinate cross-border power flows.
2	Define features and eligibility criteria for connectivity and OA	• Types of OA • Tenure and priority of various types of OA • Eligibility criteria for connectivity and OA
3	Fixation of OA charges	• Segregation and fixation of transmission and system operation charges. • Application fees. • Relinquishment charges for OA.
4	Terms and conditions, and information system for OA	• Terms and conditions for OA. • OA register and other information systems.
5	Procedure for grant of connectivity and OA	• Procedure for connectivity. • Procedure for STOA, MTOA, and LTOA. • Nodal agencies, processing time lines, required documents, and so on.
6	Establishing the operational and commercial mechanisms	• Approval of detailed procedures for OA. • Committee to prepare monthly energy accounts. • Standard agreements.
7	Encouraging regional mechanisms for coordination in CBET	• Ensuring cooperation and support in the operationalization of regional forums for collaboration in CBET.

6.5 Detailed Guideline

6.5.1 Preamble

- These guidelines apply to domestic OA and OA in CBET among the SACs.
- They are non-binding in nature and are aimed to provide national governments of SAC with a consistent set of guidelines applicable to introduce OA in their respective countries and also ensuring OA in the case of CBET projects among member countries.
- The guidelines deal only with limited areas where the need for such common guidelines has been felt by the SACs and are not meant to be comprehensively dealing with all matters related to OA.
- Efforts may be made to encourage the setting up regional forums, which can act as institutional bodies working towards enabling the guidelines and facilitating required changes to be made in the national regulatory framework. Such forums may work in close coordination with the SAARC secretariat and various bodies under it. Till permanent forums are setup, transitional arrangements may be adopted, such as annual meetings of national level regulatory commissions and system operators of SACs.

6.5.2 Guideline 1: Introduce Open Access Provisions in the Electricity Sector through Enabling Legislation

Context: In order to provide non-discriminatory OA in the transmission sector, it is necessary to have enabling provisions in the legal and regulatory framework for electricity.

In South Asia, countries such as India, Bhutan and Bangladesh have already introduced non-discriminatory OA in the transmission system, through enabling legislation. India and Bhutan have supporting regulatory framework for the legal provisions relating to OA, while Bangladesh is still to provide the supporting regulatory mechanism. Other countries in South Asia do not have a defined right to OA in their respective legislations in the electricity sector.

In the USA, FERC's Order No. 888 in 1996, laid the foundation for OA to transmission. The order required all public utilities that operate/control transmission facilities to offer transmission service to all eligible wholesale buyers and sellers. To ensure that the OA is non-discriminatory, the order required the public utilities to take transmission services for their own use under the same terms and conditions offered to others, and to functionally separate transmission and power marketing functions.

Similarly, in Brazil, Law No. 9074 of 1995 gave the right to consumers with a load of 10 MW or more, at a voltage level of 69 kV or above, to become 'Free Consumers' or OA consumers.

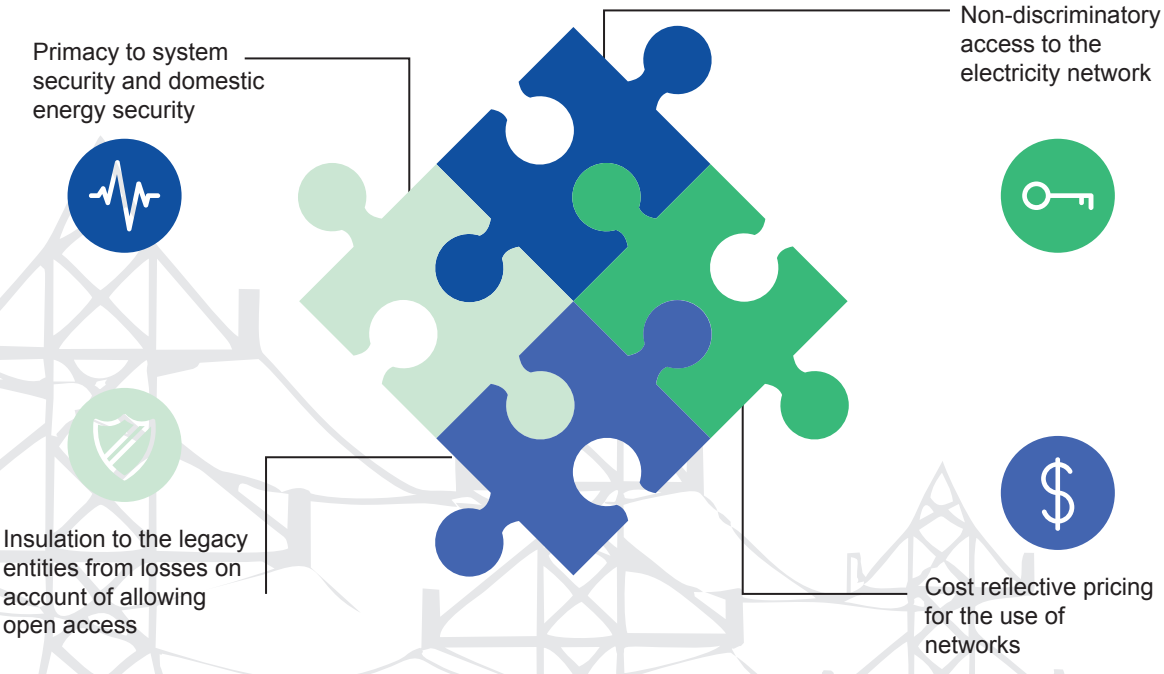
In the substantially regulated electricity markets of South Asia, it is important to have a defined legal and regulatory framework for non-discriminatory OA, so that the same may be put to use in the context of cross-border trade as well.

The legislative framework for electricity shall be amended to introduce the concept of non-discriminatory OA to transmission networks in a phased manner, with the modalities of phasing to be determined by the federal regulatory body/Government. Initially, OA may be introduced through regulations. However, at the earliest, efforts may be made to provide statutory backing to OA through legislation.

Basic provisions regarding grant of OA and the duties and obligations of persons availing OA will be incorporated either in the legislative amendments or through regulations.

The OA framework will be based on the guiding principles presented in Figure 28.

Figure 28: Guiding Principles for Open Access



Necessary changes in the power market structure of the country may be introduced to support OA. This shall include:

- Constitution of a national level independent system operator, either by segregating the system operation function from the transmission utility, or by setting up a new entity.
- Organizational and financial ring fencing of the independent system operator from other businesses of the system operator, its parent entities, or its subsidiaries. In cases where the system operator function is currently established within the transmission utility, this can be done by transferring the ownership of the system operator from the transmission utility to the Government, with the Government thereafter maintaining a prudent distance from the operations of the independent system operator.
- Reconstitution of legacy entities, to prevent the system operator and transmission utilities from indulging in power trading. *(This is to avoid possible conflict of interest during transmission corridor allocation, curtailment, and so on.*)

The legislative and regulatory framework for OA shall be exhaustive enough to cover CBET. Open Access under CBET may be treated in a similar manner to OA in the domestic market, by considering the interface points between the networks of different countries as the respective injection/drawal points. However, such OA may require stricter terms and conditions (Guideline 4). The system operator at the federal/national level shall be empowered to approve and co-ordinate cross-border electricity transactions, in coordination with the transmission utility owning the cross-border transmission lines.

In the long term, subject to the respective Government policy, the framework shall strive to support CBET transactions when the electricity network is used only for wheeling of power through the territory of a country, with the injecting entity and drawing entity located in other neighboring countries.

6.5.3 Guideline 2: Define Features and Eligibility Criteria for Connectivity and Open Access

Context:

Along with the fundamental provisions for OA, there are detailed aspects that need to be considered, such as how many types of OA will there be, what will the eligibility criteria be,the priority, and so on. In India, this is determined through CERC's regulations on OA.

In the USA, FERC's order no. 2003 in 2003, defined aspects such as the capacity for generator interconnection and queue priority for OA.

Another aspect addressed in this guideline is the need for distinction between physical connectivity to the grid and OA to the transmission network.

There will be a clear distinction between the concepts of connectivity and OA. Connectivity will deal with the physical connection to the grid,while OA will deal with injection, transmission, and drawal of power by utilizing the grid. Thus, while connectivity is a necessary condition for OA, the grant of connectivity, by itself, does not confer the right for OA.

While it is for the respective countries to specify the terms and conditions for connectivity to their grid, the countries may strive to allow connectivity, at least to the entities, satisfying the following eligibility criteria, subject to adherence to the process for application for connectivity, and payment of prescribed fees:

- Connected load/installed capacity of more than 50 MW.(As lower capacity supply sources/loads are typically allowed connectivity to medium/low voltage lines).
- Construction of interface line from the applicant's boundary to the nearest technically feasible connection point in the grid.
- Connected to the transmission network at a voltage of 66kV and above.(The voltage level of 66 kV and above typically corresponds to the voltage level of high tension transmission network in South Asia).
- Adheres to the technical standards for connectivity to the grid, including those related to safety, protection, and communication.

The OA transactions may be categorized as short term, medium term and long term, based on the tenure. There shall be additional categorization/identifier, for distinguishing cross-border transactions from domestic transactions. Thus, overall there may be at least six types of transactions: domestic short term, medium term, long term and cross- border short term, medium term and long term. If required, the cross-border transactions may again be separately classified as import and export.

Long-term OA will have priority over medium- and short-term transactions. However, while short- and medium-term OA may be allowed on available transmission margins, long-term open access may be allowed, based on dedicated transmission capacity set aside in the system for such long-term access. A summary of the salient features of various categories of OA is provided in Figure 29.

Figure 29: Categories of Open Access

		Tenure	Transmission Corridor	Scheduling Priority	Curtailment Priority
STOA	**Short Term**	Up to 1 Month	On margins available in the system	Least	First
MTOA	**Medium Term**	3 Month – 5 Years	On margins available in the system	Intermediate	Intermediate
LTOA	**Long Term**	> 7 Years	On dedicated capacity	First	Least

The basic eligibility criteria for OA will comprise the following, at the minimum.

Table 20: Eligibility Criteria for Open Access

<table>
<tr><th>Type</th><th>Criteria</th><th>Description</th></tr>
<tr><td>Legal</td><td>Type of entities</td><td>Generating and distribution companies, power exchanges and consumers directly connected to the transmission system may be eligible for applying for OA.

Trading licensees may also be allowed to apply for OA, on behalf of injection and drawal entities, subject to these entities having a valid connectivity and an endorsed application.</td></tr>
<tr><td></td><td>Phased introduction of OA</td><td>The drawal and injecting entities will fall under the eligible category of entities who have been allowed OA by the Government/regulatory commission, under the prevalent phase of OA introduction.

In the initial phase, entities with a connected load/installed capacity of more than 50 MW and direct connectivity with the grid at 66 kV or above, may be allowed OA. (The capacity and voltage level conditions may be relaxed further in the future)</td></tr>
<tr><td></td><td>Nationality</td><td>Trading licensees, power exchanges, generating companies, distribution companies, and consumers incorporated outside the country may also be allowed to apply for OA, if the application is endorsed by the domestic drawal/ injection entity.</td></tr>
<tr><td>Technical</td><td>Connectivity</td><td>The applicant shall have direct connectivity with the grid at 66 kV or above. (The voltage level may be relaxed further in the future).</td></tr>
<tr><td></td><td>Transmission margin</td><td>For STOA and MTOA, the existing network will have sufficient margins to accommodate such transactions, at least during a part of the tenure.

For LTOA, the network will have equivalent dedicated transmission capacity available throughout the tenure. In case such capacity is not available, necessary network augmentation may be done.</td></tr>
<tr><td></td><td>Energy accounting</td><td>Interface meters adhering to the requisite technical standards, and associated systems for proper energy accounting, will be available in both the injection and drawal points.</td></tr>
<tr><td></td><td>Technical standards</td><td>The entities at both the injection and drawal points and the applicant will be in compliance with the technical standards for connectivity to the grid, if such standards are notified by a regulatory commission/any Governmental authority.</td></tr>
<tr><td>Commercial</td><td>Payment defaults</td><td>The applicant will not have been declared to be in payment default to any of the legacy electricity utilities for a period of more than three months.</td></tr>
<tr><td></td><td>Payment security</td><td>The applicant will have furnished adequate payment security and additional security deposit.
<table>
<tr><th>OA Tenure</th><th>Payment Security</th><th>Additional Deposit</th></tr>
<tr><td>LTOA</td><td>2 month charges</td><td>2 month charge</td></tr>
<tr><td>MTOA</td><td>2 month charges</td><td>2 month charge</td></tr>
<tr><td>STOA</td><td>Charges for the applied tenure</td><td>1 month charge</td></tr>
</table>
While the payment security may be in the form of a letter of credit, additional security deposit may be in the form of an irrevocable bank guarantee.</td></tr>
<tr><td>Additional criteria for CBET OA transactions</td><td></td><td>Applicants may be made to furnish additional security deposits equivalent to one month OA charges, to cover for the possibility of payment default on part of an entity located outside the border.</td></tr>
<tr><td></td><td></td><td>Stricter capacity limits (more than 50 MW) and connection voltage (more than 66 kV) may be specified by the respective countries for entities indulging in cross-border OA, as part of the phased introduction of open access.</td></tr>
</table>

6.5.4 Guideline 3: Determination of Regional Open Access Charges

Context:

The pricing regime for open access shall be predefined to avoid ambiguities and disputes during the operative period of open access. This shall especially cover aspects such as transmission pricing and system operation charges.

A comprehensive framework for fixation of open access charges is available in India through separate regulations on open access, transmission pricing and recovery of charges of load dispatch centers.

In USA, FERC's order no. 888 in 1996 required all public utilities that operate / control transmission facilities file an open access transmission tariff with FERC.

The guideline on fixation of open access charges has been developed keeping in mind the principle that charges, while reasonable, shall also be adequate to allow the entities allowing open access to recover their costs.

Any entity availing the open access on regional transmission network will pay the associated transmission open access charges and system operation fees. The determination of these charges will be the responsibility of respective regulatory commissions. For example, in case of India, transmission charges are determined under a Point of Connection methodology wherein separate charges are applicable at injection and drawal points in the system.

The regulatory authority shall separately determine the charges for transmission and system operation. For transmission pricing, in the long term, the regulator may strive to adhere to a transmission pricing regime which is sensitive to distance, direction and quantum of power flow, like the Point of Connection tariff in India. The system operation and scheduling charges shall be adequate to compensate the system operator for its capital and operational expenditure.

Costs for any transmission facilities dedicated for export of power shall be recovered entirely as wheeling / transmission charges. Such costs shall not be chargeable from electricity consumers within the domestic market.

In addition, in line with the regulatory framework of the respective countries, other charges such as imbalance settlement / deviation settlement charges, reactive energy charges etc. may also be collected.

The transmission losses, as determined by the regulatory authority / system operator / energy account settlement agency, shall also be applicable on the open access transactions. Losses at voltage level of 66 KV and above, shall ideally be not clubbed together with losses of voltage below 66 KV, while determining the losses.

For all applications related to connectivity and open access, the respective nodal agency may collect a pre-determined application fee, as specified in the open access procedure / guideline, notified by the regulatory authority. The application fee shall not be unreasonably excessive. However, it shall be made sure that the fee compensates the nodal agency for the costs incurred by it towards application processing, maintaining information system, conducting system studies etc.

To start with, fees for the connectivity applications may be set as 2,000 USD for connectivity related applications, and 3,000 USD for short / medium term open access applications, and 5,000 USD for long term open access applications.

The fees shall be payable to the transmission utility for undertaking the necessary system studies and load flow analysis required for evaluating open access applications[6].

For grant of connectivity, in addition to the application fee, the applicant shall be required to pay additional charges based on the regulatory regime of respective countries, such as the costs for any additional capital expenditure incurred by the utility for enabling connectivity.

For grant of open access, a one-time registration fee may also be collected by the system operator under whose jurisdiction the market participant is situated. To clarify, this registration needs to be done only once during the entire life of the applicant, and not for each time open access is applied for. This fee is to be utilized by the system operator for registering the entity in the open access register, capturing the salient technical features, and integrating the entity in the energy accounting and scheduling system. The fees is expected to cover the lifetime costs for maintenance of an up-to-date open access register. The fees is also expected to cover expenses related to setting up IT infrastructure for the open access registry[7]. An alternative is for countries to recover these charges also as part of the monthly system operation / load dispatch charges instead of a one-time payment.

Table 21: System operator registration charges

Entity	Registration Charges
Transmission and distribution companies	USD 500
Generation companies	• Less than 100 MW: USD 150 • 100-1000 MW: USD 300 • > 1000 MW: USD 500
Trading companies	USD 150
Power exchanges	USD 500

In case the open access is voluntarily relinquished by an entity, the following relinquishment charges shall be applicable:

Table 22: Relinquishment charges for open access

Open Access	Relinquishment Charges
LTOA, for consumer who has completed 7 years of LTOA	• Zero relinquishment charges, if notice period of 1 year provided between the date of intimation and date of relinquishment. • In case the provided notice period is lesser, 66% of the transmission and system operation charges for the period falling short of 1 year notice may also be paid. [Explanation: 66%, i.e. 2/3rd of charges prescribed, as there needs to be an incentive to the consumer to surrender the capacity he no longer requires, instead of merely underutilizing it for an year]

[6]The proposed application fees for connectivity (2000 USD) is comparable to the fees charged in India, which is in the range of 3000 to 14000 USD, depending on MW capacity. In case of medium term open access, the proposed application fee of 3000 USD may be compared with India's fee of 1500 – 6000 USD, depending on MW capacity. In case of long term open access, the proposed application fee of 5000 USD may be compared with India's fee of 3000 to 14000 USD, depending on MW capacity. Considering that open access is mostly in an initial stage in South Asian countries other than India, a flat application fee, not linked with MW capacity is suggested in these guidelines.

[7]India's CERC had also floated a staff paper on 'National Open Access Registry' which envisages one time application fees, though no separate value has been specified for the same. It is better to have these charges specified initially itself in case of countries other than India. The proposed charges are comparable to registration charges for India's Renewable Energy Certificate scheme.

Open Access	Relinquishment Charges
LTOA, for consumer who has not completed 7 years of LTOA	• Net present value of 66% of the transmission charges, corresponding to the stranded transmission capacity, for the period falling short of 7 years of LTOA, if notice period of 1 year provided between the date of intimation and date of relinquishment. The nodal agency which granted the open access shall also determine the stranded transmission capacity, which shall not be more than 100% of the LTOA quantum. The nodal agency shall also adopt a common policy for determination of discount factor, for the purpose of calculation of net present value. *[Explanation: Transmission charges pertaining to only the stranded capacity may be recovered, as the remaining transmission capacity will be reallocated to other applicants]* • In case the provided notice period is lesser, 66% of the transmission and system operation charges for the period falling short of 1 year notice may also be paid.
MTOA	• Transmission charges for the remaining period of open access, from the date of relinquishment to be paid; subject to a maximum of one month. • Minimum notice period of 30 days between the date of intimation and date of relinquishment. In case the provided notice period is lesser, transmission charges for the period falling short of 30 days' notice may also be paid.
STOA	• Transmission charges for the remaining period of open access, from the date of relinquishment to be paid. • Minimum notice period of 3 days between date of intimation and date of relinquishment. In case the provided notice period is lesser, transmission charges for 3 days shall also be collected, in addition to the charges for the remaining period of open access.

6.5.5 Guideline 4: Terms and Conditions, and Information System for Open Access

Context:

Before granting OA, it is necessary to define the terms and conditions of OA, which the applicants will have to agree to comply with. Meanwhile, the stress on the 'non-discriminatory' aspect of OA puts obligations on the agencies approving OA to maintain information systems that support fairness and transparency.

India's regulatory framework for OA specifies the terms and conditions, information reporting requirements, information publishing requirements, and so on.

In the USA, FERC's Order No. 889, addressed matters needed to implement OA. The rule established the Internet-based Open Access Same-Time Information System (OASIS) for posting available transmission capacity and reserving transmission capacity.

In the Central American Interconnection System (SIEPAC), the Regional Electricity Market Regulations (REMR) specifies the obligations, rights, and technical requirements to be satisfied by all market participants.

Open Access will be undertaken while ensuring maintenance of technical and safety standards of the grid, availability of commercial mechanisms for payment, payment defaults, and dispute resolution; market mechanisms for reporting, monitoring, and surveillance. Therefore,the terms and conditions for OA will include:

- Adherence to technical standards and codes, including the grid code,any additional standards related to metering, protection, safety, and so on.
- Adherence to the scheduling framework, dispatch instructions, and restrictions imposed by the system operator

- Maintenance of the stipulated performance guarantees and security deposits.
- Timely payment of fees and charges.
- Curtailment in case of congestion in the grid.
- Timely filing and reporting of transaction information.
- Assistance in the investigations of an OA nodal agency and regulatory authorities, and so on.

For the terms and conditions for OA under CBET, the following additional aspects will have to be specified:

- Grid code, scheduling, dispatch procedures, and other technical standards and codes of both the countries shall be complied with, up to the maximum extent possible.
- The payment security and additional guarantee, as specified in Guideline 2, may be opened with banks having branches in both the countries involved.
- The parties involved will agree to mutual dispute resolution at the regional level, failing which the matter will have to be resolved through international arbitration. (At least until the period when well established regional dispute resolution mechanisms are in place).

The nodal agency may be empowered to take penal action against the OA user, if it is satisfied of the violation of OA terms and conditions, after conducting investigations.

An OA register, maintained by the system operator, in coordination with the CTU,will be the fundamental building block for information systems related to OA. The register may provide unique IDs to each OA participating entity and capture their salient features. Any OA transaction may then be linked with the corresponding entity IDs in the OA register. In the interest of transparency, all parts of the OA register, except the commercially sensitive information, will be made available by the system operator on their website.

The nodal agencies will be required to publish details of submitted, pending, and finalized OA applications. The list will contain at the minimum:

- Name of the applicant.
- Quantum applied for.
- OA tenure.
- Injection and drawal entities.
- Injection and drawal points.
- Application status.
- Reasons for denial of OA.

The system operator, in co-ordination with the central transmission utility, will conduct system studies and publish corridor-wise total transmission capacity, available transmission capacity, and available transmission margins, for the current period and forecast for the future. This will allow the entities to plan for MTOA and STOA.

6.5.6 Guideline 5: Procedure for Grant of Connectivity and Open Access

Context:

A well-defined procedure for OA can help in reducing subjectivity, thereby improving the fairness of the process.

Within South Asia, a detailed procedure for OA is currently available only in India. The detailed procedure document for OA and connectivity, is prepared by the CTU* and approved by CERC.

** Procedure for short-term OA is prepared by the system operator, POSOCO.*

In the international context, the USA has OA operational procedures for ISOs/ RTOs. In places where there is no ISO/RTO, the utilities have their own process within the regulations prescribed by the FERC. Ata regional level,SAPP has operational guidelines as one of the governing documents.

The procedure for connectivity and OA will be laid out by the regulatory authority, either as regulations or as procedures approved by the regulatory authority.

Nodal agencies will be identified for each category of OA and will receive the application and take decisions on it. While the procedure is to be specified by the regulatory agency/ Government, the transmission utility/system operator may be identified as the nodal agencies for processing OA applications.

The procedure shall clearly specify entities that may be approached for approvals and clearances for OA, along with the required application fee and charges.

The procedure may also specify timelines for each entity to process the requests related to OA.

A summary of suggestions of some of the aspects related to the procedure for applying for connectivity are provided in Table 23.

Table 23: Summary of Procedures for Connectivity

Procedural Aspect	Connectivity for Generating Stations	Connectivity for Distribution Companies/Bulk Consumers
Nodal Agency for connectivity	Central Transmission Utility.	Central Transmission Utility.
Timeline for submission of application	At least two years before operationalization of connectivity (one year in the case of solar power plants that are not remotely located).	At least one year before operationalization of connectivity.
Documents to be attached along with application	• Proof of project initiation (site identification, land acquisition, environmental and forest clearances, fuel and water arrangements, and so on). • Survey map. • Site plan. • Single line diagram. • Generator configuration. • Related technical details. • Proof of payment of application fees.	• Survey map. • Site plan. • Single line diagram. • Related technical details. • Proof of payment of application fees.
Timeline for processing of application	Within 90 days.	Within 90 days.
Timeline for operationalization of connectivity	Not more than two years from the date of signing of connectivity agreement (one year in the case of solar power plants that are not remotely located).	Not more than one year from the date of signing of connectivity agreement.

Procedural Aspect	Connectivity for Generating Stations	Connectivity for Distribution Companies/Bulk Consumers
Appellate Authority	Regulatory Commission (if present)/ Government-nominated department.	Regulatory Commission (if present)/ Government-nominated department.

Sample application formats for connectivity are provided in the Annexures.

A summary of suggestions of some of the aspects related to the procedure for applying for OA are provided in Table 21.

Table 24: Summary of Procedures for Open Access

Procedural Aspects	STOA	MTOA	LTOA
Nodal agency	System operator at the federal/national level.	Central Transmission Utility.	Central Transmission Utility.
Timeline for submission of application	Within four months before the required start of OA, and at least three days in advance.	Within five months to one year before the required start of OA.	At least three years before the required start of OA.
Documents to be attached along with application	• Proof of satisfaction of eligibility criteria (Guideline No. 2) • Proof of connectivity of injection and drawal entities. • Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees • Proof of payment of bank guarantee towards transmission and system operation charges for the duration of STOA.	• Proof of satisfaction of eligibility criteria (Guideline No. 2). • Proof of connectivity of injection and drawal entities. • Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees. • Copy of power purchase agreement.	• Proof of satisfaction of eligibility criteria (Guideline No. 2). • Proof of connectivity of injection and drawal entities. • Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees. • Bank guarantee of US$ 200/MW. • (In case injection /drawal entities are not finalized, the target region may be specified).
Timeline for processing of application	Within three days.	Within 60 days.	Within 120 days.
Priority for processing of application and grant of OA	• Applications processed on a first come first serve basis	• Applications processed on a monthly basis. • Priority for applications for longer duration of MTOA, in case of applications received within the same month. • Priority for applications received earlier, in case of application received in different months.	• Applications processed on a monthly basis. • Priority for applications for longer duration of MTOA, in case of applications received within the same month. • Priority for applications received earlier, in case of application received in different months.

Procedural Aspects	STOA	MTOA	LTOA
Additional documents to be submitted after intimation of approval of OA	Nil	• Signed MTOA agreement. • Bank guarantee for transmission and system operation charges for two months.	• Signed LTOA agreement. • Bank guarantee for execution of system strengthening activities identified for operationalization of LTOA. • Bank guarantee for transmission and system operation charges for two months. • Copy of PPA.
Amendment allowed after approval of OA	Nil	• Change of quantum, up to 50 MW. • Change of injection point, up to 20 km, subject to network feasibility. • Change of drawal point, subject to network feasibility.	• Change of quantum, up to 200 MW. • Change of injection point, up to 50 km, subject to network feasibility. • Change of drawal point, subject to network feasibility.
Renewal of OA	Not allowed.	Not allowed.	• Allowed, in case of no change in injection point, drawal point and quantum, if application for renewal is submitted at least six months prior to expiry of LTOA.
Timeline for operationalization of OA	Minimum of three days from the date of approval.	Minimum of three months from the date of signing of the MTOA agreement.	Minimum of two years from the date of signing of the MTOA agreement.
Appellate Authority	Regulatory Commission (if present)/Government-nominated department.	Regulatory Commission (if present)/Government-nominated department.	Regulatory Commission (if present)/Government-nominated department.

The sample application formats for OA are provided in 'Annexure 5: Illustrative sample formats and agreements'.The nodal agencies will strive to operationalize IT-based systems for faster processing of connectivity and OA applications.

6.5.7 Guideline 6: Establishing the Operational and Commercial Mechanisms

Context:

Absence of well-defined operational and commercial mechanisms introduces ambiguity, increases the possibility of disputes, and lowers the confidence of investors.

Within South Asia, operational and commercial mechanisms for OA are well established only in India. This consists of procedural documents, application formats, agreement formats, joint coordination meetings organized by the CTU, and meetings under the Regional Power Committees.

In the international context, SAPP has a detailed operational process for energy accounting, planning and energy exchange with their procedures. In the USA, FERC's Order No. 2003 issued in 2003, required all public utilities that own, operate/control transmission facilities in interstate commerce to file revised OA transmission tariffs, which was required to include standard generator interconnection procedures and a standard agreement.

The respective nodal agencies for OA will be responsible for preparing the operational guidelines and detailed procedure for OA, which shall then be approved by the regulator.

The operational guidelines shall cover aspects such as:

- Detailed procedure for determining the technical feasibility of OA.
- Manner of prioritization of applications.
- Manner of curtailment in case of congestion.
- Detailed procedure for undertaking network capacity augmentation.
- Procedure for handling of minor changes, amendments, and so on.

The system operator, in co-ordination with the respective nodal agencies will strive to maintain a comprehensive OA registry, which will have details of participating entities, energy transaction details, and payment details.

A committee under the federal level system operator, with representatives from central transmission utilities will be constituted to prepare monthly energy accounts at the national level. This committee may also interact with similar bodies in other countries for confirmation and reconcilement of CBET transactions.

The commercial framework will also lay down standard agreements and other terms such as:

- Agreement for connectivity.
- Agreement for OA (based on tenure).
- Agreement between central/federal transmission and other transmission utilities.
- Payment terms, payment security, settlement timelines, and so on.

There will be coordination forums for initial efforts towards dispute resolution regarding OA, failing which other legal remedies may be allowed.

6.5.8 Guideline 7: Encouraging Regional Mechanisms for Coordination in CBET

Context:

Regional coordination mechanisms are a crucial part of CBET, as the actions taken by one country with respect to CBET may have a bearing on other countries. Synergy between the actions of different constituent countries of CBET is important from the perspective of efficiency.

In South Asia, currently there is no established forum of either electricity regulators or system operators at the regional level. In fact, in the energy sector, there are very few regional bodies such as the SAARC Energy Secretariat.

Within India, there are bodies such as the Forum of Regulators (FOR), the Forum of Load Dispatchers (FOLD), and the Regional Power Committees (RPC). There are regional level regulatory bodies such as the Comisión Regional de Interconexión Eléctrica (CRIE) in the Central American Interconnection System, the Regional Electricity Regulators Association (RERA) in SAPP and the ECOWAS Regional Electricity Regulatory Authority (ERERA) in the West African Power Pool (WAPP).

Similarly, there are examples of international coordination in system operations and transmission, such as the European Network of Transmission System Operators for Electricity (ENTSO-E) in Europe, the Ente Operador Regional (EOR) in case of CRIE, and the North American Electric Reliability Corporation (NERC) in the North American bulk electric system covering the USA, Canada and Mexico.

Open Access for CBET in South Asia will require regular coordination at the regional level in terms of:

- Regulatory harmonization.
- Finalization of energy accounts.
- Coordination in system operation.
- Dispute resolution and so on.

For these purposes, there may be efforts in the future for the constitution of various relevant forums of regulators, system operators, and so on, at the regional level. As the operations of such forums are crucial for the smooth operation of CBET, the SACs may strive to give their cooperation and support in the operationalization.

Till permanent forums are setup, transitional arrangements may be adopted, such as annual meetings of national level regulatory commissions and system operators of SACs.

Implementation Roadmap

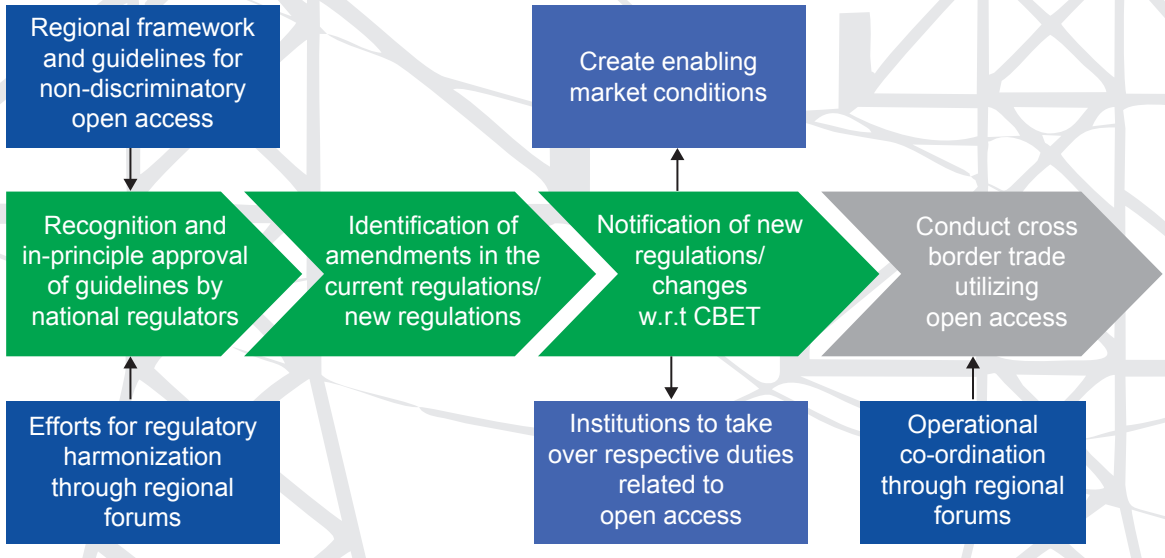
7.1 Regional Level Action Plan

The following roadmap is proposed for the implementation of the model guidelines for non-discriminatory OA for transmission in South Asia. This primarily consists of the following efforts at the national level, backed by regional attempts for regulatory harmonization for OA:

- National governments and regulators to confer in principle approval to the guidelines, while maintaining the right to deviate, if necessary.
- National regulators shall identify changes required in the national regulations for enabling the CBET OA guidelines
- National governments and regulators to notify amendments and new legislations, regulations and procedures for implementation of the CBET OA guidelines.

An implementation roadmap for the operationalization of non-discriminatory OA in transmission, for the promotion of cross-border trade is provided in Figure 30.

Figure 30: Roadmap and action plan for non-discriminatory open access regime in South Asia



The roadmap can be viewed to constitute three major phases:

1. **In-Principle Approval for the Guidelines**
   The federal/central governments and regulatory commissions in SACs may confer in-principle approval for the guidelines, after discussions in regional forums/regional meetings. This will pave the way for setting up a legal and regulatory framework for OA in the respective countries.

2. **Putting in Place Legal and Regulatory Framework**
   The countries may set up the legal, regulatory, and institutional frameworks required for OA, including:

   - Making a provision in laws, defining OA, and requiring the transmission utilities to provide non-discriminatory OA to the transmission network.
   - Defining the institutions for handling regulatory and operational aspects of OA.
   - Notifying regulations for OA, including specifications of additional requirements for obtaining OA for cross-border trade.
   - Notifying regulations and orders to create enabling market conditions, such as unbundling of utilities to carve out a separate transmission utility and granting autonomy to the system operator.

These require an initial identification of amendments and new laws/regulations and subsequent drafting and notification. As the amendment of laws could take time, subject to legal feasibility, the option of commencement of OA, through regulatory changes, may also be explored. A country-wise action plan is explained in more detail in 6.2.

However, in case the countries are reluctant to introduce reforms in the domestic market, including unbundling of integrated utilities, but keen to explore cross-border trade opportunities, they may choose to limit their reforms to an independent system operator and allow transmission OA for cross-border transactions.

3. **Conduct Cross-Border Trade**
   Once the legal, regulatory, and institutional mechanisms are in place, and the market has been restructured, OA can be commenced, in both the domestic and cross-border contexts.

   When OA is operationalized, the framework can be further refined and improved, based on the operational feedback and discussions at the regional and national levels. Some of the areas where regional coordination may prove to be beneficial include:

   - Allowing entities set up in other countries to apply and obtain OA to the transmission network in another country.
   - Planning for long-term market reforms such as wheeling of power through more than two countries.
   - Sharing of information to assist in timely compilation of energy accounts.

However, it may be noted that the roadmap is not perfectly sequential with respect to the SA region, as countries that have already completed some of the stages mentioned, can start with the implementation of subsequent stages. Also, even without a wider regional coordination, cross-border trading can continue to be conducted through government-to-government agreements and treaties.

7.1.1 Transitional Mechanisms for Institutional Framework

The regulatory commission is the key institution in each of the countries, with regard to operationalization of the OA regime. However, in the case of the following countries, independent regulatory commissions at the national level have not yet been setup. In these countries, the alternate government bodies that may be entrusted with the regulatory functions with regard to trading license regimes are listed in Table 25.

Table 25: Transitional Institutions for Regulation of Trading Licensees

Country	Institution
Nepal	Department of Electricity Development (*Only till the time regulatory commission is set up under the new law*).
Afghanistan	Ministry of Energy and Water.

In the rest of the countries, the existing regulatory bodies may take over the duties towards regulation of OA.

Another key institutional entity in OA is the system operator. A separate system operator or, at least, a separate system operation wing within a transmission utility is already constituted in the case of India, Bangladesh and Pakistan.

However, the system operator's function is embedded within a bundled utility in case of Afghanistan (DABS), Bhutan (BPC), the Maldives (STELCO, FENACA), Nepal (NEA) and Sri Lanka (CEB). These countries shall try to either carve out the system operation as a separate entity, or create the transmission and system operation as a separate entity from the current bundled utility structure. Till the time of such unbundling, the regulatory commissions may consider issuing a special order granting autonomy for the system operation wing/division/department and transmission wing/division/department on matters related to OA.

7.2 Country-specific Action Plan

The countries in South Asia are at various stages of development in moving towards the OA framework in the transmission sector. The implementation of the OA framework at the regional level would require an alignment of institutional capabilities, policy drivers, regulatory framework, and operational procedures at the respective country's power market. The following table shows the country-specific action plan.

Country	Short Term	Medium Term	Long Term
Afghanistan	• Prepare OA implementation roadmap and identify changes in the policy and regulatory framework. • Plan changes in the institutional framework such as separation of transmission and system operation functions. • Implement CBET framework as envisaged in the CASA 1000 project.	• Develop a regulatory framework to support the OA framework. • Implement legal and policy for implementation of the OA framework for the domestic power sector.	• Legal and policy for implementation of the OA framework for cross-border electricity trade.

Country	Short Term	Medium Term	Long Term
Bangladesh	• Changes in legal and policy framework for implementation of the OA framework for CBET, including extending OA to CBET by amending its Electricity Act, and by notifying OA regulations. • Identify and implement the key initiatives identified under Indian CBET guidelines.	• Mandate regulatory authorities to evolve a regulatory framework for OA in the domestic power system and for CBET.	• Align to the operational framework for regional CBET.
Bhutan	• Changes in legal and policy framework for implementation of the OA framework for CBET (extend OA provision in the Electricity Act 2001 to cover cross-border trade and issue OA regulations). • Identify and implement the key initiatives identified under the Indian CBET guidelines.	• Mandate regulatory authorities to evolve a regulatory framework for OA in CBET.	• Align to the operational framework for regional CBET.
India	• Finalize CBET guidelines after discussions at the regional level. • Develop operational procedures for CBET guidelines.	• Implementation of OA in CBET.	• NA
Maldives	• NA	• Grant autonomy to the system operation division within STELCO and FENACA.	• Create/enhance interconnection between islands, wherever possible.
Nepal	• Introduction of OA for both domestic and cross-border contexts (can be issued as regulations by the regulatory commission, once it is constituted). • Include provisions that are compliant to the Indian CBET guidelines in the institutional framework and for policy changes.	• Mandate regulatory authorities to evolve regulatory framework for OA in the domestic power system and for regional CBET.	• Notify fresh regulations for regional OA framework. • Align to the operational framework for regional CBET.
Pakistan	• Legal and policy for implementation of the OA framework for CBET (amendment of Electric Power Act 1997, to extend OA for cross-border trade also). • Institutional framework: Separation of transmission and system operation functions.	• Introduce regulatory framework for implementation of the OA framework for CBET.	• Align to the operational framework for regional CBET.
Sri Lanka	• Introduction of the OA framework in statutory acts, for both domestic and cross- border contexts (amendment of Electricity Act 2009). • Institutional framework: Separation of transmission and system operation functions.	• Introduce a regulatory framework for the implementation of the OA framework for CBET.	• Align to the operational framework for regional CBET.

Country	Short Term	Medium Term	Long Term
All South Asian Countries	• Initiate discussions under existing regional forums for regional framework on OA for CBET.	• Support the creation of new institutions such as South Asia Forum of Regulators (SAFER). • Support efforts for regulatory harmonization at the regional level. • Sharing of market information for energy accounting and market surveillance.	• Explore possibilities for setting up regional power exchange, expanding electricity trade with South East Asian countries. • Explore the possibilities of long-term market reforms, such as wheeling of power through more than two countries.

Though these have been developed, based on a study of the existing framework, international best practices, and the framework proposed in this report, the respective countries may modify it further, as per their requirements, as long as it is in line with the broad roadmap discussed in Section 6.

India's CBET Regulations and OA Consultation Paper

8.1 India's Proposed CBET Regulations

The Ministry of Power, Government of India, notified the 'Guidelines on Cross-Border Trade of Electricity' in December 2016. According to the MoP, the guidelines were prepared in order to facilitate and promote cross-border trade of electricity with greater transparency, consistency and predictability in the regulatory approaches across jurisdictions and minimize the perception of regulatory risks.

Later, the MoP was also appointed member (Power Systems) of the Central Electricity Authority as the 'Designated Authority' under the guidelines. The 'Designated Authority' will facilitate the process of approval, laying down the procedure for cross-border transaction and trade in electricity.

In line with the Ministry's guidelines, CERC notified the draft of Regulations on Cross-Border Trade of Electricity in February 2017. CERC has proposed the OA framework for CBET, based on the domestic framework for OA and, therefore, there is uniformity in terms of the nodal agency for application of LTOA/MTOA/STOA, segregation of concepts of connectivity and OA, procedure for OA, and so on. However, there are some variations also, such as a steeply higher construction bank guarantee of INR 1 crore/MW to insulate the CTU against developers abandoning the proposed CBET project.

A review of the proposed CBET framework of India reveals the following aspects, which aid/ support the development of the framework and guidelines for the non-discriminatory OA regime in transmission in the SACs:

Table 26: Merits of India's CBET Guidelines and Regulations

No.	Aspect	Merit
1	Cross-border transmission interconnections to be planned jointly between transmission planning agencies of the respective countries, with the approval of the respective governments. *(GoI Guideline, 8.1.1)*	Enables coordinated planning and execution of cross-border transmission lines.

No.	Aspect	Merit
2	Participating entities declared as eligible to undertake cross-border trade through Indian power exchanges, subject to approval from the 'Designated Authority'. *(GoI Guideline, 7.1)*	Allows entities outside India to participate in India's competitive market for wholesale electricity.
3	Disputes involving entities of separate countries may be settled through the Singapore International Arbitration Center or, as may be mutually agreed, by the participating entities. *(GoI Guideline, 10.2)*	Allows international arbitration instead of limiting jurisdiction within Indian judicial system.
4	Member (Power Systems), CEA identified as the 'Designated Authority' to coordinate with nodal agencies of neighboring countries on CBET. *(GoI Guideline, 5.1, GoI 14/1/2016-Trans (Vol. II) – 3)*	Removes ambiguity on the nodal agency for coordination on CBET in India.
5	Institutional framework for CBET. *(CERC Draft Regulations, 6 [2])*	Identification of NLDC as the nodal agency for STOA and the CTU as the nodal agency for MTOA/LTOA for CBET is in line with the domestic OA regime. Settlement Nodal Agency will be able to undertake energy settlement and other commercial matters related to cross-border trade

A few areas of concern remain with regard to the divergence in the proposed CBET framework of India and the framework for OA regime in SACs, proposed under this report:

Table 27: Demerits of India's CBET Guidelines and Regulations

No.	Aspect	Demerit	Possible Modifications
1	Eligibility criteria for participating applicant. *(CERC Draft Regulations – 7)*	Import by Indian entities from non-Indian owned private entities / projects in neighboring countries are not allowed. This restricts market choice and competition severely and creates artificial barriers of entry to privately-owned projects.	The ownership criteria may be relaxed in those cases where the supplying entities are licensed and are under regulatory jurisdiction of the respective countries in which they are set up. This should provide a comfort to India, as it will be able to recommend penal action against them through the respective governments and regulatory commissions, if required.
2	Any change in the equity pattern of the participating entities shall be intimated to the designated authority and fresh approval shall be obtained. *(GoI Guideline – 5.2.3)*	Without a threshold/allowable margin for change in equity pattern, the guidelines may result in unnecessary delays, waiting for the approval from the designated authority.	Fresh approval may be made mandatory for only those changes in equity pattern that result in an effective change in ownership.
3	Indian generating stations supplying exclusively to neighboring countries may be allowed to build independent transmission systems. *(GoI Guideline, 8.2)*	Such independent transmission systems may run counter to the concept of non-discriminatory OA, and may also prove to be an inefficient way for the development of the transmission system.	No action required as long as the CTU is also involved in the decision making to ensure that developing such independent lines is the optimum solution in each of the cases.

Notwithstanding the concerns, it may also be reiterated that OA is a gradually evolving mechanism rather than a discrete event. Even the guidelines of the Government of India and the proposed regulations of CERC are open to changes, based on operational feedback from the existing mechanism. Therefore, interactions with statutory bodies such as the Ministry of Power, the Central Electricity Authority and the Central Electricity Regulatory Commission in India may be continued. This is in the interest of the development of a fair and non-discriminatory OA regime in transmission, to initiate power trading and facilitate CBET among the SACs.

8.2 Government of India's Consultative Paper on Open Access

The Ministry of Power, Government of India, has come out with a consultation paper on OA, shared with all governments, SERCs and others stakeholders. The basic premise of the paper is that the distribution utilities are not being compensated enough for open OA and, therefore,a stricter OA regime needs to be implemented.

The key proposals in the consultative paper and the associated impact on OA transactions are summarized in the table here.

No	Proposal	Impact on Domestic Open Access	Impact on Open Access under CBET
1	OA consumers will be required to schedule for at least 24 hours whenever they seek OA.	Mainly intended to avoid consumers exploiting part time arbitrage in power exchanges.	If the proposal is applied also on CBET, the utilities in other countries will not be able to undertake day ahead transactions/contingency transactions with Indian entities for a part of the day, under the bilateral mode or through (proposed) Regional Power Exchange.
2	A Cross Subsidy Surcharge (CSS) cap of 20% of the average Cost of Supply (CoS) needs to be implemented only if the tariff is within 20% of average CoS SERCs should determine CSS, depending on category-based CoS (initially to start with voltage-wise CoS). Separate CSS is to be determined for each Time of Day (ToD) time slots.	Immediately, due to removal of 20% cap, CSS may go up in most states. In the medium term, this might then slightly come down due to the determination of CSS based on voltage-wise CoS.	These proposals pertain to distribution OA in India. These are not expected to have any considerable impact on OA under CBET. Only, the bulk consumers other than the distribution utilities in India might find the commercial feasibility being reduced for purchase of power from outside the country.
3	Recommends a new uniform methodology for determination of additional surcharge to compensate the distribution utilities for their stranded power purchase commitments, which have arisen on account of OA.	Probability of imposition of additional surcharge increases.	
4	Standby charges should be designed to reflect the actual fixed and variable cost liability incurred by the DISCOMs to supply backup power to OA consumer. SERCs should design two-part standby charges with a fixed charge and variable charge components.	Currently, these are not applicable when the consumer maintains a contract demand. However, if there is a change in applicability in the future, this may have a major impact on the attractiveness of OA.	

5	SERCs should develop a phased implementation plan over a three- to five-year horizon to progressively bring in fixed charges in retail tariff to reflect 75% to 100% of the fixed cost liability of DISCOMs.	This will initially see future tariff increases only in demand charges and may later see the reduction of energy charges, which is compensated by an increase in demand charges. This will substantially reduce the commercial attractiveness of OA.	

The proposals of the MoP, even if implemented as it is, are expected to mostly impact the domestic distribution of OA, with very negligible impact on the non-discriminatory OA regime in transmission for CBET.

However, the restriction on scheduling for part of the day may prevent utilities in other countries from undertaking day ahead and contingency transactions with Indian entities, for arranging power for a part of the day under the bilateral/collective mode. Considering that the key aim of the consultative paper is to protect the interests of the distribution utilities, at least a relaxation can be sought for, in order to allow the utilities to obtain OA for part of the day, only for CBET transactions. However, in an ideal scenario, such partial waiver of conditions, in favor of the distribution utilities,is contrary to the concept of ‘non-discriminatory’ OA.

Annexures

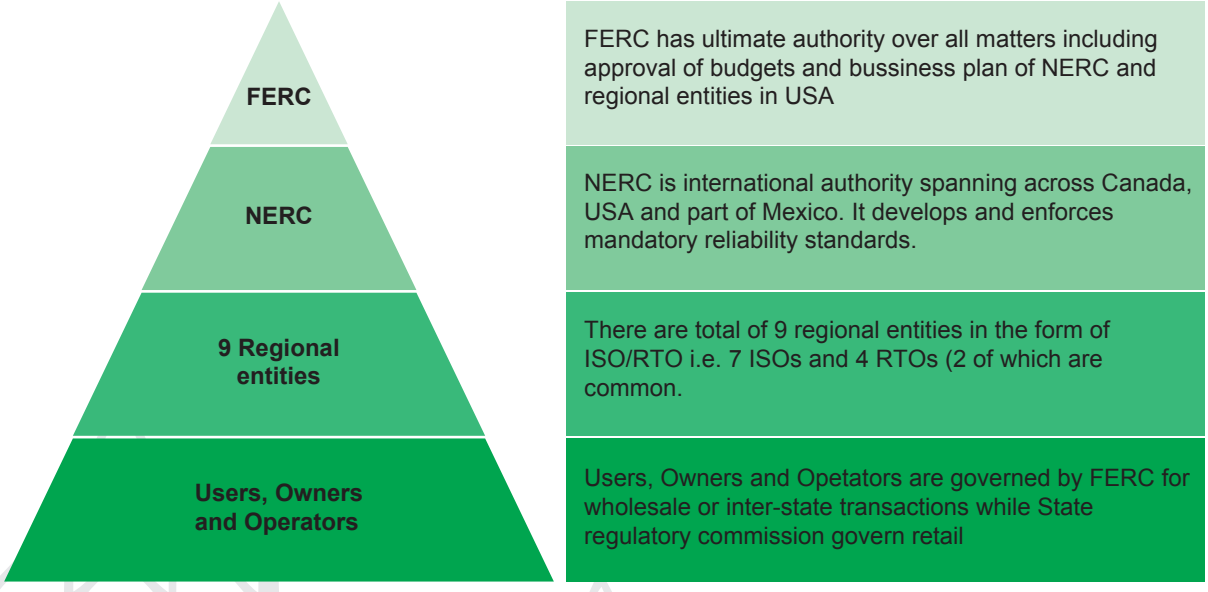
9.1 Annexure 1: International Experience

1. USA

This section discusses the domestic OA provisions in the USA.

Institutional Framework

Figure 31: USA Power Sector Institutional Framework



FERC

The Federal Energy Regulatory Commission is an independent agency within the United States Department of Energy that regulates the interstate transmission of electricity within the country. FERC does not regulate retail electricity sales to retail customers. It is responsible for:

- Regulating the i)transmission and ii) wholesale sales of electricity in interstate transactions.
- Protecting the reliability of the high voltage interstate transmission system through mandatory reliability standards.

- Monitoring and investigating energy markets.
- Enforcing FERC regulatory requirements through the imposition of civil penalties and other means.
- Overseeing environmental matters related to hydroelectricity projects.
- Administering accounting and financial reporting regulations and conducting regulated companies.

The Energy Policy Act of 2005 expanded FERC's authority to enforce regulations concerning the reliable availability of energy resources. Following this, FERC established NERC in 2006 for looking after reliability.

NERC

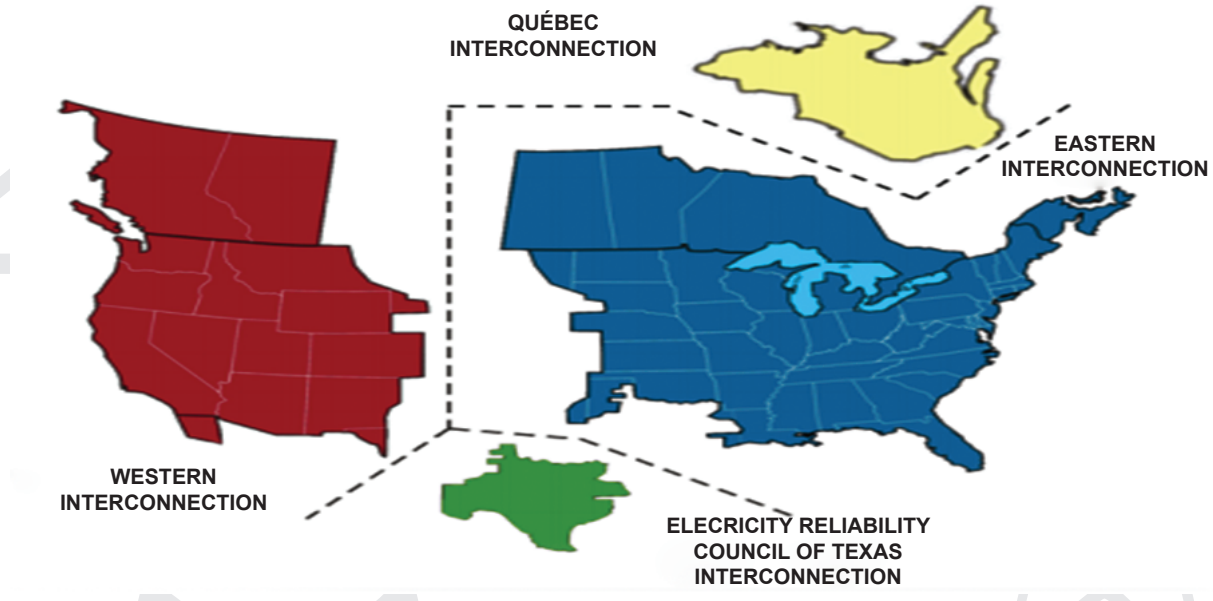
The North American Electric Reliability Corporation (NERC) is a not-for-profit **international** regulatory authority with the objective to ensure the reliability of the bulk power system in **North America**.

The Energy Policy Act of 2005 authorized FERC to designate a national Electric Reliability Organization (ERO). FERC issued an order certifying NERC as the ERO for the USA in 2006. This enabled NERC to audit power companies and levy fines for non-compliance.

NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico, made up of regional reliability coordinators. NERC has jurisdiction over electric users, owners, and operators of the bulk power system. In the USA, FERC oversees the operations of NERC as an ERO.

There are 4 interconnections (regional reliability council) under NERC:

i. Eastern interconnection.
ii. Western interconnection.
iii. Quebec interconnection.
iv. Texas interconnection.

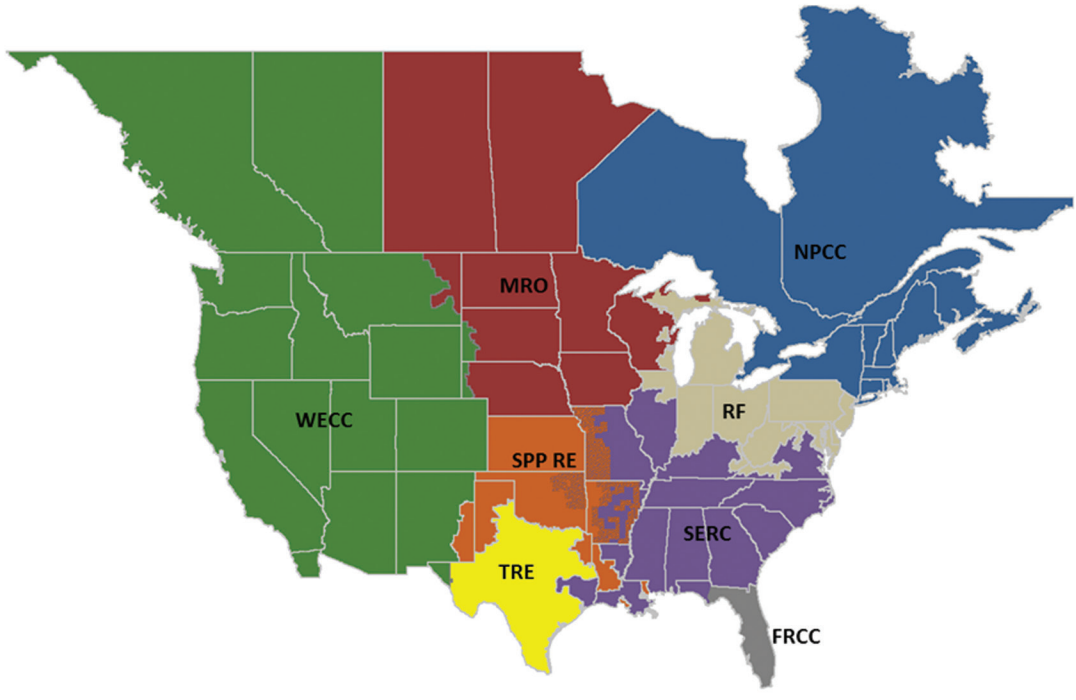


Source: FERC

The international ERO footprint covers North America comprising eight Reliability Regions:

- FRCC: Florida Reliability Coordinating Council.
- MRO: Midwest Reliability Organization.
- NPCC: Northeast Power Coordinating Council.
- RF: Reliability First.
- SERC: SERC Reliability Corporation.
- SPP RE: Southwest Power Pool RE.
- Texas RE: Texas Reliability Entity.
- WECC: Western Electricity Coordinating Council.

All these reliability regions are mentioned in the following map:



Source: NERC

ISO/RTOs

An ISO is an organization formed at the direction or recommendation of FERC. It is responsible for a) coordinating b) controlling, and c) monitoring the grid operation in one or more than one state. ISOs are responsible for:

- Operating the region's electricity grid.
- Administering the region's wholesale electricity markets.
- Reliability planning for the region's bulk electricity system.

ISOs are similar to RTOs, with the difference that either the ISO does not meet the minimum requirements specified by FERC to hold the RTO designation, or that the ISO has not applied to FERC for the RTO status. Thus, RTOs perform the same functions as ISOs, but they have greater responsibility for the transmission network established by FERC.

ISO/RTOs are also responsible for the regional planning to make sure the needs of the system are met with the appropriate infrastructure.

Individual utilities were responsible for a) coordinating and b) developing transmission plans before the ISO/RTOs were developed. In areas where there is no ISO/RTO, for instance, areas in the Southeast and West, utilities continue to perform this function. Though, utilities in these areas are still under FERC.

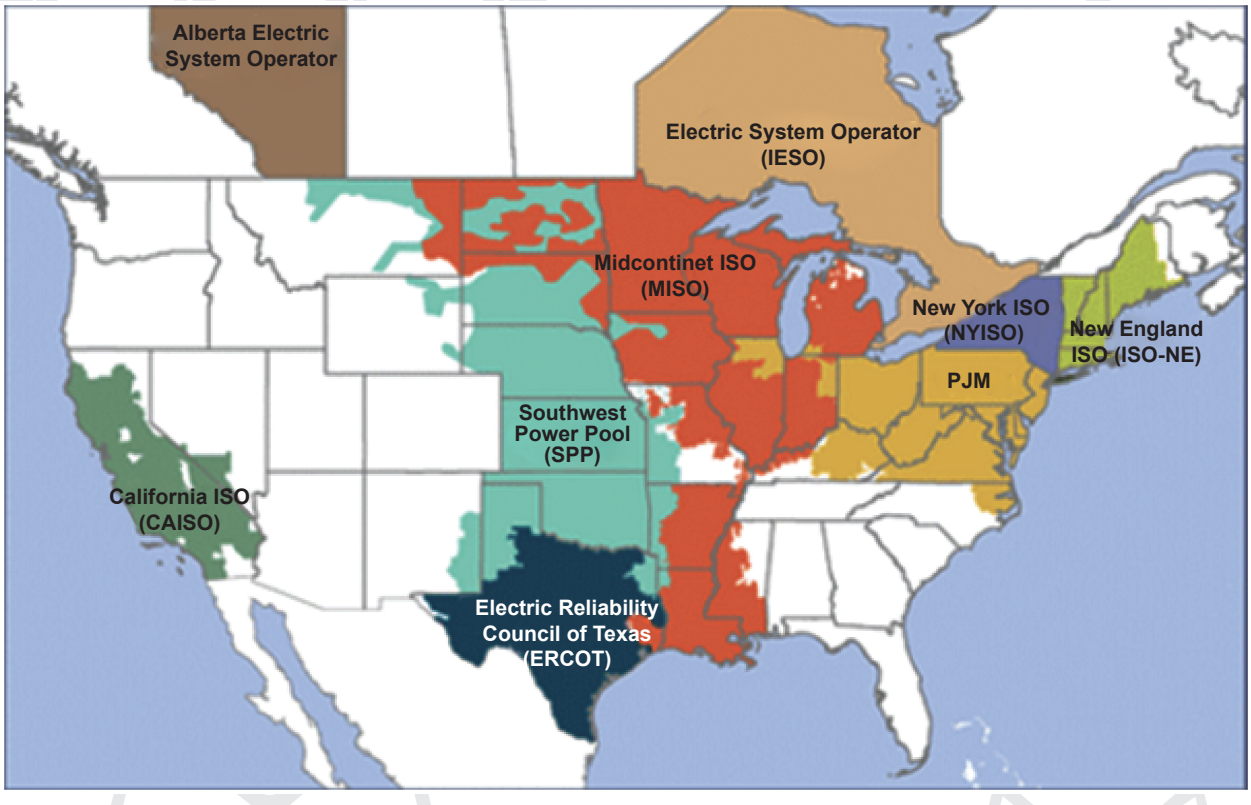
There are seven ISOs within North America:

- CAISO: California.
- NYISO: New York.
- ERCOT: Electric Reliability Council of Texas (ERCOT); also a Regional Reliability Council.
- MISO: Midcontinent.
- ISO-NE: New England.
- AESO: Alberta Electric System Operator.
- IESO: Independent Electricity System Operator.

There are currently four RTOs within North America:

- PJM: PJM Interconnection.
- MISO: Midcontinent ISO, also an RTO.
- SPP: Southwest Power Pool, also a Regional Reliability Council.
- ISO-NE: ISO New England, also an RTO.

The following map illustrates nine ISO/RTOs, that is, seven ISOs and four RTOs (two of which are the same):



Source: FERC

Domestic Open Access

Federal Energy Regulatory Commission Order 888 laid the foundation of transmission OA for generators in the USA. This order was a response to the vertically integrated utilities owning transmission systems that were stifling competition, which resulted in letting excess grid capacity unused. FERC initially encouraged utilities to grant transmission access on a case-to-case basis but the utilities responded with delay, reluctance, and discriminatory service terms and conditions. To counter these, FERC laid out Order 888 and 889. Order 888 required utilities to unbundle their transmission function and provide OA to their transmission facility. Order 889 established Open Access Same-Time Information System (OASIS) and set standards on how customers and utilities would share information regarding transmission system availability.

Table 28: Development of Framework for Domestic Open Access in the USA

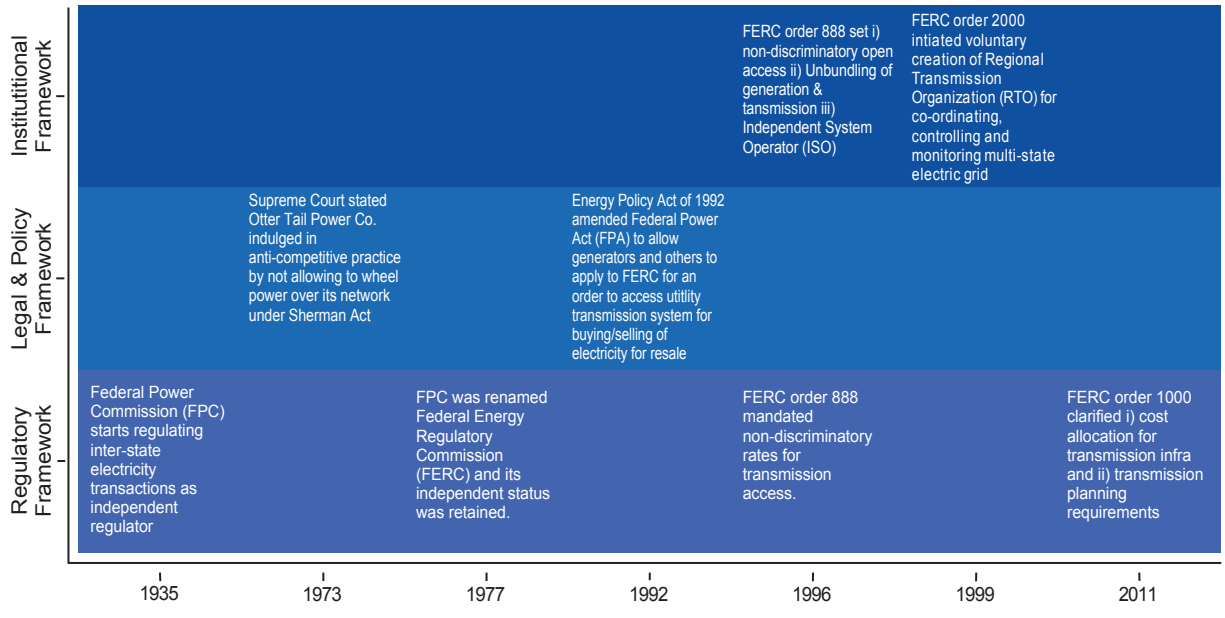
Timeline	OA Component	Example/Policy Provision of the US Power Sector
Evolving	Power market structure	The US electric power industry has evolved from vertically-integrated regulated monopolies, investor-owned, municipal, or cooperative, to one in which non-utility entities own over 40% of the generating capacity. Over the years, regulators and competition enforcers have sought to promote competition in the industry to the benefit of the consumers.
1927 and 1977	Independent regulator	In 1927 the US Supreme Court in North Attleborough noted that country lacked jurisdiction over the rates of transaction between utilities in adjoining states. These transactions constituted inter-state commerce matters and were solely within the jurisdiction of federal governments. A regulatory void was felt as there was no federal agency to look after such transactions. The Federal Power Commission (FPC) was transformed in 1935 into an **independent regulator** and it was authorized to regulate both hydropower and inter-state electricity. In 1938, the Natural Gas Act gave FPC jurisdiction over the inter-state natural gas pipeline and wholesale sales. In **1977, FPC was renamed as Federal Energy Regulatory Commission (FERC)** and its independent status was retained.
1973	Legal provision	The case of *Otter Tail Power Co. v. United States (1973)* is often cited as the first case in which the US Supreme Court held that a firm's refusal to grant access to their facility, in a business where facility is considered essential facility, is violation of the anti-trust law. In this case the US Supreme Court held that Otter Tail had violated the Sherman Act by refusing to sell wholesale power or to **'wheel'** power from another source to a municipal power system that sought to compete with Otter Tail in the retail electricity market. The court concluded that Otter Tail had monopoly power in retail sales of electric power in its service area and it had used its dominance in transmission to foreclose potential competition for retail sales. Thus, the court found Otter in violation of the Sherman Act (US statute on competition, prohibiting certain business activities, which can reduce competition) as the utility was involved in **anti-competitive practice by not allowing transmission access to its network,** which it owned and operated.
1992	Policy intent	The Energy Policy Act of 1992 ('EPACT of 1992') amended the Federal Power Act (FPA) to allow generators and other market participants, selling or buying electricity for resale, **to apply to FERC for an order to access utility transmission assets** if they have been denied access to the transmission utility.
1996	Independent transmission operator	In 1996, the FERC Order No. 888 mandated adherence to **non-discriminatory Open Access** and also required the **generation and transmission functions to be unbundled**.

Timeline	OA Component	Example/Policy Provision of the US Power Sector
		Order No. 888 required the owners of the transmission facilities to make transmission services available in the open market. FERC ordered **'functional' unbundling** in which transmission costs were strictly segregated from other costs and transmission managers were subject to a strict code of behavior. Utilities have to follow the following under functional unbundling: • Take the transmission and ancillary services for all new wholesale sales and purchases under the same tariff terms and conditions as their transmission customers. • State separate rates for wholesale generation, transmission, and ancillary services. • Use the same electronic information network as their transmission customers when obtaining information about their transmission systems.
1996 and 1999	Independent System Operator	Order No. 888 required the following for the **Independent System Operator**: i) to be not-for-profit with no interests in the outcome of competition among players in energy markets ii) to have an independent board of directors with no ties to any market participant and iii) in exercising its power, it must allow inputs from all interested parties. The ISOs own no transmission assets; they actually manage the grid and operate the market. They also effectively operate as a kind of regulatory authority with powers delegated by FERC, but also subject to FERC's oversight and review. FERC Order No. 2000, issued in 1999, initiated the voluntary creation of a **Regional transmission organization**. An RTO is an electric power **transmission system operator** that coordinates, controls, and monitors a multi-state electric grid. An ISO is a similar to an RTO. In the areas where an ISO is established, it coordinates, controls and monitors the operation of the electrical power system, usually within a single US state, but sometimes encompassing multiple states. RTOs typically perform the same functions as ISOs but cover a larger geographic area.
1996 and 2011	Commercial aspects	In 1996, the FERC Order No. 888 required transmission-owning utilities to set **non-discriminatory rates** for transmission access. In 2011, FERC came up with Order No. 1000, to clarify **cost allocation for transmission infrastructure** as follows. The rule establishes three requirements for transmission cost allocation: • Each public utility transmission provider must participate in a regional transmission planning process that has a regional cost allocation method for new transmission facilities, selected in the regional transmission plan for purposes of cost allocation. The method must satisfy six regional cost allocation principles. • Public utility transmission providers in neighboring transmission planning regions must have a common inter-regional cost allocation method for new inter-regional transmission facilities that the regions determine to be efficient or cost-effective. The method must satisfy six similar inter-regional cost allocation principles. • Participant-funding of new transmission facilities is permitted, but is not allowed as the regional or inter-regional cost allocation method.
2011	Technical standards	In 2011, FERC came up with Order No. 1000 to clarify **transmission planning requirements** for transmission infrastructure as follows. The rule establishes three requirements for transmission planning: • Each public utility transmission provider must participate in a regional transmission planning process that satisfies the transmission planning principles of Order No. 890 and produces a regional transmission plan.

Timeline	OA Component	Example/Policy Provision of the US Power Sector
		• Local and regional transmission planning processes must consider transmission needs driven by public policy requirements, established by state or federal laws or regulations. Each public utility transmission provider must establish procedures to identify transmission needs driven by public policy requirements and evaluate proposed solutions to those transmission needs. • Public utility transmission providers in each pair of neighboring transmission planning regions must coordinate to determine if there are more efficient or cost-effective solutions to their mutual transmission needs.

The US market has evolved in various phases from a vertically-integrated utility model to a multiple buyer and seller model. Key orders and regulations related to institutional framework, legal and policy framework, and regulatory framework are captured in Figure 28.

Figure 32: Open Access Evolution in the USA



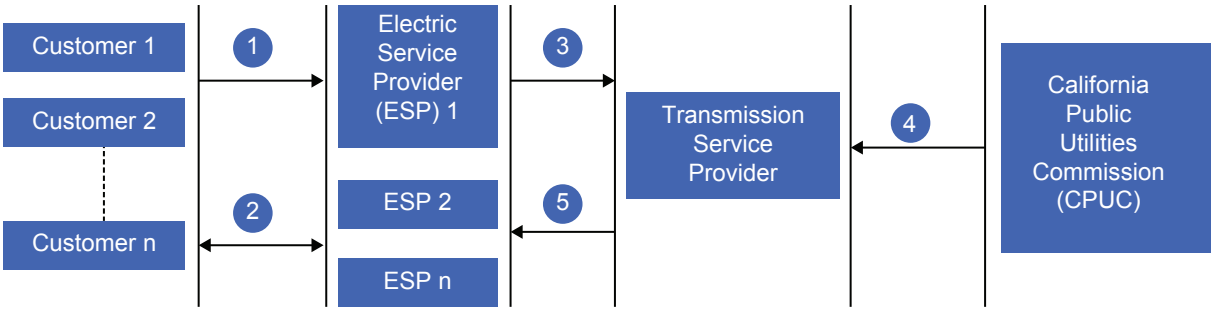
Operational Framework for California ISO

The USA has different RTOs and ISOs that are responsible for the regional management of the transmission grids. Among these grids, CA ISO is the California Independent System Operator that is responsible for managing grids operated in the California region. Pacific Gas and Electric (PG&E) is one of the important utilities in the region. In this section, the process of grant of direct access is described for the eligible customers on the PG&E's network.

Prior to April 2010, direct access had not been available to new customers in California since the Legislature suspended the program in September 2001 during the California Energy Crisis. In October 2009, the new law (Senate Bill 695) provided for a limited reopening of the DA market for only non-residential customers beginning in April 2010.

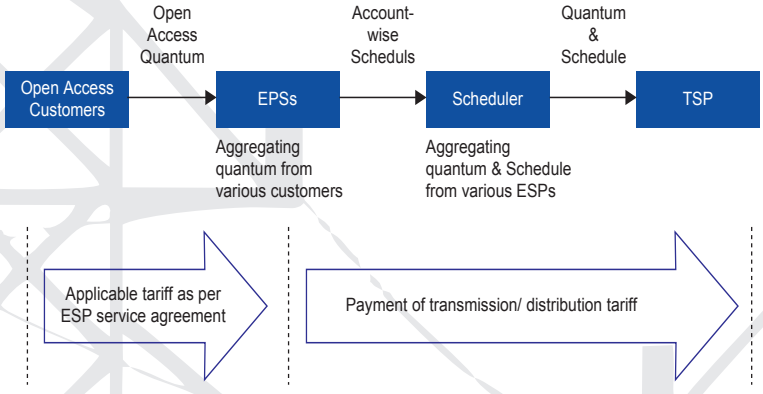
Non-residential customers can participate in PG&E's Direct Access Lottery by submitting the Six Month Notice to transfer to Direct Access Service during the PG&E DA Lottery open enrollment period.

Figure 33: Process of Grant of Open Access in California



1	Application of Open Access made by customer to ESP
2	Agreement between Customer and ESP as per CPUC guidelines
3	Direct Access Service Request by ESP (directly by customer if it is its own ESP) to TSP to (i) Start Service or (ii) Stop service
4	CPUC grants annual quota in WGh which can be granted under Open Access
5	TSP runs lottery for aal applications received from ESPs. TSP grants open access to ESPs under the quota given by CPUC

Figure 34: Process of Power Purchase and Scheduling Under Open Access



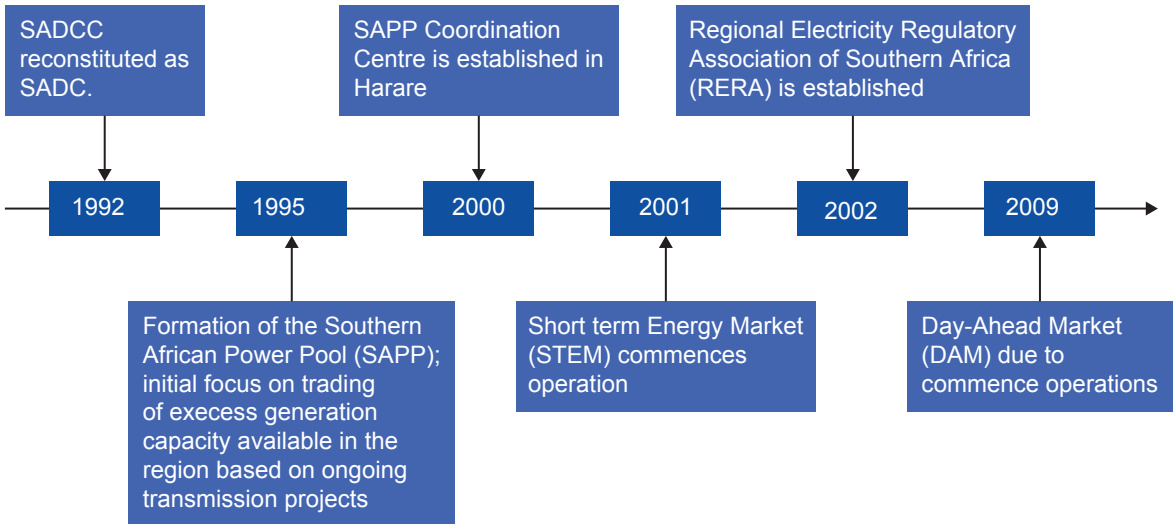
2. SAPP

The Southern African Power Pool (SAPP)was created with the primary aim to provide reliable and economical electricity supply to the consumers of each of the SAPP members, consistent with the reasonable utilization of natural resources and the effect on the environment.

Southern African Development Community (SADC) was established in 1992. Its efforts aimed at promoting regional energy development. Under these efforts, the Southern African Power Pool was established in 1995. SAPP comprises all 12 SADC member countries of which nine are operating members whose interconnected grid carries about 97 percent of the power produced by the SAPP countries. SAPP is the most advanced power pool in Africa. South Africa, the biggest power market in the region, has been the key member to develop SAPP because of its yearning to meet increased

future energy demand by low-cost hydropower from its northern neighbors. Bilateral and multilateral agreements existed among the member countries even before establishing SAPP.

Figure 35: Evolution of Power Exchange in SAPP



SAPP has four governing documents, which are the cornerstone for SAPP and are developed under the aegis of SADC. These four agreements are mentioned in Table 26.

Table 29: SAPP Governing Documents

Agreement	Main Features
Inter-governmental Memorandum of Understanding	Inter-governmental Memorandum of Understating (MOU) that authorized and guaranteed: • Inter-utility MoU. • Operating agreements.
Inter-utility Memorandum of Understanding	It deals with the two key issues: • Ownership. • Rights among the participants.
Agreement between Operating Members	It defines the interaction between the utilities with respect to operating responsibilities.
Operating Guidelines	It determines the following for plant operations: • Cost sharing. • Functional responsibilities of operations, maintenance, and safety rules.

Recently, SAPP is considering adopting market guidelines, which are under development.

SAPP Institutional Framework

SAPP's governance council consists of the SADC energy ministers group, the executive committee, the management committee and four sub-committees. The sub-committees report to the management committee, which in-turn reports to executive committee. The Executive committee is the functional head in this arrangement. It needs to take permission from the SADC energy ministers' council for the major policy issues and for considering non-SADC members for SAPP membership. Figure 32 illustrates the SAPP institutional framework:

Figure 36: SAPP Institutional Framework

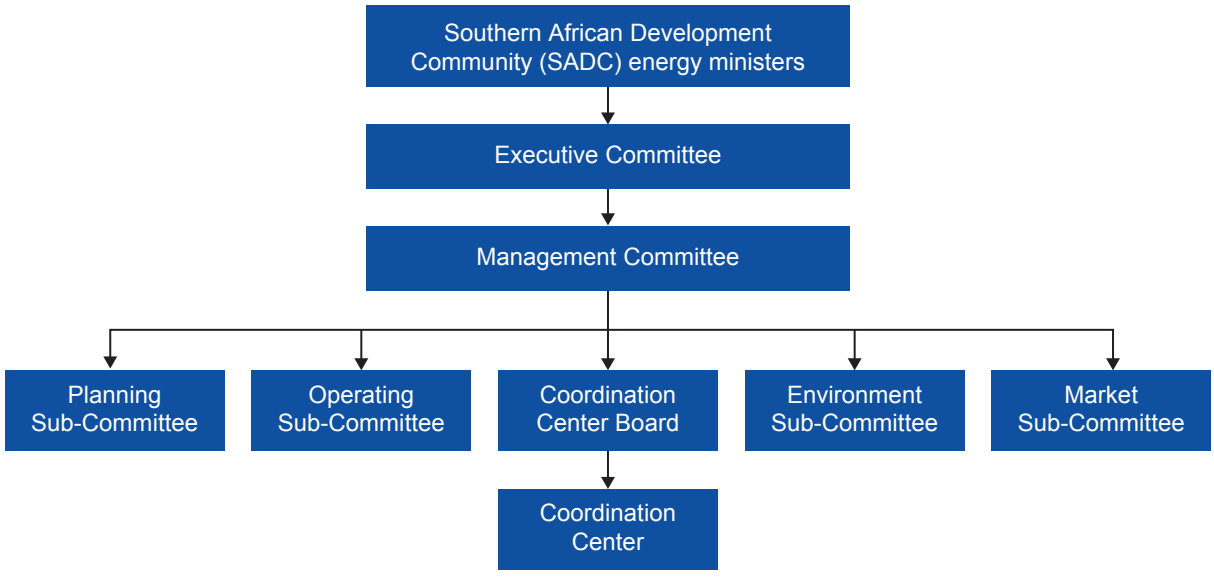


Table 27. Illustrates the function of each committee.

Table 30: SAPP Governing Council

Committee	Composition	Responsible for
SADC energy ministers	Energy ministers of SADC countries.	Decisions on requests put forward by the executive committee and adoption of non-SADC members to SAPP.
Executive committee	Chief executives of the various power utilities participating in SAPP.	Receives and refers matters such as the requests for membership by non-SADC members and the major policy issues to the SADC energy ministers for onward consideration.
Management committee	Officials from the member utilities.	Oversees the running of SAPP.
Planning sub-committees	As per rules indicated by the management committee.	Responsible to the management committee. A key objective of the planning sub-committee is to conduct all relevant studies to allow for the construction of interconnections with members who are still isolated from the main network.
Operating sub-committees	As per rules indicated by the management committee.	Responsible to the management committee.
Market sub-committees	As per rules indicated by management committee.	Responsible to the management committee.
Environmental sub-committees	As per rules indicated by management committee.	Responsible to the management committee.

Operating Sub-Committee

The operating sub-committee's duties include, but are not limited to, the following:

- Approving the methods and standards used for testing generating units in order to establish their sent-out generating capacity.
- Conducting short-term (maximum three years) system reliability studies as required, using interalia, the reliability criteria specified by the planning sub-committee or service schedules.
- Establishing and reviewing the methods and standards used to measure the performance (planned and forced outage rates, mean time to failures, and so on) of generating units and transmission facilities.

- Establishing and reviewing the formula to drive the Operating Reserve Obligation of the operating members and ensure that these obligations are met.
- Determining annually the System Peak Obligation and the Accredited Capacity Obligation of each operating member for each month of the next 12 months. Each operating member will be required to provide plans for meeting its monthly accredited capacity obligation for each of the next 12 months.
- Establishing and updating the Operating Guidelines and resulting procedures for the operation of the pool. Such procedures will deal with transfer limits, frequency control, voltage control, tie-line power control, automatic generation control, data exchange, telecommunication switching, and so on.
- Coordinating the generation and transmission maintenance schedule of the operating members so as to maintain, at all times, the required reserve and service levels.
- Establishing short-term transfer limits between the systems of the operating members (adjacent and non-adjacent system).
- Ensuring that each operating member is equipped with, or contracts for, the required Automatic Generation Control (AGC) telemetering and telecommunication facilities in accordance with the Operating Guidelines.

Planning Sub-Committee

The planning sub-committee shall consist of a maximum of two representatives per member and they shall be of sufficient seniority in their own organization to make all relevant decisions. The planning sub-committee will be tasked with the following:

- Establishing and updating common planning and reliability standards, which have an impact on SAPP.
- Based on the individual member's plans, developing every two years, an overall pool plan to highlight the benefits and opportunities for cost savings that can be derived by the members from the coordination of activities. The pool plan will take into account the forecasted demand and energy consumption in each member's system, anticipated sales and purchases by each member. It will contain the characteristics, location, and commissioning dates of the new generating units and new transmission facilities of 110 kV and above.
- Evaluating software and other tools, which will enhance the value of planning activities such as load forecasting, system studies, reliability standards, and so on.

Coordination Center

The coordination center is an independent and neutral entity located at a permanent location and funded by the members of the pool. The coordination center will be implemented in stages as recommended by the operating sub-committee and agreed upon by the management committee.

The manager of the coordination center will be appointed on a contract basis by the management committee, upon recommendation of the operating sub-committee and will report to the operating sub-committee.

The coordination center will be responsible for:

- Monitoring continuously the operation of the power pool.
- Checking transactions between operating members and between members and non-members.
- Monitoring the inadvertent power flows and the returns, in kind, between the members.

- Providing daily reports, data, and information that is relevant to the operation of the power pool to the operating sub-committee and to the members.
- Providing information and giving technical advice/support to the members of SAPP, in matters pertaining to parallel operation.
- Performing various operational planning studies to highlight possible operating problems.
- Advising on short- and long-term operation problems, and the feasibility of wheeling transactions.
- Monitoring the calculation and implementation of various types of reserves and protection performance on all tie-lines.
- Identifying capital projects required by the Coordination Centre and making proposals to the operating sub-committee.
- Endeavoring to obtain funding for the capital projects of the coordination center upon the approval by the operating sub-committee.
- Preparing and presenting an annual budget covering the coordination center expenditure for approval by the operating sub-committee.

Cost Sharing for Coordination Center

Members shall pay their contributions up front for the financial year, based on the approved budget for the coordination center. Additional costs can be approved by the management committee on the recommendation by the operation sub-committee. The calculation will be:

- 30 percent to be shared equally among all operating members.
- 30 percent to be allocated between operating members in proportion to the actual energy measured in megawatt hour (Mwh) and imported from other members or other parties during the financial year.
- 20 percent to be allocated between all SAPP members in proportion to their annual system peak demand in the financial year.
- 10 percent to be allocated between operating members in proportion to the combined 75 degree Celsius thermal rating of their interconnection with other members.
- 10 percent to be deemed to constitute a benefit payable only by the host member.

SAPP Operational Rules

SAPP was built on pre-existing bilateral and multilateral connections and primarily trades power reserves when loads are below peak in the generating country. The trading arrangements between members have continued to operate predominantly under the pre-SAPP–type bilateral and multilateral contracts.

The bilateral contracts dominate the trading arrangements in SAPP and in FY 2016 SAPP witnessed 86 percent energy traded bilaterally, while only 14 percent was traded in the competitive market. Bilateral agreements usually cover a period of one to five years or more. These agreements guarantee the security of supply but are not flexible enough to accommodate varying demand profiles and prices.

The Short-Term Energy Market (STEM) was introduced in 2001 and operated until 2007. Run by the SADC Coordination Centre, STEM was introduced to provide a market for the surplus power that is not covered by bilateral contracts. It was restricted to power utilities only and was designed as a precursor to full competition. Buyers and traders were matched and traded at the sellers' offer prices.

Bids and offers were made via an Internet platform. The Coordination Centre checked the capacity on the interconnected transmission lines, matched demands and offers, and confirmed the successful contracts.

In order to ensure a more competitive electricity trading platform, a DAM was introduced in 2009. The evolution of power trade in SAPP is shown in Figure 33.

Figure 37: Power Market Evolution in SAPP

Early Years

- Bilateral Contracts

From 2001

- Bilateral Contracts
- Short-term Energy Market (STEM) -2001
- Post STEM (Balancing Market) -2002

Current and future

- Bilateral Contracts
- Day-Ahead Market (DAM) - From 2009
- Energy Imbalance Settlement -From 2010
- Anciallary Services Charges -From 2013
- Balancing Markets -From 2014
- Financial Markets -In future

Calculation of Available Trading Capability of TSO for Bilateral and DAM Trade

Bilateral trade is given preference over DAM. The time window followed for calculating transmission capacity is shown here. First, bilateral is taken into account, then left out capacity is used for DAM, as mentioned in the table.

Time	Bilateral Trade	For DAM Purpose
09:00	Bilateral parties request TSO for a wheeling path for the next day.	Exchange rate (US$ to Rand) published by the market operator.
11:00	TSO confirms (information relayed to each bilateral party and market operator).	TSO declares the transmission capacity for the next day (remaining after accommodating bilateral trade).
11:30	Market operator aggregates bilateral transactions for the next day.	The seller submits bilateral and OTC trade volume (hourly sale data for the next day) to market operator.
11:45	Market operator notifies the aggregate capacities to individual TSOs.	Market operator publishes the next day's available trading capability for DAM.
13:00	Utilities raise a schedule request with their respective control area.	
15:00	Schedule is finalized for the next day.	
15:30	Final bilateral trades are submitted by sellers based on the final schedule.	
16:00	Control area submits interchange schedule for the next day to the market operator.	

Bilateral Contract

Parameter	Feature of Bilateral Contract:
Features	• Trading arrangements mutually agreed between bilateral parties. • Volumes and prices are the key parameters. • Transmission path to be secured in advance. • Can be firm or non-firm type.
Contract types with their features	**Firm Contacts:** • Have penalties for non-delivery. • Generally not interruptible, reliability premium. **Non-firm Contracts:** • Are interruptible with notice. • If notice given, no penalties. Generally less than 75% reliable.
Pricing of bilateral contracts	• The parties agree to both capacity and energy charges. • The prices are negotiated by both parties. • Wheelers are notified and confirm path.
Billing	• Direct billing from seller to buyer. • Billing is on schedules and not on actuals.
Metering and settlement	• Actual meter readings done on monthly basis. • Inadvertent energy management is done using SAPP-agreed methodology.
Currency of Bids	• Bids and the published settlement amounts to be in either South African rand or the US dollar.

Day Ahead Market

DAM market's rules related to trading (operational, settlement, balancing, losses, obligation of market operator, and so on)and financial (prices, payment, invoicing, settlement, auditing, participation fee, and so on) are governed by the DAM Book of Rule.

DAM allows the buyer and seller to put bids in the window of market opening to 10:30 hours on one day before delivery. During this time both buyer and seller place their bids for the next day.

At 12:00 hours the market operator publishes the results to all the participants. The results are consistent with the unconstrained Market Clearing Price (MCP) and any local prices. Each individual participant will in addition to the above, receive its awarded volumes in the auction.

Condition for DAM Participation

Participants can only trade directly on the DAM market by:

- Having been licensed or given permission by the host country to undertake cross-border trading.
- Being accepted as a market participant by the SAPP executive committee.
- Being party to a TSO connected to a SAPP control area and having arrangements for balance responsibility.
- Signing the DAM governance documents.
- Opening the requisite accounts for trading purposes and having the requisite security for trading purposes.
- Having at least two trained traders.

Trading Model

- Trading to be concluded daily for delivery the next day
- Forward bidding up to 10 days.
- Participants submit bids (purchase) and (sale) offers.
- Closed market auction; only the market operator and the participant know the details of the bid/ offer.
- Price discovery.

Other Terms and Conditions for Participation in SAPP

Membership Condition

- All participating electricity enterprises must be situated in a country that was a member of SADC in September 1994.
- Full membership is for national utilities only and is restricted to one per country as designated by the country's Government.

Membership of non-SADC country utilities is subject to approval by a two-thirds majority of the SAPP Executive Committee before being forwarded to the SADC Energy.

Member

The following can become members:

- An entity that is a member of SAPP.
- An entity that is interconnected with other member(s) of SAPP.
- An entity that undertakes to comply with all the rules and requirements specified in this agreement and in the operating guidelines can become an operating member by signing this agreement. Admission as full operating members shall require a two-third majority by the members of the executive committee who are already signatories to this agreement.

Observer Status

By consensus, or two-third in case of no consensus, the executive committee may grant (after approval by the SADC council of energy ministers) observer status to an electricity supply enterprise interested in the interconnected operation of the pool electricity supply enterprises. The enterprise will have the same rights and obligations as specified in advance by the management committee.

Independent Power Producers

An independent power producer may become an operating member of SAPP and the procedure for acceptance is the same as for electricity supply enterprises. This membership will, however, be of a limited nature, such that the operating member shall be entitled to participate in the operating and planning sub-committees, but not in the management or the executive committees of SAPP.

Rights and Obligations of the Operating Members

Emergency Energy

When an emergency situation develops in the system of an operating member, the other operating members will supply emergency energy upto the full amount of their available accredited capacity, provided the operating member experiencing the emergency situation complies with the provisions of the service schedule; in terms of priority emergency energy shall over-ride all non-firm types of transactions.

Wheeling

Each operating member of the pool has to allow the wheeling of capacity or energy through its system where this is technically and economically feasible.

Accredited Capacity Obligation

Each member will comply with its accredited capacity obligation.

Maintenance Schedules

Maintenance schedules leading to planner outages of generation and transmission facilities will be submitted to other operating members and to operating sub-committees from time-to-time, as decided by the operating sub-committee.

Disclosure of Costs and Other Parameters

The operating members shall disclose all information about the costs relating to their generation facilities in the manner prescribed by the planning sub-committee. Members who have thermal generation, will provide details of their Average Production Cost/and Short Run Marginal Cost of generation, at each of their thermal generation facilities.

Scheduling

Each operating member of the pool will maintain and keep, for five years, an accurate record of the capacity and energy scheduled and delivered. It will disclose such information to the other operating members and to the coordination center once it is established.

Monthly accounts will be prepared and sent, by the operating members themselves, and will be settled monthly, unless otherwise agreed.

For billing purpose the amounts of energy delivered and the amounts of generation or transmission capacity involved in a transaction (including wheeling) shall be the amounts scheduled in advance at the points of interconnection.

When wheeling takes place, the purchasing member shall be liable for the additional losses incurred in the wheeler's system. Payment for additional losses (positive or negative) in the wheelers system will be retuned in kind, in the form of hourly schedules, for additional capacity determined in advance and purchased by the purchasing member from the selling member. This will be done so as to make the transaction neutral from the point of view of losses in the wheeler's system.

Definition of Various Terms Used and Clarification

Accredited Capacity

The accredited capacity of an operating member will mean its net generation capacity plus participation power purchase, minus participation power sales.

Annual System Peak Demand

The annual system peak demand of a member will mean the highest hourly integrated system demand occurring in the supply area of such a member during a year from 1 April to 31 March of next year. This system demand will include the transmission losses but exclude the consumption of power station auxiliaries.

Available Accredited Capacity

The available capacity of a member will mean its accredited capacity is adjusted for:

- Generating the capacity out of service for maintenance or repair.
- Any other miscellaneous change in capacity.

Accredited Capacity Obligation

The accredited capacity obligation of each operating member will be determined as follows and the penalties for not complying will be calculated:

- Over each month every operating member needs to provide atleast the accredited capacity obligation for that month. The accredited capacity obligation will be equal to the monthly system peak obligation, plus the reserve capacity obligation, based on the annual system peak obligation.
- Prior to the beginning of each month, an operating member can acquire additional capacity if it does not meet its accredited capacity obligation by advancing the completion date of its new facilities, or by purchasing firm power from the operating or non-operating member, or by reducing its monthly system peak obligation.

The operating sub-committee will determine the system peak obligation and accredited capacity obligation of each operating member, for each of the next 12 months.

In case of non-compliance, a member will be charged for the number of MW required to fulfill the obligation multiplied by the penalty rate for that bracket. The payment by deficient operating members will be split among the members who have a surplus of accredited capacity.

Any dissenting operating member will refer to the management committee within 14 days after any disagreement related to the accredited capacity has arisen.

Continuity of Supply

Average Production Cost

The average production cost will be defined as follows:

$$\text{Average production cost} = \frac{F+W+C+M+L}{S} \quad [US\$/Mwh)$$

Where,

F	Fuel	Total cost of fuel to send out S Mwh.	Total cost of fuel (that is, coal furnace oil, nuclear oil, gas, or other). This is equal to the average cost per unit of fuel (tonne cubic meter, and so on) for the year, multiplied by the required quantity of fuel.
W	Water	Total cost of water to send out S Mwh.	Total cost of water (cooling water, potable water, and so on). This is equal to the average cost of water for the year multiplied by the required quantity of water.
C	Chemical	Total cost of chemicals to send out S Mwh.	Total cost of chemicals is equal to the average cost of chemicals for the year, multiplied by the required quantity of chemicals.
M	Maintenance	Total cost of maintenance to send out S Mwh.	100% of the annual cost of maintenance, spares, and maintenance contracts. This does not include costs of repairs that cannot be attributed to nominal fair wear and tear.

L	Labor	Total cost of labor to send out S Mwh.	100% of the annual labor cost for station operation and maintenance staff only. No administration staff or overheads to be included.
S	Sent out Generation	This is equal to the generated Mwh, less the auxiliary station power Mwh.	

If, in a year, a member fails to review the costs above, then the costs in the financial year 'n+1'will be equal to the costs in the financial year 'n' multiplied by the ratio between the production price index in the USA in October of year 'n' divided by that in October of year 'n-1'.

Participation Power

Participation power shall mean the lease of a specific generating unit or a portion of such a unit and the sale of its production by one operating member to another. This capacity and energy will be continuously available except when such a unit is out of service for maintenance or repair, during which time the delivery of energy from other sources will be at the seller's discretion.

Points of Interconnection

The points of interconnection between operating members will be those locations where their respective transmission facilities are physically connected, unless otherwise agreed. The transactions under the service schedules will be deemed to take place at the points of interconnection. The management committee will update from time-to-time, the list giving the points of interconnection between the networks of the operating members.

Metering

Metering equipment, as well as telemetering and communication facilities,will be installed, so as to determine the actual flow of active and reactive power at the point of interconnection.

Process of Grant of Open Access to the ESKOM Network

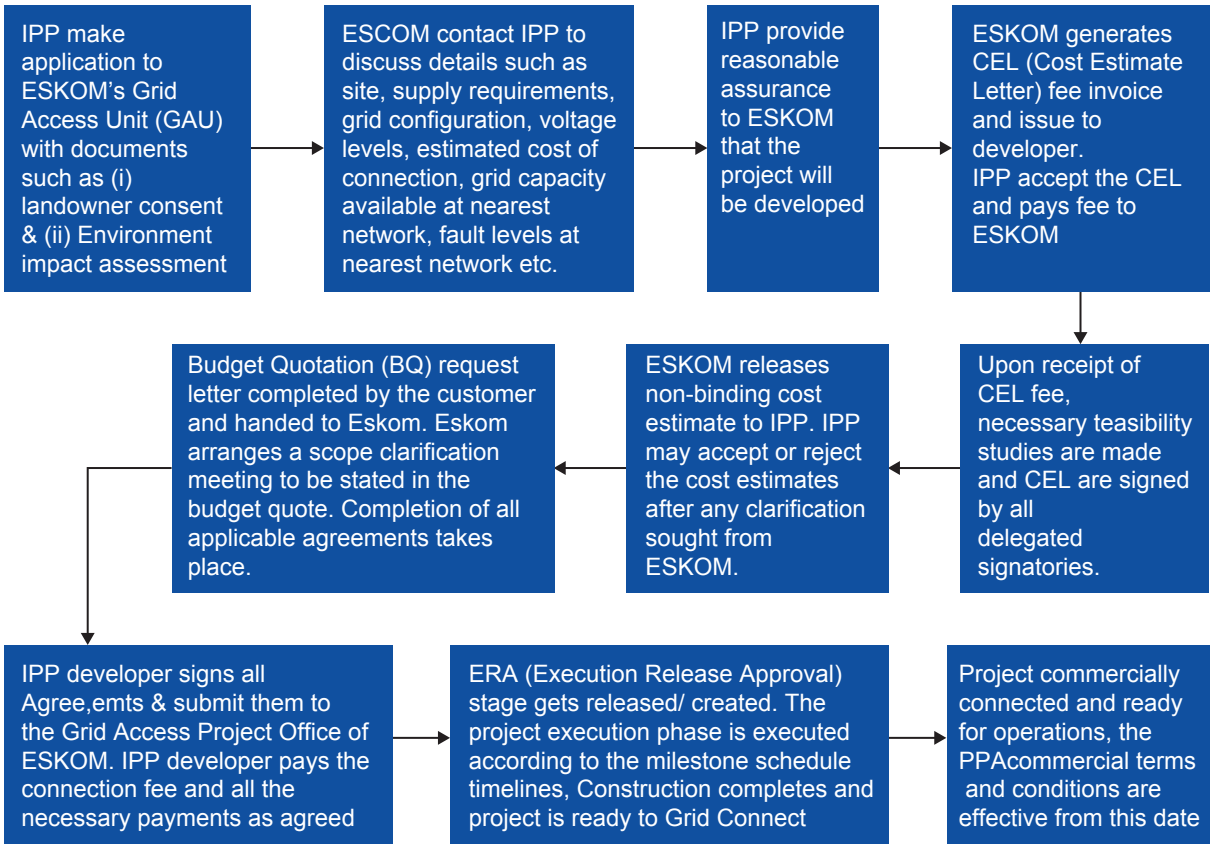
Grid Access Unit (GAU) is a business unit in Eskom, within the transmission and sustainability division with focus on servicing new and existing IPPs and generators. Its mandate is to manage and facilitate the grid access entry of the IPPs and generators, thereby providing holistic solutions to aptly serve their needs, resulting in successful and viable grid connections and operations.

GAU's key objectives are to manage and facilitate service relationship and grid access for IPP to ensure:

- Sufficient transparency to guarantee non-discriminatory grid access and operations for IPPs and Eskom generators.
- Transparency on pricing policy, network contracts, and operating agreements.
- Optimized IPP connection and operation processes.

The process for applying to ESKOM and getting OA is discussed here.

The following process for grant of OA to ESKOM's network is followed.



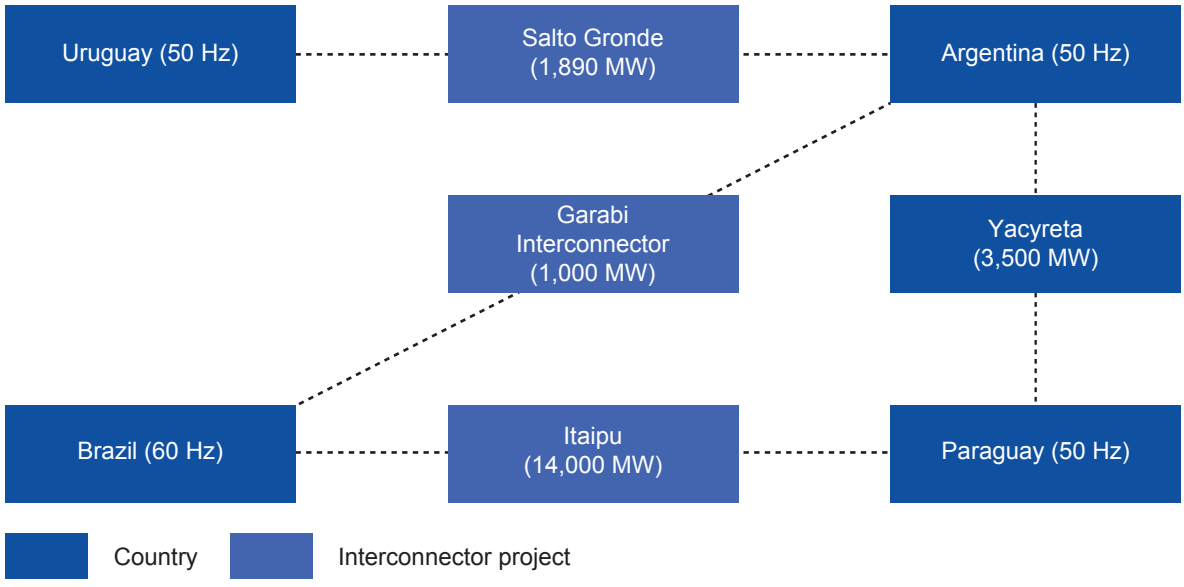
3 South America

Argentina, Brazil, Paraguay and Uruguay are the major countries in South America that are involved in power trading. These countries utilize bilateral trading mechanisms among themselves for CBET, using interconnecting power projects that supply power to participating countries. Among these four countries, the power grid of three is operated at 50 Hz frequency, while Brazil operates at a frequency of 60 Hz. Figure 34 illustrates the geographical positioning of these countries:

Figure 39: CBET in South America (Bilateral Mode)

Among these interconnection power projects, the Itaipu (between Brazil and Paraguay) and Garabi (between Brazil and Argentina) interconnectors are of particular importance as both interconnect countries operating at different frequencies. Itaipu is important as it was the largest (140,000 MW) power trading project shared between two countries. The Garabi interconnector was unique because it was among the few privately-owned regional interconnector schemes in the world. Figure 35 shows various interconnection projects among these four South American countries.

Figure 40: Interconnecting Projects in South America

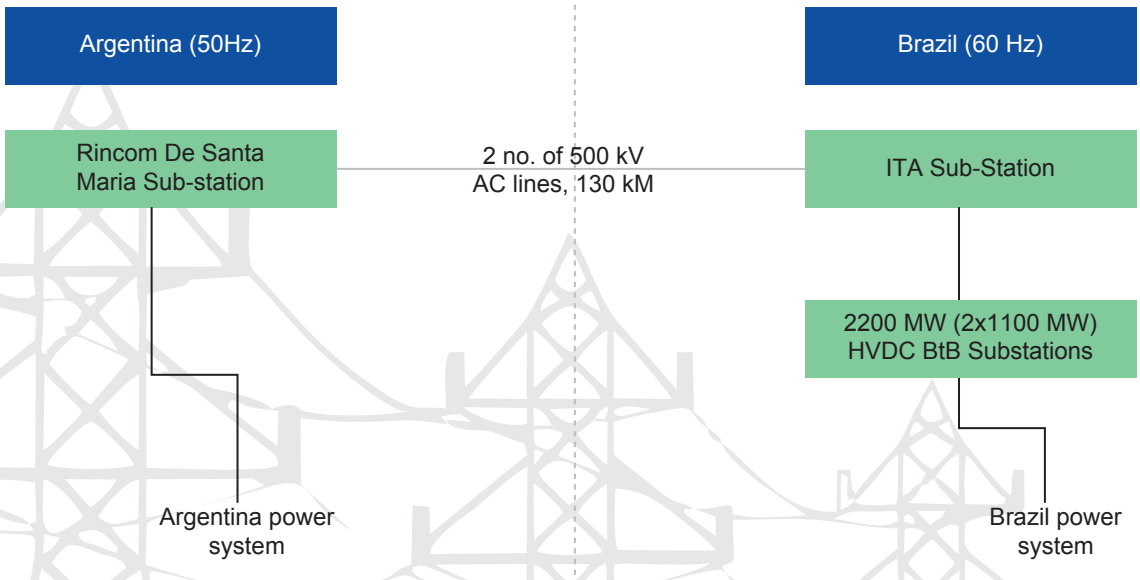


4 Argentina-Brazil CBET (Garabi Interconnector)

North Argentina had surplus power in 1998 and Brazil was power deficit. This situation motivated Brazil to import power from Argentina. The Garabi interconnector was conceptualized so that Argentina could sell its excess power to Brazil through CBET. These two countries were operating at different frequencies, thus there was a need to build an HVDC convertor station for the interconnector.

It is important to note that there is no supranational regulatory or coordinating body for the Argentina-Brazil CBET, which is in stark contrast to many other regional CBET projects. Any coordination needed is required to be done through CIEN (a Brazilian power transmission company) only. There is no standing committee to serve as a forum or to assist with coordination.

Figure 41: illustrates the arrangement for the Garabi interconnection



The table illustrates the evolution of cross-border power trade between two countries:

Timeline	Evolution of CBET between Argentina and Brazil
1997	Argentina and Brazil signed an agreement on cross-border trade
1998	• Endesa (a Spanish firm) registered CIEN as a special purpose company in Brazil. • Argentina and Brazil signed a 20-year contract with CIEN to import electricity from Argentina to Brazil.
1999–2000	Construction of Phase-I (1,100 MW) was completed by ABB acting as EPC contractor to CIEN.
2000	Formation of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA).
2002	Construction of Phase-II (1,100 MW) was completed by ABB acting as EPC contractor to CIEN.
2004	Argentina passes regulations that have the effect of abrogating Argentina's Garabi agreement commitments.
2006	CIEN declares a contractual breach.

Garabi was a unique project as it was one of the few privately-owned regional interconnector schemes in the world. It was developed by the Spanish firm, Endesa, which enlisted its special purpose company in Brazil under the name of CIEN.

A 20-year contract was signed between the Governments of Argentina, the Brazilian Ministry of Mines and Energy and CIEN. This contract allowed for:

i. 1,000 MW firm capacity from Argentina to Brazil.
ii. 1,000 MW available for private purchase by Brazilian DISCOMs.

CIEN contracted an engineering, procurement, and construction turnkey project to ABB for building a 500 kV AC transmission system and 50-60 Hz HVDC BtB converter stations. ABB completed Phase-I (1,100 MW) in 2000 and Phase-II in 2002.

After the handover, the infrastructure has been operated and managed by CIEN.

An operating agreement was carried out between two countries, detailing the procedure and responsibilities regarding trade, voltage control and repair, and O&M of the interconnector.

The national entities responsible for the system and market operations are:

i. In Argentina, Compania Administradora del Mercado Mayorista Electrico (CAMMESA).
ii. In Brazil, Operador Nacional do Sistema Electrico (ONS).

The initial 20-year contract had a provision to sell 1,000 MW of Garabi capacity to Brazil. CIEN had contracts with IPPs in Argentina for the supply and it had a Power Purchase Agreement (PPA) with companies in Brazil for selling power.

In 2004, Argentina, faced with a domestic power crisis,abrogated the contract commitment to sell power to CIEN. CIEN, in 2006, declared the contract breach.

	Argentina	Brazil
Regulator	ENRE	ANEEL
System and Market Operator	CAMMESA	ONS

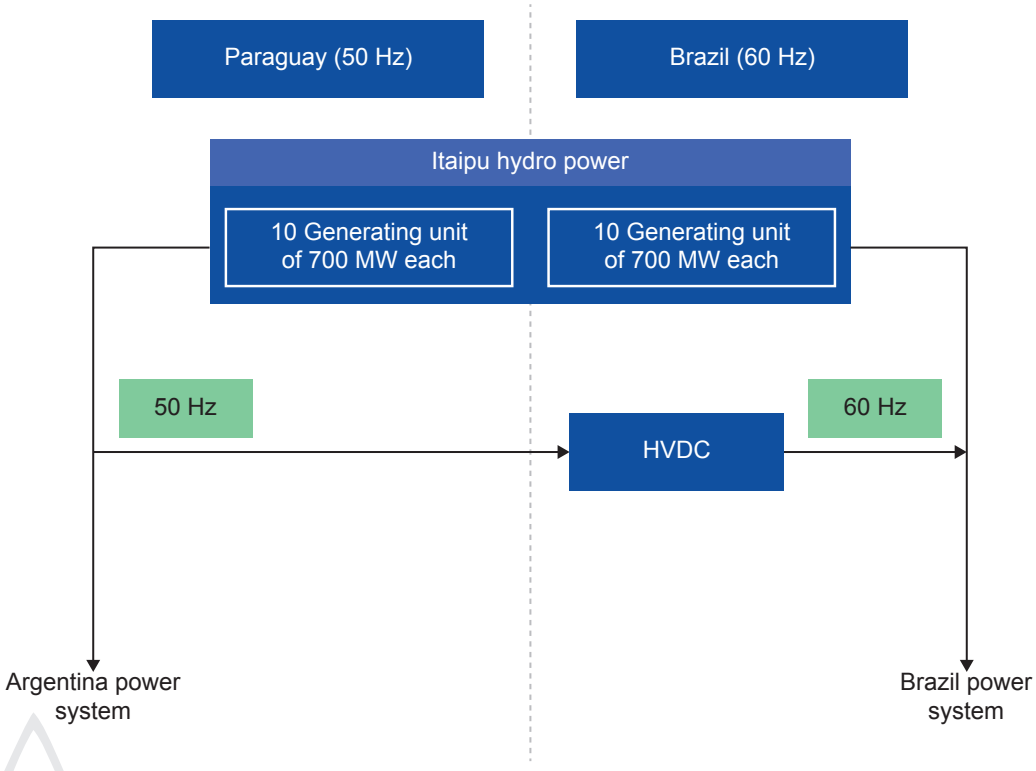
In 2004, Argentina, faced with a domestic power crisis,abrogated the contract commitment to sell power to CIEN. CIEN, in 2006, declared the contract breach.

5 Brazil-Paraguay CBET (Itaipu Interconnector)

Negotiations for this power plant started back in the 1960s. In 1973, both countries signed the Itaipu Treaty, which authorized them to use the Parana River for hydroelectric purposes. In 1974, the company, Itaipu Binacional, was created to build and manage the power plant.

Itaipu hydro has a total installed capacity of 14,000 MW with 20 generating units of 700 MW each. Of these, 10 generating units produce energy at 50 Hz for Paraguay, while the other 10 produce energy at 60 Hz for Brazil. Brazil has built HVDC to procure 50 Hz Paraguay power. Itaipu started operating in 1984 and it is the largest clean power source in the world after Three Gorges dam of China.

Figure 42: Brazil-Paraguay Interconnection (Itaipu)



The table illustrates the evolution of cross-border power trade between two countries:

Timeline	Evolution of CBET between Paraguay and Brazil
1960s	Intense negotiations between two countries for the Itaipu project on the Parana river.
1973	Both countries signed the 50-year Itaipu Treaty for which equal distribution of cost and resulting energy from the project was foreseen. Owing to lack of resources, Paraguay requested Brazil to pay for its share and it would allow Brazil to have Paraguay's share at a cost for generation, for compensating expenses.
1974	Itaipu Binacional was formed to carry out the project.
1974-84	The consortiums that carried out construction (civil, electrical, and mechanical) work:

<table>
<tr><th>Timeline</th><th colspan="3">Evolution of CBET between Paraguay and Brazil</th></tr>
<tr><td>1984</td><td colspan="3">Itaipu started operations as the world's largest clean energy source of that time.
<table><tr><th></th><th>Brazil side Consortium</th><th>Paraguay side Consortium</th></tr><tr><td>Construction work</td><td>Unicon</td><td>Conempa</td></tr><tr><td>Electrical-mechanical work</td><td>Itamon</td><td>CIE</td></tr></table></td></tr>
<tr><td>2000</td><td colspan="3">The formation of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA).</td></tr>
<tr><td>2007-08</td><td colspan="3">The Paraguay president, Fernando Lugo, re-negotiated the terms of the 1973 Itaipu Treaty with Brazil.</td></tr>
<tr><td>2009</td><td colspan="3">Brazil accepted re-negotiated terms with these conditions:
i. Paraguay can sell power to other countries.
ii. Brazil has to increase its annual payment from US$ 120 million to US$ 360 million a year (from the earlier US$ 100 million a year).
iii. Brazil has to finance the construction of a transmission line to the Paraguay capital.</td></tr>
</table>

Brazil-Paraguay CBET has a special status in the world of power trade among countries due to Itaipu's large capacity of 14,000 MW. Itaipu is the world's largest hydropower generator in the world. It began generating in 1984 and is located at the Parana River on the border between Brazil and Paraguay. It provides 15 percent and 75 percent of the energy consumer, respectively, in both countries.

This project was conceptualized in 1973 when Argentina and Brazil signed a bilateral treaty with a 50-yearterm in which each country would receive 50 percent of the energy produced. Both countries have to equally contribute to the project but Brazil, bore the full funding of the venture, while Paraguay pledged to pay their share in the form of surplus energy. In this arrangement, Paraguay had access to only five percent of the amount it was entitled to, while the rest was exclusively sold to Brazil, at the cost of generation, to settle at US$ 18 billion, which would be created with the Brazilian Government by the year 2023.

These terms of the Treaty have later been viewed by Paraguayans as unjust as they have to lose the opportunity to sell the same power at market rate to other countries. It became a major national issue and influenced the elections in Paraguay. It was claimed by BBC Brazil that Paraguay, by selling its energy at production cost, receives around US$ 100 million annually, but if it had sold the same electricity at market price it would be receiving US$ 11 billion annually, which represents four times the value of its foreign debt and is equal to the country's GDP in 2007.[8]

Nationalist Fernando Lugo won the presidential elections in Paraguay and re-negotiated the terms of the 1973 Itaipu Treaty with Brazil during 2007-08. In 2009,while re-negotiating, Brazil allowed Paraguay to sell power to other countries and had to increase its annual payment to US$ 360 million a year. Brazil also financed the construction of the transmission line to the Paraguay capital.

6 Brazil

In 1995, Brazil went through multiple reforms to promote competition in the energy market:

- Unbundling of vertically integrated state-owned electric utilities by separating transmission, distribution, and system control from generation.

[8]http://g1.globo.com/Noticias/Mundo/0,,MRP418955-5602,00.html

- Implementing a regulation regime that promotes efficient behavior by market participants.
- Creating a well-designed wholesale market with enough independent suppliers to facilitate competition.
- Allowing retail competition for industrial consumers.

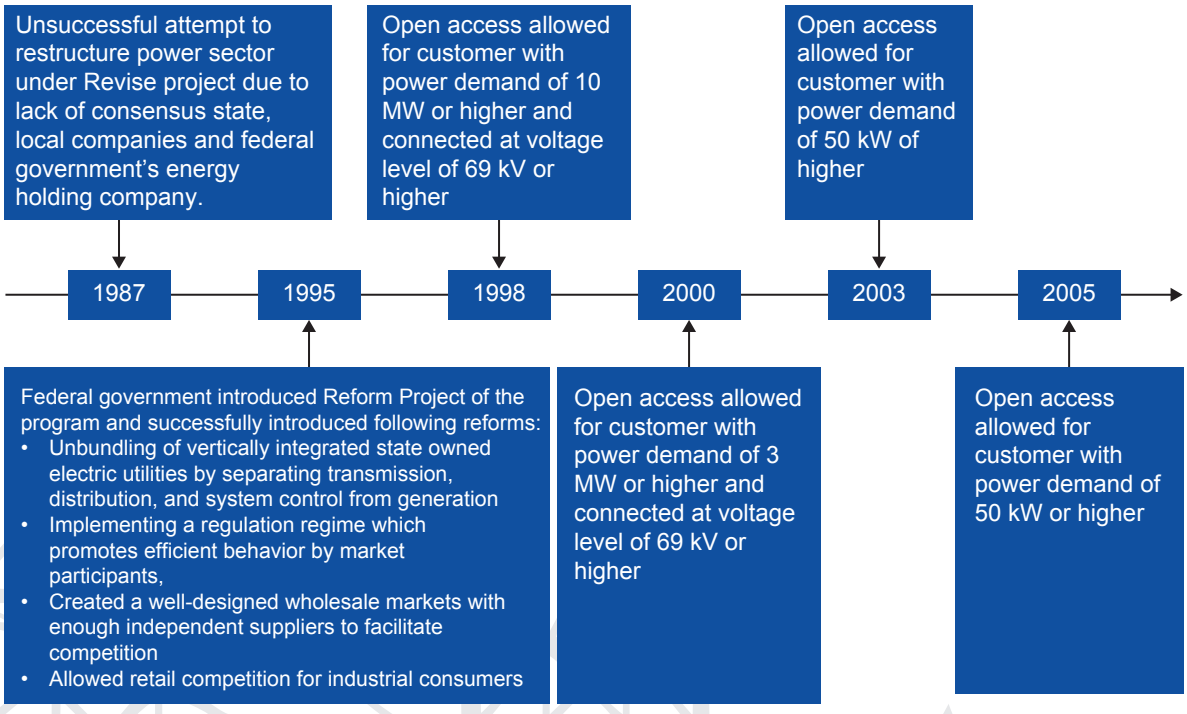
Brazil has a provision for OA in its power transmission system. It gives the right to every plant to get connected to the system. Similarly, a consumer falling under the category of 'Free Consumer' has the right to choose the electricity supplier and pay a rate for using the transmission or distribution system.

Law No. 9074, which was enacted in 1995, gives the right to a consumer who has a certain load to become a 'Free Consumer'. Between 1995 and 2000, this facility was granted to large consumers only with an installed load of 10 MW or more, and served by a voltage of 69 kV or more. In practice, this resulted in the Brazilian model to accommodate:

- Competition in wholesale, where multiple distributors may buy electricity from competing generators and access transmission, using OA provisions.
- Competition in retail area, where large consumers have access to competing generators, directly or through a retailer of their choice.

In 2005, Federal Law No. 9074 also allowed all Brazilian consumers to choose their power suppliers, which resulted in even small consumers, such as household or small **business, buying electricity from the generators on a competitive basis.**

Figure 43: Open Access Evolution in Brazil



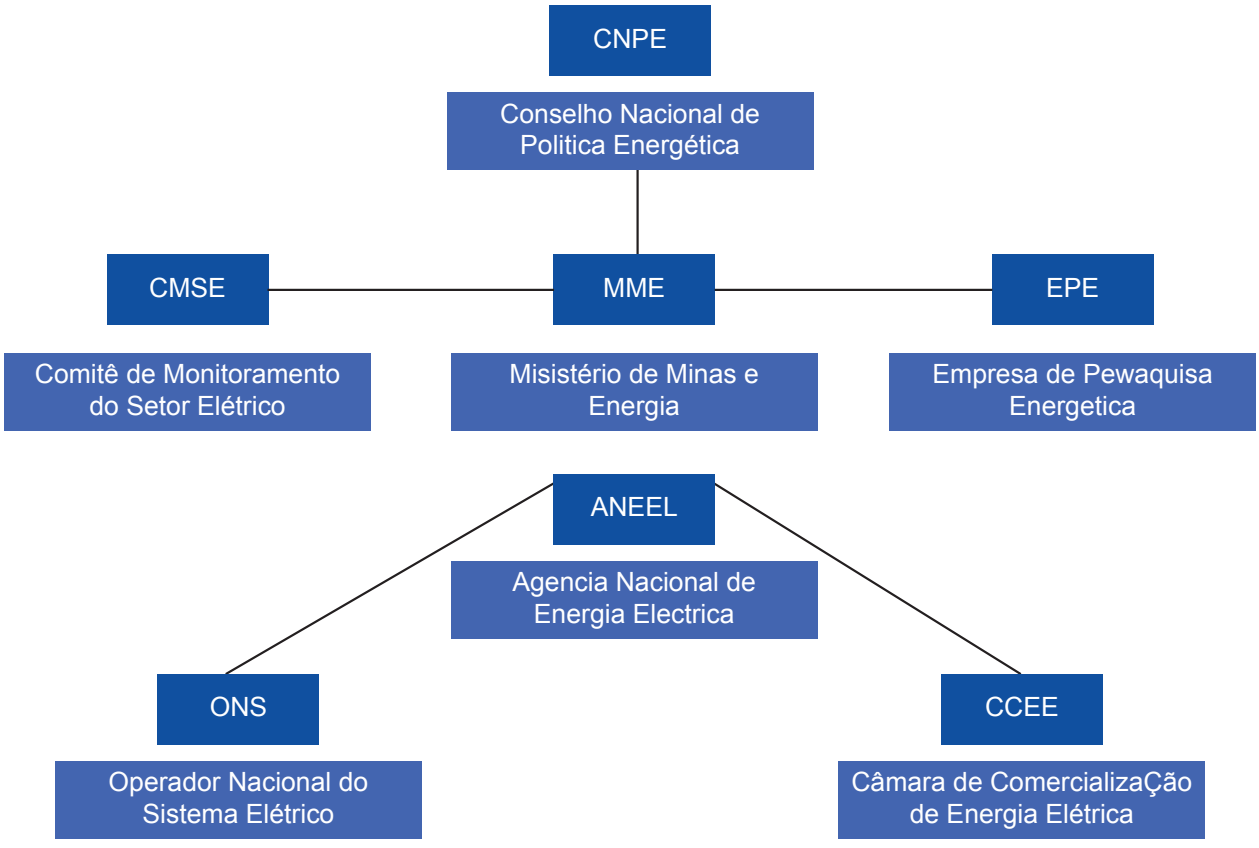
Institutional Structure of the Brazil Power Sector

Brazil has a mixed model where it has both, the free and regulated, environment. In the free environment, prices are freely negotiated for the generation and commercial usage. In the regulated

environment, however, auctions and bids are conducted for the least tariffs. The functions of the members are:

Agency	Function
Advisor **CNPE (Conselho Nacional de Política Energética)**	CNPE is an advisory body to the President. It formulates national policies and guidelines for energy, on the use of natural energy resources of the country and periodically reviews the energy matrix. It also establishes guidelines for specific programs. It is a multi-ministerial body headed by the Minister of Mines and Energy.
Ministry **MME (Ministério de Minas e Energia)**	MME is in charge of formulating, planning, and implementing actions of the Federal Government under the national energy policy.
Monitoring **CMSE (Comitê de Monitoramento do Setor Elétrico)**	CMSE is constituted under the MME and under direct coordination with the primary function of monitoring and permanent assessment of the continuity and safety of the electric energy supply throughout the country.
Planning **EPE (Empresa de Presquisa Energetica)**	EPE is responsible for the long-term planning of the sector.
The National Electricity Regulator **ANEEL (Agencia Nacional de Energia Electrica)**	Formed in 1996, ANEEL is the authority on special regime, linked to the MME, with the purpose of monitoring the production, transmission, distribution, and sale of electricity in accordance with the policies and guidelines of the Federal Government. It approves the project's technical compliances and also runs the auctions.
System Operator **ONS (Operador Nacional do Sistema Elétrico)**	Formed in 1998 under Law No. 9648, ONS is a non-profit system operator, which is a legal entity under the regulation and supervision of ANEEL. ONS coordinates and controls the operation of generation and transmission, under the National Interconnected Power System (NIPS). It is responsible for: • Drafting operational rules for the grid users, which are then submitted to ANEEL for approval. • Evaluating the technical compliances regarding the bid requirements and the grid procedures. • Identifying the transmission system reinforcement needs. • Organizing the NIPS and international interconnections. • Assuring that the OA principle is respected by transmission companies. • Drafting plans to the Energy Ministry for extension of NIPS.
Regulating energy sale **CCEE (Câmara de Comercialização de Energia Elétrica)**	CCEE is a non-profit legal entity under the regulation and supervision of ANEEL, with the purpose of enabling the sale of electricity in NIPS. It manages the contracts of purchase and sale of electricity, its accounting, and liquidation.

Figure 44: Brazil Power Sector Institutional Structure



Model of Power Procurement by Free Consumers

Electricity purchase and sale transactions may be carried out in two different market segments in Brazil:

i. Regulated market (ACR), which comprises the purchase by DISCOM through public bids of all electricity required to supply their captive consumers.
ii. Free market (or ACL), which encompasses the purchase of electricity by non-regulated entities (such as free consumers and energy traders). The ACL is an open market but it is available only for free consumers.

The model for the wholesale power market distinguishes between regulated markets for captive consumers and free markets for large users. In the regulated market, DISCOMs are required to pool their purchase of power to supply their captive consumers in annual auctions. The demand in the regulated market comes from captive and potentially free (over three MW demand) consumers, while the demand in the free market comes from large consumers that have decided to leave the regulated market already.

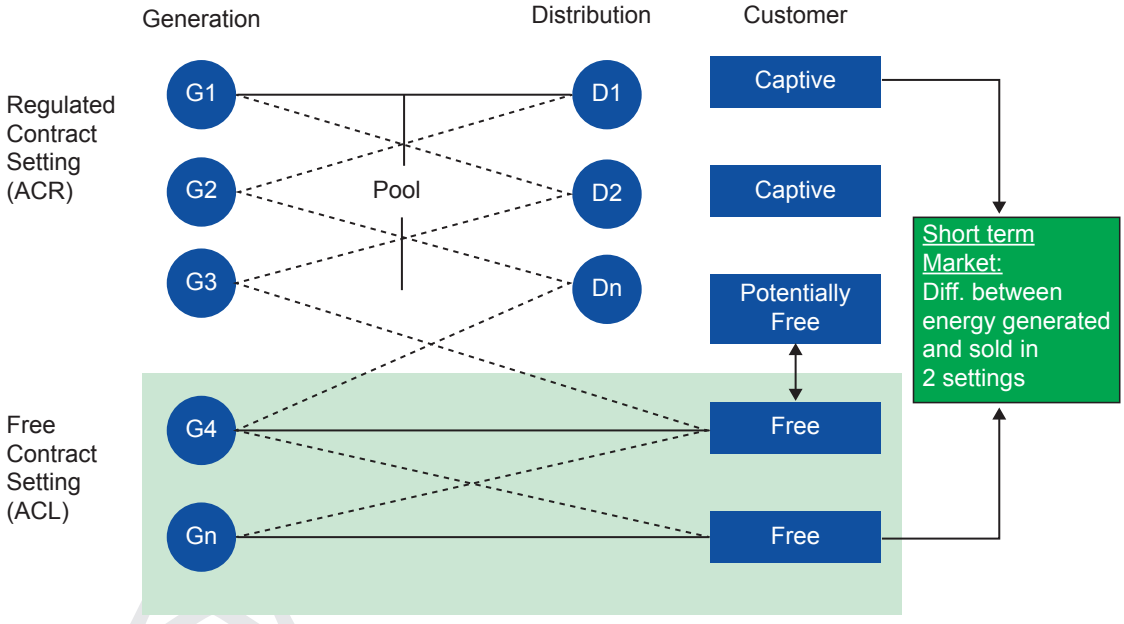
DISCOMs and free consumers are required to contract up to 100 percent of their five- year future demand. Distribution companies must supply their consumers with power procured in public auctions conducted by Aneel.

Potentially free consumers have to produce a previous intimation to their distribution company before moving into the free market, in order to avoid the risk of a surplus of power among distribution companies.

Generation companies may sell to either the free or the regulated market, or to both; those that wish to sell to the free market must pay a fee to the regulated market pool.

Figure 45 illustrates the power market setting in Brazil.

Figure 45: Power Transaction Market Model of Brazil



Process of Getting Open Access by the Free Consumer

Brazil has a policy of providing OA to consumers and generators by giving them access to the National Interconnected System (SIN). The steps involved are:

- Access the grid; then free consumers and generation companies have to request the system operator (ONS) or the distribution company that owns the facilities where the generation company intends to access the SIN.
- ONS decides on the connection point after ensuring other access conditions are met.
- A generation company must enter into two agreements; i) with the transmission or distribution company, for regulating the use and connection to the distribution or transmission systems, and ii) the conditions for the payment of charges arising from the use of the grid, among other responsibilities.
- Free consumers start receiving power from the generator of their choice through OA to the transmission network.

7. ENTSO-E

In July 2009, ENTSO-E took over operations of Europe's TSOs. ENTSO-E operates through the coordination of TSOs by market coupling. Market coupling does not create energy flow, it just creates day-ahead plans for the cross-border energy flow. These plans may be altered by the market players' intra-day cross-border trading or the TSO's cross-border trading of energy.

Regulation (EC) No. 714/2009 states the adoption of non-discriminatory rules for access conditions to the network for cross-border exchange and rules on capacity allocation and congestion management for interconnections and transmission systems affecting cross-border electricity flow.

Table 28 shows the timeline of coupling for the European power markets.

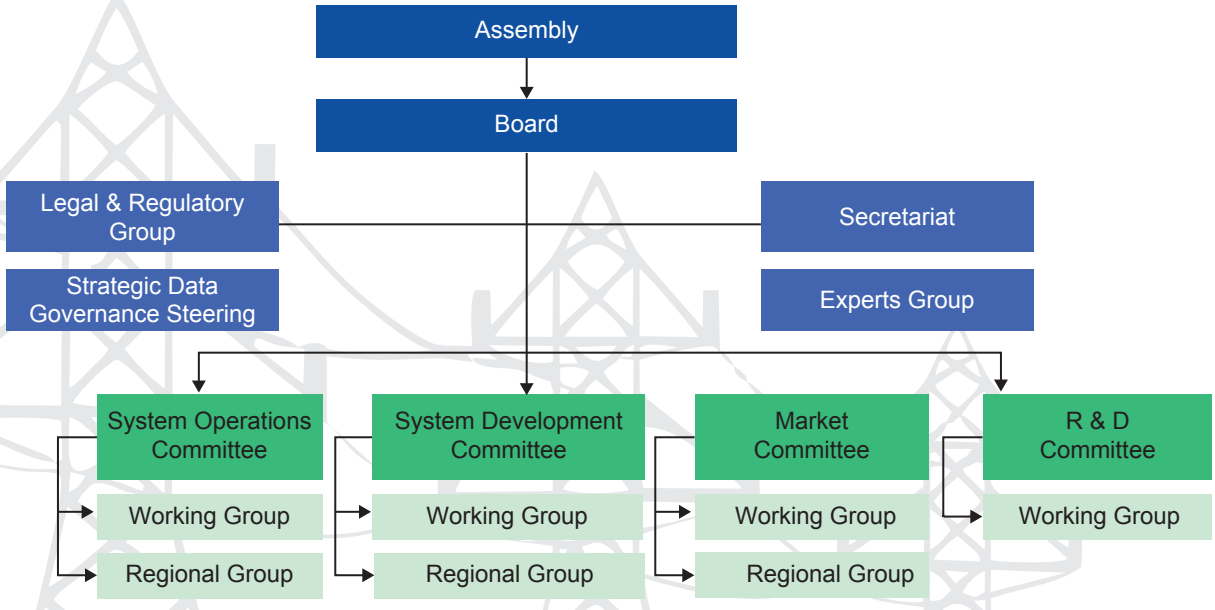
Table 31: Market Coupling Timeline

Coupling	Year	Description
Trilateral Market Coupling	2006	The implicit market coupling of the Netherlands, Belgium, and France was an important step towards the integration of the North West European electricity markets.
Coupling Central West Europe	2008	TSOs in the Netherlands, France, Germany, Belgium, and Luxembourg set up Capacity Allocation Service Company, Central West Europe (CASC-CWE) as a joint trading platform, to execute explicit long-term auctions (annual and monthly). Its activities have since expanded to include TSOs in Italy, Switzerland, and Scandinavia. In 2010, the name changed to CASC-EU.
Coupling Central Eastern Europe	2008	The Central Allocation Office GmbH (CAO) was founded in 2008 as a single point of registration for capacity auctions in Central Eastern Europe, allocating cross-border electricity transmission capacity in Austria, Czech Republic, Germany, Hungary, Poland, Slovakia, and Slovenia.
Coupling CWE and Nordics	2008	The European Market Coupling Company (EMMC) was founded in Hamburg in 2008 to couple the CWE and Nordic regions. Its first interconnection was between Germany and Denmark in 2009. Subsequently, the Baltic Cable linked Germany and Sweden and the NorNed cable connected Norway and the Netherlands.
Coupling UK	2011	The UK joined to the Dutch DAM via the BritNed cable in 2011, bringing Europe a step closer to integrating DAMs in Europe.
Coupling North West Europe	2014	The DAMs in North Western Europe (NWE) were successfully coupled in February 2014, enabling electricity to be traded from France to Finland under a common day-ahead electricity price calculation. This laid the foundation for multi-regional coupling and in May 2014, the NWE region was coupled with south western Europe, linking markets and TSOs all the way down to Portugal.

Price Coupling of Regions (PCR) is the initiative of seven European Power Exchanges (APX, Belpex, EPEX SPOT, GME, Nord Pool Spot, OMIE, and OTE), to develop a single price coupling solution to be used to calculate electricity prices across Europe and allocate cross-border capacity on a day-ahead basis.

ENTSO-E Institutional Framework

Figure 46: ENTSO-E Institutional Framework



ENTSO-E Member Companies

European TSOs are entities operating independently from the other electricity market players and are responsible for the bulk transmission of electric power on the main high voltage electric networks. TSOs provide grid access to the electricity market players (that is, generating companies, traders, suppliers, distributors, and directly connected customers) according to non-discriminatory and transparent rules.

A total of 43 TSOs from 36 countries are members of ENTSO-E.

Governing Documents

ENTSO-E was formally established and given legal mandates by the EU's Third Energy Package, which was adopted in July 2009. Although the Third Energy Package did not formally apply until March 2011, ENTSO-E was created in December 2008 and fully operational as of July 2009.

The Articles of Association and Internal Regulations were further reviewed and improved in September 2014. There are two association documents for ENTSO-E:

i. The **Articles of Association** govern, among others, the operation of ENTSO-E, its membership, the roles and relationships between the various ENTSO-E's bodies, and the distribution of voting rights between the members.
ii. The **Internal Regulations** complement the Article of Association by defining the practical and technical rules and procedures governing the operations of the Association.

Regional Group

The System Operations Committee has five permanent regional groups, based on the synchronous areas (Continental Europe, Nordic, Baltic, Great Britain, and Ireland-Northern Ireland), and two voluntary Regional Groups (Northern Europe and Isolated Systems).

Voluntary Group

Voluntary Regional Group Northern Europe

The members of the Voluntary Regional Group Northern Europe (VRGNE) are the following TSOs:

- Denmark (East): Energinet.dk.
- Finland: Fingrid OyJ.
- Germany: TenneT TSO GmbH (corresponding member).
- Germany: 50Hertz Transmission GmbH (corresponding member).
- Netherlands: TenneT TSO B.V.
- Norway: Statnett SF.
- Poland: PSE Operator S.A.
- Sweden: Affärsverket Svenska Kraftnät.

Voluntary Regional Group Isolated Systems

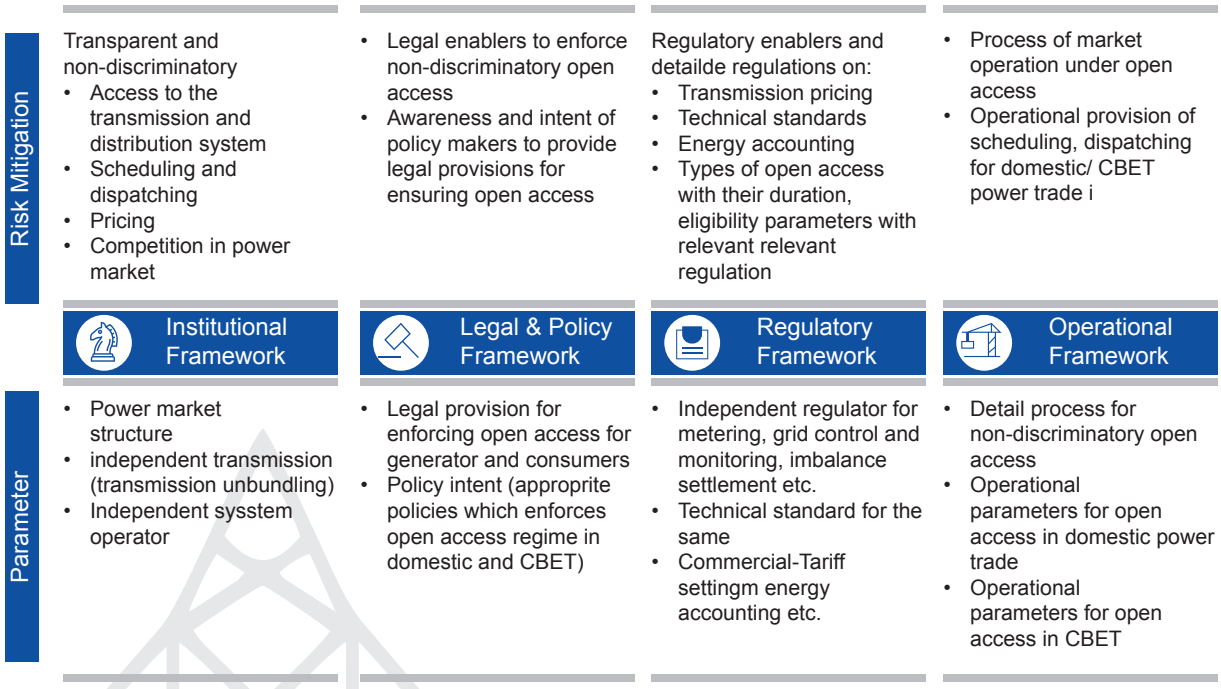
The members of the Voluntary Regional Group Isolated Systems (RGIS) are the following TSOs:

- Cyprus: Cyprus Transmission System Operator.
- Iceland: Landsnet hf.
- Italy: Terna - Rete Elettrica Nazionale SpA.
- Spain: Red Eléctrica de España: S.A.

9.2 Annexure 2: Risks and Mitigation Measures for Open Access

Non-discriminatory OA has four broad parameters with associated mitigation:

Figure 47: Key Risk and Mitigation Measures in Open Access



Key Risk Areas, Their Description, Risk Bearer and Impact

Each parameter for OA has its risk in the form of weak institution, implementation, and so on. The table illustrates the risk associated with each of the parameters.

Table 32: Key Risk Parameters, Definition and Risk Bearer, and Impact

S. No.	Framework Parameter	Risk Description in Parameter	Key Risk	Risk Bearer and Risk Impact
1.	**Institutional Framework** For OA to be in place, it is necessary to have the institutional framework in place. This needs to be strong in order to guide power market structures leading towards OA, imposing penalties for deviance and continuously doing course corrections as the power market matures and more participants take part in buying and selling under OA. Inabilities of the institution to deal with such uncertainties would result in poor implementation of OA.			
1. a	**Power market structure**	In the absence of a competitive power market, there will be only a few sellers and buyers, which is detrimental to competition. In the initial phase of OA, PPAs could be bilateral in nature. As OA matures, the power market moves from long term to short term to real time market operation.	Non-competitive power market.	Generators and Customers. **Impact: High for small generators.**

S. No.	Framework Parameter	Risk Description in Parameter	Key Risk	Risk Bearer and Risk Impact
1. b	**Independent transmission (unbundled)**	This may pose a risk when a transmission operator does not allow the third party to use its network on equitable basis with its own generation. Thus, it is needed to unbundle the transmission system from generation. Meanwhile, when this is not possible, the regulator should try to at least functionally unbundle the transmission system.	No access to transmission system due to network owner.	Generators and Customers. **Impact: High for generators, average for customer.**
1. C	**Independent system operator**	A biased system operator may give preference to a certain generation and load while scheduling what is detrimental to fair market principles and would not contribute in discovering the best price possible.	Unfavorable treatment in scheduling.	Generators. **Impact: Average.**
2.	**<u>Legal and Policy Framework</u>** Legal and policy framework are important tools for realizing non-discriminatory OA in any market. The policy framework acts as a signal to market participants and can be construed as the seriousness of policy makers to implement OA. On the other hand, a legal framework provides for necessities in case of non-compliance of OA regulations by certain market participants.			
2. a	**Legal provision**	Legal provisions are the enabler of OA. In their absence, OA cannot be enforced and thus, market participants may not comply with the regulations mandating OA to their network.	No penalty for not providing OA by the system owner.	Generator and consumer. **Impact: High for consumer and generators.**
2. b	**Policy intent**	The policy intent acts as a signal to market participants from policy makers. In the absence of any signal that policy makers may want to move towards more equitable terms under OA, market participants may continue with business as usual.	Absence of relevant OA policy.	All market participants. **Impact: No direct impact but indirect impact in terms of uncompetitive practice.**
3.	**<u>Regulatory framework</u>** A regulatory framework acts as the backbone for interchanges between market participants in terms of determining technical requirements of interconnection, energy accounting, tariff setting, and eligible consumer category. In the absence of a robust regulatory framework, the market may not utilize OA fully.			
3. a	**Independent regulator**	If the regulator is one of the market participants, then its regulatory judgment may be impacted by its vested interest.	Biased regulations.	Generators. **Impact: high.**
3. b	**Technical standard**	The entire power grid system may be jeopardized in the absence of poor planning and non-compliance of technical standards. Open Access by definition would provide room for increased numbers of buyers and sellers, which will connect to the grid, thus ensuring system stability becomes paramount by ensuring proper technical standards.	Threat to system stability.	Grid stability. **Impact: high.**

S. No.	Framework Parameter	Risk Description in Parameter	Key Risk	Risk Bearer and Risk Impact
3. c	**Commercial aspects**	Tariff determination and energy accounting are very important aspects of OA. If these aspects are not taken care of, there might be no incentive for market participants to move to the OA regime.	Uncertainty in tariff determination.	Both generator and consumer. **Impact: high.**
4.	**Operational framework** The operational framework sets out the process and type of OA connection. It keeps evolving as the OA evolves and the power market matures. A detailed process of grant of OA both, in the domestic and CBET context, is a must for efficient usage of OA provision in power markets.			
4. a	Detailed process of non-discriminatory OA	In the absence of operational guidelines for generators and customers, it may become cumbersome for them to opt for OA. Thus, it is important to plan out a detailed process for operationalizing OA for any generator or consumer. The relevant parties and their roles should be clearly identified and mapped.	Unclear process may lead to disinterest by market participants in OA.	Market participants. **Impact: Average.**

Risk Mitigation Measures Adopted in Different Countries and Regions

Table 33: International Experience on Key Risk Mitigation Measures

Key Ingredient	Key Risk	Mitigation Example (case)
• Institutional risk		
Power market structure	Non-competitive power market	**USA Experience** • The US Supreme Court realized the lack of a body to control the rates of transaction between states in 1927 and came up with the Federal Power Commission, which was renamed as the Federal Regulatory Commission (FERC) in 1977. This was the **independent regulator** since inception and remained so. • The FERC Order No. 888 required an established **Independent System Operator** (ISO) to: i) be not-for-profit with no interests in the outcome of competition among players in energy markets ii) have an independent board of directors with no ties to any market participant and iii) in exercising its power, the ISO to allow inputs from all interested parties. Where the ISOs own no transmission assets, they actually manage the grid and operate the market. They also effectively operate as a kind of regulatory authority with powers delegated by FERC, but also subject to FERC's oversight and review. • FERC Order No. 2000, issued in 1999, initiated the voluntary creation of the regional transmission organization (RTO). An RTO is an electric power **transmission system operator** that coordinates, controls, and monitors a multi-state electric grid. **India Experience** • The Electricity Act 2003 initiated the process of independent transmission utilities. Its **power market structure** has also grown from being vertically integrated to **unbundling** the power sector at the central at states level. • It has SLDCs and POSOCO at the state and central level and they act as **independent system operators**.
Independent transmission (unbundled)	No access to transmission system due to network owner	

Key Ingredient	Key Risk	Mitigation Example (case)
Independent system operator	Unfavorable treatment in Scheduling	• CERC and SERCs are the **independent regulators** at the central and state level. **SAPP Experience** • At the regional level, SAPP has emerged from bilateral trade (in 1950 between Zambia to DRC) to the present level of the DAMs. **Brazil Experience** • Brazil's **power market** gradually opened up for OA. It initially allowed only big players to participate and later reduced the requirement of the system size to allow even small players. • Formed in 1996, ANEEL is an **independent system regulator**. It is an authority on the special regime, linked to the MME, with the purpose of monitoring the production, transmission, distribution, and sale of electricity, in accordance with the policies and guidelines of the Federal Government. It approves the project technical compliances and also runs the auctions. • Formed in 1998 under Law No. 9648, ONS is a **non-profit system operator**, which is a legal entity, under the regulation and supervision of ANEEL. ONS coordinates and controls the operation of generation and transmission, under NIPS.
• Legal and Policy Risk		
Legal provision	No penalty for not providing OA by system owner.	**USA Experience** • In 1973, the US Supreme Court found Otter in violation of the Sherman Act (the US statute on competition, prohibiting certain business activities that can reduce competition) as the utility was involved in **anti-competitive practices by not allowing transmission access to its network**, which it owned and operated. • The Energy Policy Act of 1992 (EPACT of 1992) amended the Federal Power Act (FPA) to allow generators and other market participants, selling or buying electricity for resale, **to apply to FERC for an order to access the utility transmission assets** if they had been denied access to transmission utility. **India Experience** • Clause 5.3.2 of the National Electricity Policy 2005, states that the 'Network expansion should be planned and implemented, keeping in view the anticipated transmission needs that would be incident on the system in the Open Access regime'. • Clause 5.3.3 of the National Electricity Policy 2005, states that 'Open Access in transmission has been introduced to promote competition amongst the generating companies who can now sell to different distribution licensees across the country'. • Clause 5.3.4 of the National Electricity Policy 2005, states refer that 'Non-discriminatory Open Access shall be provided to competing generators supplying power to licensees upon payment of transmission charge to be determined by the appropriate Commission'. • Section 9.2 of the Electricity Act 2003 provides for OA as it states, 'Every person, who has constructed a captive generating plant and maintains and operates such a plant, shall have the right to Open Access for the purposes of carrying electricity from his captive generating plant to the destination of his use'. • The Electricity Act 2003 mandated the CTU under Section 38.2.d of the Electricity Act 2003 that it needs to provide non-discriminatory OA to its transmission system for any generation company or consumer on payment of transmission charges. Section 40 of the Electricity Act 2003 makes the same conditions on the other transmission licensees as well.
Policy intent	Absence of relevant OA policy.	

Key Ingredient	Key Risk	Mitigation Example (case)
		SAPP Experience • Two of the SAPP governing documents (inter-governmental MoU and inter-utility MoU) served for legal and binding provision on member countries, in line with the dispute resolution mechanism and methodology provided in these documents. • RERA is responsible for the facilitation of the Electricity Supply Industry Policy, Legislation, and Regulations. This includes the Electricity Supply Industry Policy legislations and regulations for cross-border trading, focusing on the terms and conditions for access to transmission capacity and cross-border tariffs. **Brazil Experience** • Law No. 9074, which was enacted in 1995, gives the right to the consumer who has a certain load to become a 'Free Consumer' or OA consumer. Between 1995 and 2000, this facility was granted to large consumers only with an installed load of 10 MW or more and served by a voltage of 69 kV or more. Later, even smaller consumers were recognized as free consumers or OA consumers.
• Regulatory risk		
Independent regulator	Biased regulations.	**USA Experience** • The USA has various independent regulatory bodies at the central, regional, or state levels. These bodies, such as FERC, NERC, and ISO/RTO act as neutral/independent agencies and set the fair rules for power market participants. • The Federal Energy Regulatory Commission (FERC) is an independent agency within the US Department of Energy, which regulates the interstate transmission of electricity within the country. • The North American Electric Reliability Corporation (NERC) is a not-for-profit **international** regulatory authority with the objective to ensure the reliability of the bulk power system in **North America**. **India Experience** • As specified in the Electricity Act 2003, different agencies, such as the Central Transmission Utility, the state transmission unit, the system operator (load dispatch center, POSOCO), and the regulatory commission, need to perform their respective functions. • The Central Electricity Regulation Commission's Sharing of ISTS Charges and Losses Regulation 2010 repealed the CERC (terms and conditions of tariff) Regulations 2009, and CERC (OA in inter-state transmission) Regulations 2008. CERC's sharing of ISTS Charges and Losses Regulation, 2010, describes in detail the intent and process for calculating and sharing of charges and losses for OA. • Section 5.4 of Chapter 3 of CERC Sharing of ISTS Charges and Losses Regulation 2010, 'The Point of Connection transmission charges shall be computed in terms of rupees per MW per month. The amount to be recovered from any designated ISTS customer towards ISTS charges shall be computed on a monthly basis as per these regulations. The Point of Connection transmission charges for short-term Open Access transactions shall be in terms of rupees per MW per hour and shall be applicable for the duration of short-term Open Access approved by the RLDC/NLDC'. • Section 13, Chapter 6 of CERC Sharing of ISTS Charges and Losses Regulation 2010, provides for the Transmission Service Agreement (TSA), which would give detail of various arrangements such as the sharing of charges, metering, billing, accounting, treatment of injection/withdrawal, and so on.
Technical standard	Threat to system stability.	
Commercial aspects	Uncertainty in tariff determination.	

Key Ingredient	Key Risk	Mitigation Example (case)
		SAPP Experience • Established in 2002, RERA is a responsible, regional regulatory cooperation. It has also received a mandate from SADC to help address major regulatory constraints in enabling the environment for cross-border power trading. • The overall objective of RERA is to ensure that efficient cross-border deals are not constrained by unclear or complicated processes for making regulatory decisions. **Brazil Experience** • CCEE is a non-profit legal entity under the **regulation and supervision of ANEEL**, with the purpose of enabling the sale of electricity in NIPS. It manages the contracts of purchase and sale of electricity, its accounting, and liquidation.
• Operational framework		
Detailed process of non-discriminatory OA	Unclear process may lead to disinterest by market participants in OA.	**USA Experience** • The USA has an ISO/RTO-wise OA operational procedure. In places where there is no ISO/RTO, the utilities can have their own process within the regulations prescribed by FERC. • CAISO has a quota for energy in GWh, which can be given under OA. Its process of granting and scheduling OA is given in the USA experience in the Annexure. **India Experience** • India has a detailed process for non-discriminatory OA at the central and state level, under long-term, medium-term and short-term OA. • Various agencies involved for functions such as planning, regulations for eligibility, controlling transaction (technical and monetary), feasibility study and construction, O&M of transmission lines, grid monitoring and balancing are listed in the country-wise experience of India in the Annexure of this report. **SAPP Experience** • SAPP, at a regional level, has operational guidelines as one of the governing documents. • SAPP, at a regional level, has a detailed operational process for energy accounting, planning, and energy exchange with its procedures. **Brazil Experience** • Various agencies are responsible for the detailed operational procedure of OA for Brazil. CMSE is constituted under the MME and under the direct coordination with the primary function of monitoring and permanent assessment of the continuity and safety of the electric energy supply throughout the country. EPE is responsible for the long-term planning of the sector. CCEE is responsible for the sale of electricity.

9.3 Annexure 3: Case Study: Open Access Charges in India

Case Study 1: Inter-state Open Access in India

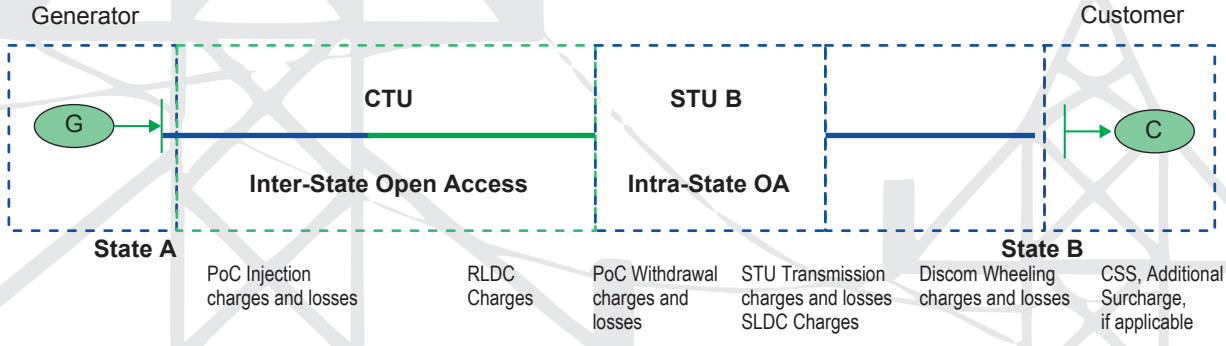
In this example, we assume that a generator is directly connected to the CTU network in the Indian state of Madhya Pradesh and is supplying power to a Non Domestic Supply (NDS) consumer, who is connected to a 33 kV network in Rajasthan.

In such a case, the following charges and losses will get cascaded on the generator's bus bar tariff:

- PoC injection charge at the injection node.
- PoC injection losses at the injection node.
- RLDC charges.
- PoC withdrawal charges at the Rajasthan state periphery.
- PoC withdrawal losses at Rajasthan state periphery.
- Rajasthan STU's transmission charges
- Rajasthan STU's transmission losses.
- Rajasthan SLDC charges.
- Rajasthan Distribution Utility's wheeling charges.
- Rajasthan Distribution Utility's wheeling losses.

In case of third party OA, (non-captive consumption), there will also be additional charges such as cross-subsidy surcharge and additional surcharge.

Figure 48: Illustration of Inter-state Open Access Arrangement



Case Study 2: Bilateral Open Access Between Two Countries

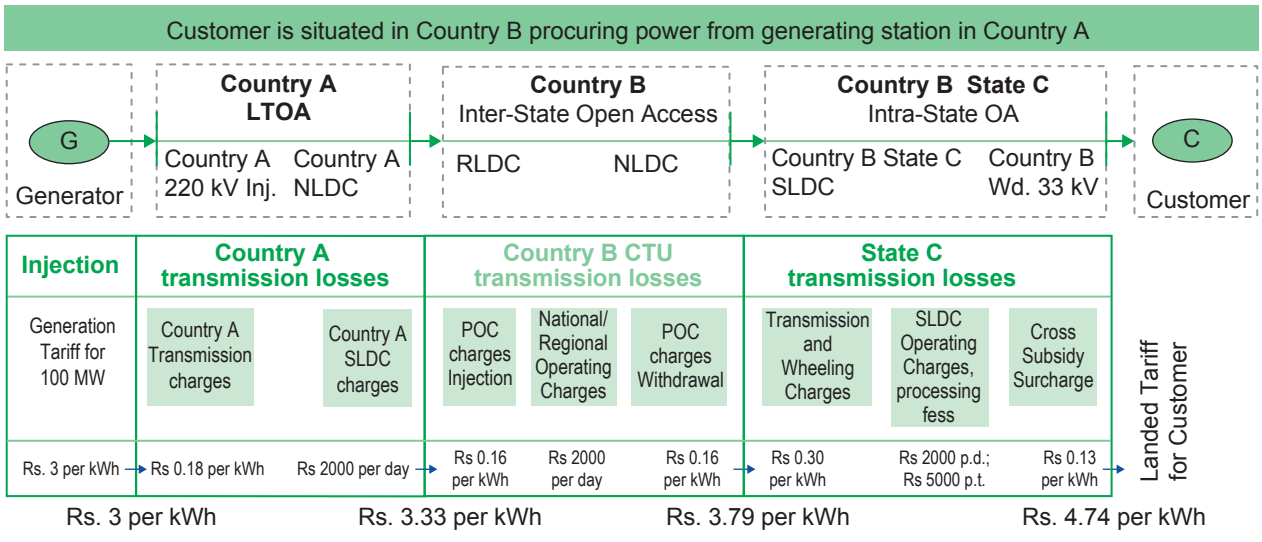
The following case of bilateral long-term OA transaction is between India (Country B) and a neighboring country (Country A). Here, the customer is embedded in a state (State C) distribution utility and is receiving power at 33 kV voltage level from a generator in the neighboring country, which is connected to the grid at 220 kV. The various charges that would be applicable as per the proposed framework in the Indian CBET guidelines would be:

- Long-term OA charges for country A.
- System operator fees/charges for country A.
- POC charges and losses (inter-state OA charges) at injection node for country B.
- National/regional system operation charges for country B.

- POC withdrawal charges and losses at the state periphery for country B.
- Transmission and wheeling charges and losses for state C.
- System operation charges for State C.
- Cross subsidy charge and additional surcharge for State C, if applicable.

The landed consumer tariff and various entities involved in the transaction, based on assumed illustrative values,are shown in Figure 44.

Figure 49: Illustration of Bilateral OA Between Two Countries

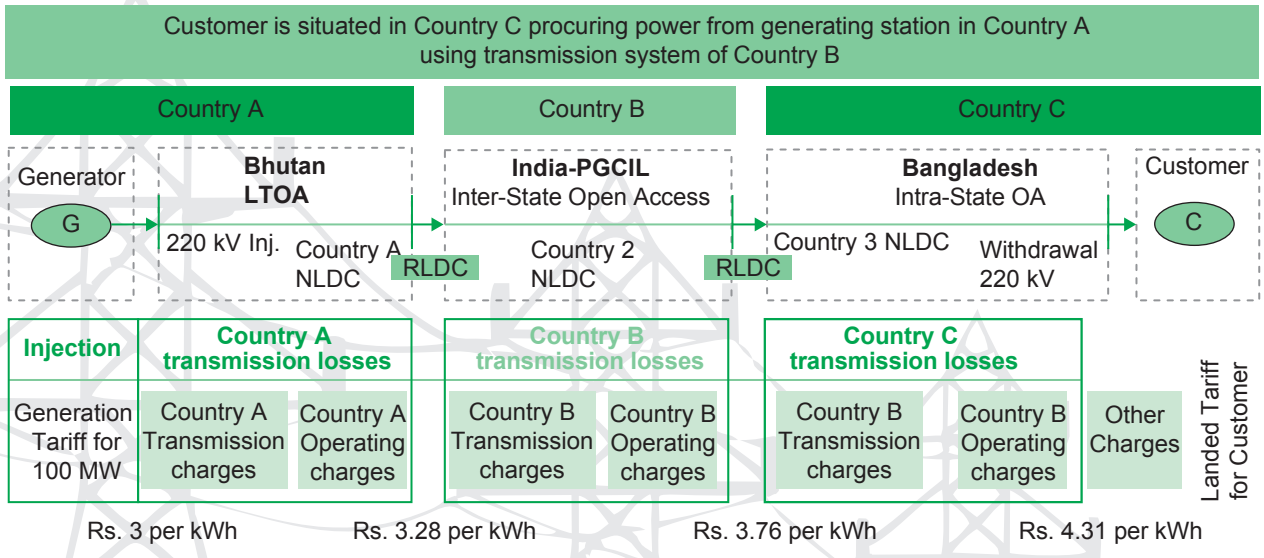


** Values are assumed, and not reflective of actual figures*

Case Study 3: Regional Open Access Between Multiple Countries

The following case assumes a multilateral long-term OA transaction between Bhutan (Country A) and Bangladesh (Country C), using the Indian (Country B) system as transit. The landed consumer tariff and various entities involved in the transaction, based on assumed illustrative values, for this hypothetical scenario, is shown in Figure 45.

Figure 50: Illustration of OA Between Multiple Countries



** Values are assumed, and not reflective of actual figures*

9.4 Annexure 4: Explanatory Memorandum to Model Guidelines

Guideline 1: Introduce Enabling Provisions for Open Access Through Enabling Legislation

A. Current Practice in South Asia

In SACs other than India, Bhutan, and Bangladesh, there is no defined right to non-discriminatory OA, in their respective fundamental legislations on the electricity sector. Even in the case of Bangladesh, there is no supporting regulatory framework for the legal provisions relating to OA.

B. International Experience

In the USA, FERC's Order No. 888 in 1996, laid the foundation for OA to transmission. The order required all public utilities that operate/control transmission facilities to offer transmission services to all eligible wholesale buyers and sellers. To ensure that the OA is non-discriminatory, the order required public utilities to take transmission services for their own use under the same terms and conditions offered to others, and to functionally separate transmission and power marketing functions.

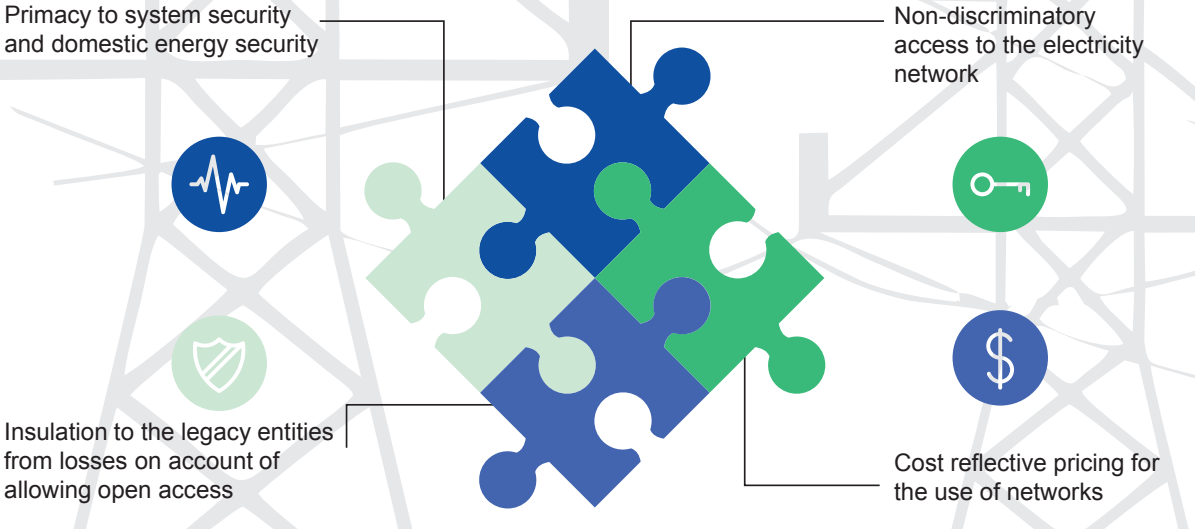
Similarly, in Brazil, Law No. 9074 of 1995, gave the right to consumers with a load of 10 MW or more, at a voltage level of 69 kV or above, to become 'Free Consumers' or OA consumers. The restrictions were further relaxed since 2000.

C. Recommendations for South Asia

The legislative framework for electricity will be amended to introduce the concept of non-discriminatory OA to transmission networks in a phased manner, with the modalities of phasing to be determined by the federal regulatory body/Government. Initially, OA may be introduced through regulations. However, at the earliest, efforts may be made to provide statutory backing to OA through legislation.

Basic provisions regarding grant of OA, and the duties and obligations of persons availing OA will be incorporated either in the legislative amendments/through regulations. The OA framework shall be based on the guiding principles shown in Figure 46.

Figure 51: Guiding Principles for Open Access



Necessary changes in the power market structure of the country may be introduced to support OA. This will include:

- Constitution of national level independent system operator, either by segregating the system operator's function from the transmission utility, or by setting up a new entity.
- Organizational and financial ring fencing of the independent system operator from other businesses of the system operator, its parent entities, or its subsidiaries. In cases where the system operator's function is currently established within the transmission utility, this can be done by transferring the ownership of the system operator from the transmission utility to the Government, with the Government thereafter maintaining a prudent distance from the operations of the independent system operator.
- Reconstitution of legacy entities, to prevent the system operator and transmission utilities from indulging in power trading. *(This is to avoid possible conflict of interest during transmission corridor allocation, curtailment, and so on.)*

The legislative and regulatory framework for OA shall be exhaustive enough to cover CBET. Open Access under CBET may be treated in a similar manner to OA in the domestic market, by considering the interface points between the networks of different countries as the respective injection/drawal points. However, such OA may require stricter terms and conditions (Guideline 4). The system operator at the federal/national level shall be empowered to approve and coordinate cross-border electricity transactions, in coordination with the transmission utility owning the cross-border transmission lines.

In the long term, subject to the respective Government policy, the framework shall strive to support CBET transactions where the electricity network is used only for wheeling of power through the territory of a country, with the injecting entity and drawing entity located in other neighboring countries.

Guideline 2: Define Features and Eligibility Criteria for Connectivity and Open Access

A. Current Practice in South Asia

Along with the fundamental provisions for OA, there are detailed aspects that need to be considered, such as how many types of OA will there be, what will be the eligibility criteria for OA, what will the priority be, and so on. In India, this is determined through CERC's regulations on OA.

B. International Experience

In the USA, FERC's Order No. 2003 in 2003 defined aspects such as the capacity for generator interconnection and the queue priority for OA.

C. Recommendations for South Asia

There will be a clear distinction of the concepts of connectivity and OA. Connectivity will deal with the physical connection to the grid, whereas OA will deal with injection, transmission and drawal of power by utilizing the grid. Thus, while connectivity is a necessary condition for OA, the grant of connectivity, by itself, does not confer the right for OA.

While it is for the respective countries to specify the terms and conditions for connectivity to their grid, the countries may strive to allow connectivity, at least to the entities satisfying the following eligibility

criteria, subject to adherence to the process for application for connectivity and payment of the prescribed fees:

- Connected load/installed capacity of more than 50 MW. *(As lower capacity supply sources/loads are typically allowed connectivity to medium/low voltage lines).*
- Construction of interface line from the applicant's boundary to the nearest technically feasible connection point in the grid.
- Connected to the transmission network at a voltage of 66 kV and above. *(The voltage level of 66 kV and above typically corresponds to the voltage level of a high tension transmission network in South Asia).*
- Adheres to the technical standards for connectivity to the grid, including those related to safety, protection, and communication.

The OA transactions may be categorized as short term, medium term and long term, based on tenure. There shall be additional categorization/identifier, for distinguishing cross-border transactions from domestic transactions. Thus, overall there may be at least six types of transactions: domestic short term, medium term, long term and cross-border short term, medium term and long term. If required, the cross-border transactions may again be separately classified as import and export.

Long-term OA will have priority over medium-term and short-term transactions. However, while short-term and medium-term OA may be allowed on available transmission margins, long-term OA may be allowed, based on dedicated transmission capacity set aside in the system. A summary of the salient features of the various categories of OA is provided in Figure 47.

Figure 52: Categories of Open Access

		Tenure	Transmission Corridor	Scheduling Priority	Curtailment Priority
STOA	**Short Term**	Up to 1 Month	On margins available in the system	Least	First
MTOA	**Medium Term**	3 Month – 5 Years	On margins available in the system	Intermediate	Intermediate
LTOA	**Long Term**	> 7 Years	On dedicated capacity	First	Least

Table 34: Eligibility Criteria for Open Access

Type	Criteria	Description
Legal	Type of entities.	Generating companies, distribution companies, power exchanges and consumers directly connected to the transmission system may be eligible for applying for OA. Trading licensees may also be allowed to apply for OA, on behalf of injection and drawal entities, subject to such injection and drawal entities having a valid connectivity and having endorsed the application.

<table>
<tr><th>Type</th><th>Criteria</th><th>Description</th></tr>
<tr><td></td><td>Phased introduction of OA.</td><td>The drawal and injecting entities will fall under the eligible category of entities who have been allowed OA by the Government/regulatory commission, under the prevalent phase of OA introduction.

In the initial phase, entities with a connected load/installed capacity of more than 50 MW, with direct connectivity to the grid at 66 kV or above, may be allowed OA. (The capacity and voltage level conditions may be relaxed further in the future).</td></tr>
<tr><td></td><td>Nationality</td><td>Trading licensees, power exchanges, generating companies, distribution companies and consumers incorporated outside the country may also be allowed to apply for OA, if the application is also endorsed by the domestic drawal/injection entity.</td></tr>
<tr><td>Technical</td><td>Connectivity</td><td>The applicant shall have direct connectivity with the grid at 66 kV or above. (The voltage level may be relaxed further in the future).</td></tr>
<tr><td></td><td>Transmission Margin</td><td>For STOA and MTOA, the existing network will have sufficient margins to accommodate such transactions, at least during a part of the tenure.

For LTOA, the network will have equivalent dedicated transmission capacity available throughout the tenure. In case such capacity is not available, the necessary network augmentation may be done.</td></tr>
<tr><td></td><td>Energy accounting</td><td>Interface meters adhering to the requisite technical standards and associated systems for proper energy accounting, will be available in both, the injection and drawal points.</td></tr>
<tr><td></td><td>Technical standards</td><td>The entities at both the injection and drawal points and the applicant will be in compliance with the technical standards for connectivity to the grid, if such standards are notified by the regulatory commission/any Governmental authority.</td></tr>
<tr><td>Commercial</td><td>Payment defaults</td><td>The applicant will not have been declared to be in payment default to any of the legacy electricity utilities, for a period of more than three months.</td></tr>
<tr><td></td><td>Payment security</td><td>The applicant will have furnished adequate payment security and additional security deposit.</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>OA Tenure</td><td>Payment Security</td><td>Additional Deposit</td></tr>
<tr><td>LTOA</td><td>2 month charges</td><td>2 month charge</td></tr>
<tr><td>MTOA</td><td>2 month charges</td><td>2 month charge</td></tr>
<tr><td>STOA</td><td>Charges for the applied tenure</td><td>1 month charge</td></tr>
</table>
While the payment security may be in the form of a letter of credit, additional security deposit may be in the form of an irrevocable bank guarantee.
</td></tr>
<tr><td>Additional criteria for CBET OA transactions</td><td></td><td>Applicants may be made to furnish additional security deposit equivalent to one month OA charges, to cover for the possibility of payment default on part of an entity located outside the border.</td></tr>
<tr><td></td><td></td><td>Stricter capacity limits (more than 50 MW) and connection voltage (more than 66 kV) may be specified by the respective countries for entities indulging in cross-border OA, as part of the phased introduction of OA.</td></tr>
</table>

Guideline 3: Fixation of Open Access Charges

A. Current Practice in South Asia

A comprehensive framework for the fixation of OA charges is available in India through separate regulations on OA, transmission pricing, and recovery of charges of load dispatch centers.

B. International Experience

In the USA, FERC's Order No. 888 in 1996 required all public utilities that operate/control transmission facilities to file an OA transmission tariff with FERC.

C. Recommendations for South Asia

The regulatory authority will separately determine the charges for transmission and system operation. For transmission pricing, in the long term, the regulator may strive to adhere to a transmission pricing regime, which is sensitive to distance, direction, and the quantum of power flow, like the Point of Connection tariff in India. The system operation and scheduling charges will be adequate to compensate the system operator for its capital and operational expenditure.

The cost for any transmission facilities dedicated to export of power will be recovered entirely as wheeling/transmission charges. Such costs will not be chargeable from electricity consumers within the domestic market.

In addition, in line with the regulatory framework of the respective countries, other charges, such as imbalance settlement/deviation settlement charges, reactive energy charges, and so on may also be collected.

The transmission losses, as determined by the regulatory authority/system operator/energy account settlement agency, will also be applicable on the OA transactions. The losses at a voltage level of 66 kV and above will ideally not be clubbed together with the losses of voltage below 66 kV, while determining the losses.

For all applications related to connectivity and OA, the respective nodal agency may collect a pre-determined application fee, as specified in the OA procedure/guideline, notified by the regulatory authority. The application fee will not be unreasonably excessive. However, it will be necessary to ensure that the fee compensates the nodal agency for the costs incurred by it towards application processing, maintaining the information system, conducting system studies, and so on. To start with, this may be set as US$ 2,000 for connectivity-related applications, and US$ 3,000 for short- and medium-term OA applications, and US$ 5,000 for long-term OA applications.

For grant of connectivity, in addition to the application fee, the applicant will be required to compensate for any cost incurred/expected to be incurred by the transmission utility while granting connectivity. Such additional costs shall include:

1. Costs towards construction/augmentation of any line/sub-station bay/sub-station incurred by the transmission utility to enable connectivity.
2. Costs towards supply and commissioning of metering and protection systems, if the same was provided by the transmission utility.
3. Supervision charges for validation of drawing and inspection of installations related to the construction of dedicated transmission lines and interface systems by the applicant.

For grant of OA, a one-time registration fee may also be collected by the system operator. To clarify, this registration needs to be done only once during the entire life of the applicant, and not for each time that OA is applied for. This fee is to be utilized by the system operator for registering the entity in the OA register, capturing the salient technical features, and integrating the entity in the energy accounting and scheduling system.

Table 35: System Operator Registration Charges

Entity	Registration Charges
Transmission and distribution companies	US$ 30,0000
Generation companies	• Less than 100 MW: US$ 1,500 • 100-1000 MW: US$ 15,000 • > 1000 MW: US$ 30,000
Trading companies	US$ 1,500
Power exchanges	US$ 30,000

In case the OA is voluntarily relinquished by an entity, the following relinquishment charges will be applicable:

Table 36: Relinquishment Charges for Open Access

Open Access	Relinquishment Charges
LTOA, for consumer who has completed 7 years of LTOA	• Zero relinquishment charges, if notice period of one year provided between the date of intimation and the date of relinquishment. • In case the provided notice period is less, 66% of the transmission and system operation charges for the period falling short of one year notice may also be paid. *[Explanation: 66%, that is, two-thirds of the charges prescribed, as there needs to be an incentive to the consumer to surrender the capacity he no longer requires, instead of merely underutilizing it for a year].*
LTOA, for consumer who has not completed 7 years of LTOA	• Net present value of 66% of the transmission charges, corresponding to the stranded transmission capacity, for the period falling short of seven years of LTOA, if notice period of one year provided between the date of intimation and date of relinquishment. The nodal agency which granted the OA will also determine the stranded transmission capacity, which will not be more than 100% of the LTOA quantum. The nodal agency will also adopt a common policy for determination of discount factor, for the purpose of calculation of net present value. *[Explanation: Transmission charges pertaining to only the stranded capacity may be recovered, as the remaining transmission capacity will be reallocated to other applicants].* • In case the provided notice period is less, 66% of the transmission and system operation charges for the period falling short of one year notice may also be paid.
MTOA	• Transmission charges for the remaining period of OA, from the date of relinquishment to be paid; subject to a maximum of one month. • Minimum notice period of 30 days between the date of intimation and the date of relinquishment. In case the provided notice period is less, transmission charges for the period falling short of 30 days' notice may also be paid.
STOA	• Transmission charges for the remaining period of OA, from the date of relinquishment to be paid. • Minimum notice period of three days between the date of intimation and the date of relinquishment. In case the provided notice period is less, transmission charges for three days will also be collected, in addition to the charges for the remaining period of OA.

Guideline 4: Terms and Conditions, and Information System for Open Access

A. Current Practice in South Asia

India's regulatory framework for OA specifies the terms and conditions, information reporting requirements, information publishing requirements, and so on.

B. International Experience

In the USA, FERC's Order No. 889 addressed matters needed to implement OA. The rule established the Internet-based Open Access Same-Time Information System (OASIS) for posting available transmission capacity and reserving transmission capacity.

In the Central American Interconnection System (SIEPAC), the Regional Electricity Market Regulations (REMR) specifies the obligations, rights, and technical requirements to be satisfied by all the market participants.

C. Recommendations for South Asia

Open Access will be undertaken while ensuring maintenance of technical and safety standards of the grid, availability of commercial mechanisms for payment, payment defaults, and dispute resolution; as well as market mechanisms for reporting, monitoring, and surveillance. Therefore,the terms and conditions for OA will include:

- Adherence to technical standards and codes, including the grid code, and any additional standards related to metering, protection, safety, and so on.
- Adherence to the scheduling framework, dispatch instructions, and restrictions imposed by the system operator.
- Maintaining the stipulated performance guarantees and security deposits.
- Timely payment of fees and charges.
- Curtailment in case of congestion in the grid.
- Timely filing and reporting of transaction information.
- Assistance in the investigations of an OA nodal agency and regulatory authorities, and so on.

In the case of the terms and conditions for OA under CBET, the following additional aspects will have to be specified:

- Grid code, scheduling, and dispatch procedures and other technical standards and codes of both the countries will be complied with, up to the maximum extent possible.
- The payment security and additional guarantee, as specified in Guideline 2, may be opened with banks that have branches in both the countries involved.
- The parties involved will agree to the mutual dispute resolution at the regional level, failing which the matter will have to be resolved through international arbitration. (At least until well-established regional dispute resolution mechanisms are in place).

The nodal agency may be empowered to take penal action against the OA user, if it is satisfied of the violation of the OA terms and conditions, after conducting investigations.

An OA register, maintained by the system operator, in coordination with the central transmission utility will be the fundamental building block for information systems related to OA. The register may provide unique IDs to each OA participating entity, and capture their salient features. Any OA transaction may then be linked with the ID of the corresponding entity in the OA register. In the interest of transparency, all parts of the OA register, except commercially sensitive information, will be made available by the system operator,on their website.

The nodal agencies will be required to publish details of submitted, pending, and finalized OA applications. The list will contain, at the minimum:

- Name of the applicant.
- Quantum applied for.
- OA tenure.
- Injection and drawal entities.
- Injection and drawal points.
- Application status.
- Reasons for denial of OA.

The system operator, in coordination with the central transmission utility will conduct system studies and publish corridor-wise total transmission capacity, available transmission capacity, and available transmission margins, for the current period and forecast for the future period. This will allow the entities to plan for MTOA and STOA.

Guideline 5: Procedure for Grant of Connectivity and Open Access

A. Current Practice in South Asia

Within South Asia, a detailed procedure for OA is currently available only in India. The document for OA and connectivity is prepared by the CTU* and approved by CERC.

* Procedure for short-term OA is prepared by the system operator, POSOCO.

B. International Experience

The USA has ISO/RTO-wise OA operational procedures. In places where there is no ISO/RTO, the utilities have their own process within the regulations prescribed by FERC.

At the regional level, SAPP has operational guidelines as one of the governing documents.

C. Recommendations for South Asia

The procedure for connectivity and OA will be laid out by the regulatory authority, either as regulations or as procedures approved by the regulatory authority.

Nodal agencies will be identified for each category of OA, which will receive the applications and take decisions on them. While the procedure is to be specified by the regulatory agency/Government, the transmission utility/system operator may be identified as the nodal agencies for processing OA applications.

The procedure will clearly specify entities that may be approached for approvals and clearances for OA, along with the required application fee and charges.

The procedure may also specify timelines for each entity to process the requests related to OA.

A summary of suggestions of some of the aspects related to the procedure for applying for connectivity are provided in Table 34.

Table 37: Summary of Procedure for Connectivity

Procedural Aspect	Connectivity for Generating Stations	Connectivity for Distribution Companies/Bulk Consumers
Nodal Agency for connectivity	Central Transmission Utility	Central Transmission Utility
Timeline for submission of application	At least two years before operationalization of connectivity *(one year in the case of solar power plants that are not remotely located).*	At least one year before operationalization of connectivity.
Documents to be attached along with application	• Proof of project initiation (site identification, land acquisition, environmental and forest clearances, fuel and water arrangements, and so on). • Survey map. • Site plan. • Single line diagram. • Generator configuration. • Related technical details. • Proof of payment of application fees.	• Survey map. • Site plan. • Single line diagram. • Related technical details. • Proof of payment of application fees.
Timeline for processing of application	Within 90 days.	Within 90 days.
Timeline for operationalization of connectivity	Not more than two years from the date of signing of the connectivity agreement *(one year in the case of solar power plants that are not remotely located).*	Not more than one year from the date of signing of the connectivity agreement.
Appellate Authority	Regulatory commission (if present)/ Government-nominated department.	Regulatory commission (if present)/Government-nominated department.

A summary of suggestions of some of the aspects related to the procedure for applying for OA are provided in Table 35.

Table 38: Summary of Procedures for Open Access

Procedural Aspects	STOA	MTOA	LTOA
Nodal Agency	System operator at the federal/national level.	Central Transmission Utility.	Central Transmission Utility.
Timeline for submission of application	Within four months before the required start of OA and, at least, three days in advance.	Within five months to one year before the required start of OA.	At least three years before the required start of OA.
Documents to be attached along with application	• Proof of satisfaction of eligibility criteria (Guideline No. 2). • Proof of connectivity of injection and drawal entities.	• Proof of satisfaction of eligibility criteria (Guideline No. 2). • Proof of connectivity of injection and drawal entities.	• Proof of satisfaction of eligibility criteria (Guideline No. 2). • Proof of connectivity of injection and drawal entities.

Procedural Aspects	STOA	MTOA	LTOA
	• Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees. • Proof of payment of bank guarantee towards the transmission and system operation charges for the duration of STOA.	• Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees. • Copy of power purchase agreement.	• Concurrence of load dispatch center under whose jurisdiction the injection and drawal entities are located (if different from the system operator). • Proof of payment of application fees. • Bank guarantee of INR 10,000/MW. i. (In case injection/ drawal entities are not finalized, target region may be specified).
Timeline for processing of application	Within three days.	Within 60 days.	Within 120 days.
Priority for processing of application and grant of OA	• Applications processed on a first come, first served basis.	• Applications processed on a monthly basis. • Priority for applications for longer duration of MTOA, in case of applications received within the same month. • Priority for applications received earlier, in case of application received in different months.	• Applications processed on a monthly basis. • Priority for applications for longer duration of MTOA, in case of applications received within the same month. • Priority for applications received earlier, in case of applications received in different months.
Additional documents to be submitted after intimation of approval of OA	Nil	• Signed MTOA agreement. • Bank guarantee for transmission and system operation charges for two months.	• Signed LTOA agreement. • Bank guarantee for execution of system strengthening activities identified for operationalization of LTOA. • Bank guarantee for transmission and system operation charges for two months. • Copy of PPA
Amendment allowed after approval of OA	Nil	• Change of quantum, up to 50 MW. • Change of injection point, up to 20 km, subject to network feasibility. • Change of drawal point, subject to network feasibility.	• Change of quantum, up to 200 MW. • Change of injection point, up to 50 km, subject to network feasibility. • Change of drawal point, subject to network feasibility.
Renewal of OA	Not allowed.	Not allowed.	• Allowed, in case of no change in injection point, drawal point and quantum, if application for renewal is submitted at least six months prior to expiry of LTOA.

Procedural Aspects	STOA	MTOA	LTOA
Timeline for operationalization of OA	Minimum of three days from the date of approval.	Minimum of 3 months from the date of signing of MTOA agreement.	Minimum of 2 years from the date of signing of MTOA agreement.
Appellate Authority	Regulatory Commission (if present)/ Government-nominated department.	Regulatory Commission (if present)/Government-nominated department.	Regulatory Commission (if present)/Government-nominated department.

The nodal agencies will strive to operationalize IT-based systems for faster processing of connectivity and OA applications.

Guideline 6: Establishing the Operational and Commercial Mechanisms

A. Current Practice in South Asia

Within South Asia, operational and commercial mechanisms for OA are well established only in India. This consists of procedural documents, application formats, agreement formats, joint coordination meetings, organized by the CTU, and meetings under the Regional Power Committees.

B. International Experience

In the USA, FERC's Order No. 2003 issued in 2003, required all public utilities that own, operate/ control transmission facilities in interstate commerce to file revised OA transmission tariffs. They were required to include standard generator interconnection procedures and a standard agreement.

SAPP also has a detailed operational process for energy accounting, planning, and energy exchange with their procedures.

C. Recommendations for South Asia

The respective nodal agencies for OA will be responsible for preparing the operational guidelines and detailed procedures for OA, which will then have to be approved by the regulator.

The operational guidelines will cover aspects such as:

- Detailed procedure for determining the technical feasibility of OA.
- Manner of prioritization of applications.
- Manner of curtailment in case of congestion.
- Detailed procedure for undertaking network capacity augmentation.
- Procedure for handling of minor changes, amendments, and so on.

The system operator, in coordination with the respective nodal agencies will strive to maintain a comprehensive OA registry, which will have details of participating entities, energy transaction, and payments.

A committee under the federal level system operator, with representatives from the central transmission utility will be constituted to prepare monthly energy accounts at the national level. This committee may also interact with similar bodies in other countries for confirmation and reconcilement of CBET transactions.

The commercial framework will also lay down standard agreements and other terms such as:

- Agreement for connectivity.
- Agreement for OA (based on tenure).
- Agreement between the central/federal transmission utility and other transmission utilities.
- Payment terms, payment security, settlement timelines, and so on.

There will be coordination forums for the initial efforts towards the dispute resolution regarding OA, failing which other legal remedies may be allowed.

Guideline 7: Encouraging Regional Mechanisms for Coordination in CBET

A. Current Practice in South Asia

In South Asia, currently there is no established forum of either electricity regulators or system operators at the regional level. In fact, in the energy sector, there are very few regional bodies such as the SAARC Energy Secretariat.

Within India, there are bodies such as FORs, FOLDs and RPCs. There are regional level regulatory bodies such as CRIE in the Central American Interconnection System, RERA in SAPP, and ERERA in WAPP.

B. International Experience

Within India, there are bodies such as FOLD and RPCs. There are regional level regulatory bodies such as CRIE in the Central American Interconnection System, RERA in SAPP, and ERERA in WAPP.

Similarly, there are examples of international coordination in system operations and transmission, such as ENTSO-E in Europe, EOR in case of CRIE and NERC in the North American bulk electric system covering the US, Canada, and Mexico.

C. Recommendations for South Asia

Open access for CBET in South Asia will require regular coordination at the regional level in terms of:

- Regulatory harmonization.
- Finalization of energy accounts.
- Coordination in system operation.
- Dispute resolution, and so on.

For these purposes, there may be efforts in the future for the constitution of various relevant forums of regulators, system operators, and so on at the regional level. As the operations of such forums are crucial for the smooth operation of CBET, the SACs may strive to give their cooperation and support in the operationalization of such regional forums for collaboration in CBET.

Till permanent forums are setup, transitional arrangements may be adopted, such as the annual meeting of the national level regulatory commissions and system operators of SAC.

9.5 Annexure 5: Illustrative Sample Formats and Agreements

Note: All the formats have been derived from those approved by CERC in India, with minor modifications.

A.1 Application Format for Connectivity

1. Application for Grant of Connectivity

1. Name of applicant:
2. Address for correspondence:
3. Contact details:
4. Nature of applicant:
   - Generator (other than captive)
   - Captive generator
   - Bulk consumer (other than distribution company)
   - Distribution company
5. Details for connectivity:
   5a. Capacity (MW) for which connectivity is required
   5b. Date from which connectivity is required
6. Location of the applicant's project facility for which connectivity is required:
   - Latitude
   - Longitude
   - Nearest village/town
   - District
   - State
7. Installed capacity/peak load of the facility for which connectivity is required (unit wise):
8. Commissioning schedule of the facility for which connectivity is required:
9. Details of nearest 400/220/132/110/66 kV sub-stations:

Sub-Station-1	Voltage levels available	Owner
Distance(Km)	Sub-Station-2	Voltage levels available
Owner	Distance(Km)	Sub-Station-3
Voltage levels available	Owner	Distance(Km)

10. Details of applicant, in case of generating station (including captive):

A.	Type of generation plant (hydro, thermal, gas, solar, wind, and so on)	:
B.	Rating of generator units (normal, maximum continuous rating, technical minimum, and so on)	: (to be separately enclosed)

C.	Maximum export capacity required (MW)	:
D.	Maximum import capacity required *(Capacity required during startup) (MVA)*	:
E.	Station house-load during normal operating conditions (MW/MVAR)	:
F.	Expected running regime, for instance, base load, peaking, and so on	:
G.	Data regarding fault (for short circuit studies), dynamic simulation data	: (to be separately enclosed)

11. Details of applicant, in case of bulk consumer (including distribution company):

A.	Type of load (industrial/commercial) including type of industry, that is. electric furnace, rolling mills, manufacturing, assembly line, and so on	:
B.	Peak load in MVA, MW, and MVAR	:
C.	Peak import required in MVA, MW, and MVAR	:
D.	Month-wise peak import required in MVA, MW, and MVAR	:
E.	Month-wise energy requirement in MU	:
F.	Data for fault (short circuit studies)	:

12. Proposed data connectivity:

A.	Data gateway	Remote terminal unit/substation automation system
B.	Data protocol	:
C.	Communication media and capacity	:

13. Details of payment of application fees:
14. Documents to be enclosed:

- Location marked in official topographical map.
- Site plan of facility to which connectivity is required, in appropriate scale.
- Single line diagram of the facility, detailing all significant items.

A.2 Intimation Format for Acceptance of Connectivity

Connectivity to the grid is hereby permitted as per the details given below:

1.	Name of the link (sub-station/line) at which connectivity granted	:
2.	Voltage level	:
3.	Type of link	:
4.	Reactive compensation to be provided	: (specify rating of line reactor/bus reactor/ series compensation, if any)
5.	Maximum import capacity through the link	:
6.	Maximum export capacity through the link	:
7.	Expected date of commercial operation	:
8.	Bay allocated in the switchyard of connectivity	: Bay No.
9.	Equipment to be provided by applicant in the allocated bay meeting the standards of connectivity to the grid	:
10.	Protection equipment to be provided by applicant, meeting the standards of connectivity to the grid	:
11.	System recording and SCADA equipment meeting the standards of connectivity to the grid, and compatible to facilitate exchange of data with the existing system installed in the transmission network	:
12.	Details of modification/alteration to existing facilities for accommodating with opposed connection and its estimated cost	:
13.	Name of communication link for data and voice communication	: From [name of switchyard/substation] – to [name of switchyard/substation]
14.	Communication interface details with the CTU	:
15.	Site responsibility schedule	

A.3 Agreement for Connectivity

Connection Agreement

THIS AGREEMENT is made the ( ) day of () 20()

BETWEEN:

[Name and registered address of the CTU] (here in after called the **'CTU'**), which expression shall, unless repugnant to the context or meaning thereof, be deemed to mean and include its successors or permitted assigns and for the purposes of this connection agreement the CTU shall act through its _____ (*relevant office/unit*)

and

[Name and registered address of the applicant company] (hereinafter called **'the applicant'**), which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns;

The CTU and applicant are hereinafter collectively referred to as 'parties' and individually as 'party'.

WHEREAS:

(A) The applicant has applied to the CTU for connection of the (***mention generating station including a captive generating plant or bulk consumer as appropriate***) facility to the CTU's transmission system and use of the CTU's transmission system to transmit electricity to and from the facility through the ISTS.

(B) The CTU has agreed to the connection of the (***mention generating station, including a captive generating plant or bulk consumer as appropriate***) facility to the CTU's transmission and communication system (via the applicant's site-related connection equipment) at the connection point (……. mention details of the connection point, the name of the sub-station, the name of the line that is to be made Loop-In-Loop-Out (LILO), and so on) using the transmission and communication system of the CTU or inter-state transmission licensee, other than the CTU, as the case may be, to transmit electricity as well as real time data to and from the facility through the CTU's transmission and communication system.

(C) The parties will enter into this connection agreement to record the terms and conditions upon which they will carry out their respective connection works, in addition to the estimated cost required to be carried out by the CTU for works related to the interconnection, in accordance with the connection agreement. In the case of a generating plant seeking connection to the ISTS not owned by the CTU, a tripartite connection agreement would be signed between the CTU, the inter-state transmission licensee and the applicant, since the planning of the ISTS, insulation coordination, system studies, and so on are the responsibility of the CTU. The responsibilities of the three parties would be defined accordingly in the tripartite agreement.

(D) The parties will separately take up modalities for the implementation of the works on mutually agreed terms and conditions. The scope of the work, time schedule for completion of the work, including the timelines for the various milestones to be reached (PERT chart), will form an appendix to this agreement and provide the basis for evaluating whether the work by the parties is being executed in time.

Penalties for non-completion of the work in time by one party, resulting in financial losses to the other party, may be appropriately priced, as per a mutual agreement for indemnification of each other against losses incurred in this regard, and form a part of this agreement. Similarly, for the regular O&M of the connection equipment's owned by the applicants and located in the CTU's premises/switchyard, the parties shall separately take up the O&M agreement on mutually agreed terms and conditions.

(E) Further,a signed copy of the agreement, along with all the annexures and amendments, whenever made,will be submitted to the regional/national load dispatch center.

IT IS HEREBY AGREED:

1. General Conditions for Connectivity

1.1 The parties agree to the following general conditions:

(a) The parties will abide by the applicable regulations, in respect of the procedure of grant of connectivity and other matters.

(b) The applicant or inter-state transmission licensee, as the case may be, will be responsible for planning, design, construction, and safe and reliable operation of its own equipment in accordance with the statutory provisions on connectivity to the grid.

(c) The applicant or inter-state transmission licensee will provide necessary facilities for voice and data communication for transfer of real time operational data such as voltage, frequency, real and reactive power flow, energy, status of circuit breaker and isolators positions, transformer taps, and other parameters from their station to Data Collection Point (DCP) of the CTU. The responsibility of the data transfer will be that of the applicant.

1.2 The following documents and their schedules, which have been initialed by the parties and annexed herewith, will be deemed to form an integral part of this agreement in the order of precedence listed:

(a) Application for seeking connection to the ISTS.

(b) Intimation for grant of connectivity.

(c) This agreement.

1.3 Availability of Statutory/Regulatory Approval

Not withstanding anything to the contrary in the agreement, the applicant or inter-state transmission licensee will be responsible for obtaining the statutory clearances/approval, including the transmission license (if necessary), for carrying out the works requiring connection to the transmission system. Accordingly, the provisions of the agreement, dealing with the execution of the work, either by the applicant or the CTU (unless otherwise agreed mutually) in all respects, would be conditional on and subject to the CTU being satisfied that the necessary approvals/ clearances are available with the applicant.

2 Agreement to Pay Charges and Costs

2.1 Agreement to Monthly Transmission Tariff

The applicant declares that it will pay the monthly transmission tariff, including the load dispatch center charges, for use of the transmission system, as and when OA is availed by the applicant.

2.2 Agreement to Additional Costs

The applicant declares that it shall pay the cost towards modification/alterations to the transmission network infrastructure, for accommodating the proposed connection, as specified in the letter of the CTU, furnishing connection details.

2.3 Agreement to Pay for Damages

The applicant declares that it will pay/make good damages, if any, caused by the customer to the transmission network, within reasonable time of its occurrence, during the course of control, operation, and maintenance of the equipment.

2.4 Agreement to Pay Charges for Construction of Bays

The applicant will execute an agreement with the CTU for the erection of equipment of applicant in the substation premises of the CTU for construction of bays, if required. For this purpose the applicant or inter-state transmission licensee will pay charges to the CTU on mutually agreed terms.

2.5 Agreement to Pay O&M Charges

The applicant will pay O&M charges to the CTU, on mutually agreed terms, for the bay equipment of the applicant being operated and maintained by the CTU in their substation. These O&M charges will be governed from time to time according to mutually agreed terms.

3. Conditions Precedent to the Implementation of the Commissioning Instructions

The applicant or inter-state transmission licensee will have to get appropriate 'commissioning instructions' prior to actually first charging for the equipment through the grid. The charging instructions will be issued only when the CTU is satisfied (by acting reasonably) that the:

(a) Connection works have been completed.

(b) Applicant has complied with its obligations as set out in the connectivity intimation letter.

(c) Applicant or inter-state transmission licensee has demonstrated the voice and data communication facilities to the concerned load dispatch center.

(d) Applicant or inter-state transmission licensee has obtained the necessary approvals from competent authority.

(e) Applicant has complied with its obligations, as per the regulations on technical standards, for grid connectivity.

4. Metering

The applicant or inter-state transmission licensee will provide and maintain the metering equipment, in accordance with the statutory requirements.

5.1 Site Access

Being a restricted area, the CTU may give permission or allow access to the employees and/or agents and/or sub-contractors and/or invitees of the applicant, in its premises, to carry out preliminary site investigation works regarding connections, modifications, inspections, and so on, based on a written request giving reasonable advance notice. All such actions are to be carried out under the strict supervision of the CTU's authorized representative, to safeguard the safety and security requirements of the CTU's installations and safety of the personnel.

Similarly, the applicant may also allow, with prior permission, site access to the CTU's employees and/or agents and/or invitees to carry out preliminary site investigation works, inspections, and so on, in the connection site of the applicant, provided that a written request has been made giving reasonable advance notice.

5.2 Conditions of Access

Site access for the CTU/applicant or inter-state transmission licensee, will include the right to bring such vehicles, plant, machinery, and construction materials as will be reasonably necessary to carry out the functions in respect of which the permission of access is granted. Being a restricted area, any individual to whom access is given under the agreement,will comply with all reasonable

directions given by the applicant/CTU and its duly authorized employees and agents to safeguard the interest of security requirements of the personnel and equipment. All such access will be exercisable without payment of any kind.

6. Transfer Assignment and Pledge

The applicant or inter-state transmission licensee will not transfer, assign or pledge its rights and obligations, under this connection agreement, to any other person.

7. Notice

All correspondence/notices required or referred to under this agreement will be in writing and signed by the respective authorized signatories of the parties mentioned here, unless otherwise notified.

The authorities of the parties, who will be responsible for the correspondence notices, and so on, in connection with this agreement, will be informed in advance.

8. Settlement of Disputes and Arbitration

All differences and/or disputes between the parties, arising out of or in connection with those present will,at first instance, be settled through an amicable settlement at the level of the CEO/ CMD of the CTU.

In the event of unresolved disputes or differences, as covered under the statutory arbitration, they will be resolved accordingly.

Notwithstanding the existence of any disputes and differences referred to arbitration, the parties will continue to perform their respective obligations under this agreement.

9. Force Majeure

Force Majeure here is defined as any clause that is beyond the control of the CTU or the applicant or inter-state transmission licensee, as the case may be, which could not be foreseen or with a reasonable amount of diligence, could not have been foreseen and, which substantially affects the performance of the agreement. Force majeure events would include:

- Natural phenomenon, including but not limited to floods, droughts, earthquakes, and epidemics.
- War (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, in each case involving or directly affecting the nation, revolution, riot, insurrection or other civil commotion, act of terrorism or sabotage, in each case within the nation.
- Nuclear explosion, radioactive/chemical contamination/ionizing radiation, directly affecting the generation station, captive generating plant or bulk consumer, ISTS of the CTU or inter-state transmission licensee other than the CTU, or any facility or system that is integral to and substantial for the performance of this agreement.
- Any event or circumstance of a nature that is similar to any event set forth above, within the nation.

Provided either party will, within 15 days from the occurrence of such a force majeure event, notify the other in writing of such cause(s).

Neither of the parties will be liable for delays in performing obligations on account of any force majeure causes as referred to and/or defined above.

10. Confidentiality

The parties will keep confidential any information obtained under this connection agreement and will not divulge it to any third party without the prior written consent of the other party, unless such information is:

a) In the public domain.

b) Already in the possession of the receiving party.

c) Required by the Government/Ministries/Agencies/Court of a competent jurisdiction.

The information exchanged here between the parties will be used only for the purpose of, and in accordance with, this agreement and for the purpose stated here. This clause will remain in force even after the termination of the connection agreement.

11. Governing Laws and Jurisdiction

The agreement will be governed by the nation's laws and rules.

12 Amendment to the Connection Agreement

In case of modification to the point of connection such as, re-allocation of bays, upgradation of voltage level, and so on, by either of the parties, if mutually agreed, an amendment to the connection agreement will be executed between the parties within 30 days of implementing such modification.

IN WITNESS WHEREOF the CTU and the applicant or inter-state transmission licensee have caused this agreement to be executed by a duly authorized representative on the date written above.

(Signatures)

A.4 System Operator Registration Format

OPEN ACCESS - REGISTRATION FORM

1. Name of applicant:

2. Address for correspondence:

3. Type of applicant (generating station, trader, bulk consumer, and so on):

4. Contact details of nodal officer:

5. Trading license number and type (if trader):

6. Connectivity details to the grid (if not trader) to be enclosed.
(Details of boundary meters shall also be furnished)

7. Proof of payment of registration fees:

8. Declaration:

   i It is hereby agreed that MoU/Agreement(s) between the buyer/seller/trader will be executed before the application for scheduling of bilateral transaction is made and will be produced on demand.

   ii All entities (including the buyer, seller, and trader) to the transaction will abide by the statutory provisions on OA.

   iii The procedures for scheduling issued by the CTU are hereby agreed.

A.5 Application Format for Short-term Open Access

OPEN ACCESS -APPLICATION FOR SCHEDULING

For Month and Year:

1.	Application No:			Date:	
2.	Applicant name:			Registration code:	
3.	Scheduling request:	**Date**		**Hours**	**MW***
		From	To	From	To	

**MW at the Point of Injection*

4.	Buyer/seller details:		
		Injecting Entity	Drawee Entity
	Name of entity:		
	Utility in which it is embedded:		
	Concerned load dispatch center:		
5.	Applied route (from injection point to drawl point):		
6.	If re-routing to be considered, please specify the alternate route(s):		
7.	Payment details of application fee:		
8.	Declaration: The statutory provisions and CTU's procedures, with respect to OA transactions, are hereby understood and would be binding. Signature and Name (With stamp/seal)		
9.	For use of nodal Local Distribution Company (LDC)		
	Approval No: (if approved) *Or reason of refusal (if refused)*		

A.6 Intimation Format for Grant of Short-term Open Access

OPEN ACCESS - ACCEPTANCE FOR SCHEDULING

LDC name:_____

Acceptance No.:_____ Date:_____

Ref. Original Application No.:_____ Date:_____

1. Name of applicant:_____

   Registration code:_____

2. Name of injecting entity/state/region:_____

3. Name of drawee entity/state/region:_____

4. Wheeling region(s):_____

5. Open Access scheduling accepted:

Date		Hours		MW*	Route	Mwh
From	To	From	To			
					Total:	

6. Reasons for curtailment, if any:_____

7. Payment schedule:_____

A.7 Application Format for Medium-term Open Access

APPLICATION FOR GRANT OF MEDIUM-TERM OPEN ACCESS (MTOA)

1. Name of applicant:
2. Address for correspondence:
3. Contact details:

   Primary contact person:

   Alternate contact person:
4. Nature of applicant:

   Normal generator (other than captive)

   Captive generator

   Bulk consumer

   Electricity trader

   Distribution licensee

   Others
5. Details for Medium-term Open Access (MTOA):

   5a. Quantum (MW) for which MTOA required:

   5b. Date from which MTOA required:

   5c. Date upto which MTOA required:

   5d. Injection of power:

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:

5e Drawal of power:

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:
6. Details of payment of application fee:
7. Details of bank guarantee:

A.8 Intimation Format for Medium-term Open Access

INTIMATION FOR GRANT OF MEDIUM-TERM OPEN ACCESS (MTOA)

1. Intimation No.:

   Date:

2. Ref. Application No.:

   Date:

3. Name of applicant:

4. Address for correspondence:

5. Nature of applicant:

   Normal generator (other than captive)

   Captive generator

   Bulk consumer

   Electricity trader

   Distribution licensee

   Others

6. Details for Medium-term Open Access (MTOA):

   6a. Quantum (MW) for which MTOA is granted:

   6b. Date from which MTOA is granted:

   6c. Date upto which MTOA is granted:

7. Injection of Power:

   Entity

   State/region

   Quantum

   Connectivity with the grid

8. Drawal of power:

   Entity

   State/region

   Quantum

   Connectivity with the grid

9. Transmission charges applicable:

A.9 Agreement for Medium-term Open Access

AGREEMENT FOR MEDIUM-TERM OPEN ACCESS

BULK POWER TRANSMISSION AGREEMENT

BETWEEN …….

AND <<NAME OF THE CTU>>

This Bulk Power Transmission Agreement entered into on the …….day of…… month … year, between <<NAME OF CTU>>, which is the CTU, that has its registered office at <<ADDRESS OF CTU>> (Central Transmission Utility, hereinafter called 'CTU', which expression will, unless repugnant to the context or meaning, thereof include its successors and assigns) as the party of the first part; and _____ a medium-term transmission customer with its office at _____ (hereinafter called 'Medium-term Transmission Customer', which expression will, unless repugnant to the context or meaning thereof, include its successors and assigns) as the party of the second part.

AND WHEREAS the medium-term transmission customer is a generating company/licensee/consumer and is desirous to avail the medium-term Open Access to the transmission system of the CTU.

AND WHEREAS the medium-term Open Access is required by the medium-term transmission customer as per the following details:

Injection Utility	**Drawee Utility(ies)**
Name_____	Name_____
Location_____	Location_____
Region_____	Region(s)_____
Capacity(MW)_____	Capacity(MW)_____

Date from which the Open Access is granted is_____for a period of_____

AND WHEREAS, in accordance with the system studies carried out by CTU, the following transmission system is required to facilitate operationalization of the above medium-term Open Access.

_____(name of transmission system)

AND WHEREAS the implementation of the above transmission system is to be undertaken by the medium-term transmission customer.

AND WHEREAS the medium-term transmission customer has agreed to share and pay all the transmission charges of the inter-state transmission system (ISTS), for the use of ISTS of _____ region and _____ region (regions as applicable)as per the transmission pricing regime in vogue.

AND WHEREAS it has become incumbent upon both the parties to enter into this Bulk Power Transmission Agreement.

AND WHEREAS the medium-term transmission customer is desirous of wheeling its power through medium-term Open Access.

Therefore, in consideration of the premises and mutual agreements, covenants and conditions set forth here, it is hereby agreed by and between the parties:

1.0

(a) The medium-term transmission customer will share and pay the transmission charges of ISTS of _____region and _____region (as applicable), including charges for inter-regional links and system strengthening schemes and any addition thereof.

(b) The medium-term transmission customer will provide security in the form of an irrevocable Bank Guarantee (BG) in favor of the CTU, equivalent to two months estimated average transmission charges of the concerned region(s) and two months system operation charges. The security mechanism will be valid till one month after the validity of the Open Access.

(c) The estimated average transmission charges will be reviewed every six months or till the period of the medium-term Open Access, whichever is less, and accordingly the amount of security will be enhanced/reduced by the medium-term transmission customers.

(d) In case the medium-term transmission customer defaults in the payment of the monthly charges, then the CTU will be entitled to encash the BG immediately.

(e) In case of encashment/adjustment of the BG by the CTU against the non-payment of monthly charges by the medium-term transmission customer, the charges should be immediately recouped by the medium-term transmission customer before the next billing cycle.

2.0. The CTU agrees to provide the MTOA required by the medium-term transmission customer as per the details mentioned above and in accordance with the applicable regulations.

3.0. The medium-term transmission customer may relinquish its rights, fully and partly, as per the provisions of the applicable regulations.

4.0. This agreement will be valid from the date of its signing till the validity of Open Access.

In witness whereof, both the parties have executed this agreement through their authorized representatives.

(Signatures)

A.10 Application Format for Long-term Open Access

APPLICATION FOR THE GRANT OF LONG-TERM OPEN ACCESS (LTOA)

1. Name of applicant:
2. Address for correspondence:
3. Contact details:

   Primary contact person:

   Alternate contact person:
4. Nature of applicant:

   Normal generator (other than captive)

   Captive generator

   Bulk consumer

   Electricity trader

   Distribution licensee

   Others
5. Details for Long-term Open Access (LTOA):

   5a. Quantum (MW) for which LTOA required:

   5b. Date from which LTOA required:

   5c. Date upto which LTOA required:

   5d. Injection of power (more than one only in case of single drawal)

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:

   5e. Drawal of power (more than one only in case of single injection):

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:
6. Details of payment of the application fee:
7. Details of bank guarantee:

A.11 Intimation Format for Long-term Open Access

INTIMATION FOR THE GRANT OF LONG-TERM OPEN ACCESS (LTOA)

1. Intimation No.: Date:
2. Ref. Application No.: Date:
3. Name of applicant:
4. Address for correspondence:
5. Nature of applicant:

   Normal generator (other than captive)

   Captive generator

   Bulk consumer

   Electricity trader

   Distribution licensee

   Others
6. Details for Long-term Open Access (LTOA)

   6a. Quantum (MW) for which LTOA is granted:

   6b. Date from which LTOA is granted:

   6c. Date up to which LTOA is granted:
7. Injection of power:

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:
8. Drawal of power:

   Entity:

   State/region:

   Quantum:

   Connectivity with the grid:
9. Implementing agency for the transmission system required for LTA:
10. Transmission charges applicable:
11. Amount (in rupees) for which the bank guarantee is to be provided by applicant:

A.12 Agreement for Long-term Open Access

AGREEMENT FOR LONG-TERM OPEN ACCESS

BULK POWER TRANSMISSION AGREEMENT

BETWEEN .....

AND <<NAME OF THE CTU>>

This Bulk Power Transmission Agreement entered into on the …….day of…… month..... year, between <<NAME OF THE CTU>>, that has its registered office at <<ADDRESS OF THE CTU>> (Central Transmission Utility, hereinafter called 'CTU', which is the expression that will, unless repugnant to the context or meaning thereof, include its successors and assigns) as a party of the first part; and _____ a long-term transmission customer with its office at _____(hereinafter called 'Long-term Transmission Customer', which expression will, unless repugnant to the context or meaning thereof, include its successors, and assignees) as a party of the second part.

A). AND WHEREAS the long-term transmission customer is a **generating company/licensee/ consumer** and is desirous to avail long-term Open Access to the transmission system of the CTU.

Injection Utility	**Drawee Utility(ies)**
Name_____	Name_____
Location_____	Location_____
Region_____	Region(s)_____
Capacity(MW)_____	Capacity(MW)_____

B). AND WHEREAS the long-term Open Access is required by the long-term transmission customer as per the following details:

C). The transmission system required for direct evacuation of power from the generating units to the pooling points of the CTU has been finalized and it will be built, owned, operated, and maintained by the long-term transmission customer.

D). The augmentation of the grid to evacuate and dispatch power from the generation projects will be built, owned, operated, and maintained by the CTU.

E). The long-term transmission customer has agreed to share and bear the applicable transmission charges of the total transmission scheme, from the scheduled date of commissioning of the respective generating units, corresponding to the capacity of the power contracted from the said generation project through Open Access, irrespective of their actual date of commissioning.

F). The CTU has agreed to provide Open Access, required by the long-term transmission customer from the date of availability of the evacuation transmission system for the transfer of power.

G). AND WHEREAS the parties have agreed that in case the transmission system augmentation is executed, owned, and operated by any agency (ies), other than the CTU, as per the directives of the competent authority (for which the CTU would immediately inform all the parties), then the

tariff would be payable by the long-term customer, directly to the concerned agency(ies) through a separate agreement to be entered by the long-term customer with the concerned agency(ies).

H). AND WHEREAS the long-term transmission customers have agreed to share and pay all the transmission charges of the CTU from time to time, for the use of its transmission system of the concerned regions, including inter-regional links/LDC charges. These charges will be shared and paid from the scheduled date of commissioning of the respective generating units.

I). AND WHEREAS it has become incumbent upon the long-term transmission customer and the CTU to enter into this Bulk Power Trnsmission Agreement.

Now, therefore, in consideration of the premises and mutual agreements, the covenants and conditions set forth herein, it is hereby agreed by and between the parties as follows:

1.0. In accordance with the statutory regulations and in accordance with the terms mentioned above, the CTU agrees to provide such Open Access required by the long-term transmission customer from the date and in the manner mentioned in the annexure of this agreement, for a period of …… years.

2.0.

(a). The long-term transmission customer will share and pay the transmission charges in accordance with the transmission pricing regime in vogue of the concerned applicable region, including charges for inter-regional links/LDC charges and any additions thereof. These charges would be applicable, corresponding to the capacity of power contracted from the said generation project through Open Access from the scheduled date of the commissioning of the generating projects, as indicated in Annexure-I, irrespective of their actual date of commissioning.

(b). The long-term transmission customer will share and pay the transmission charges of the transmission system augmentation. In case, in the future, any other long-term transmission customer(s) is/are granted Open Access through the transmission system, he/they would also share the applicable transmission charges.

(c). In addition to the opening of Letter of Credit for 105 percent of the estimated average monthly billing for charges mentioned at 2(a) and 2(b) above, the long-term transmission customer will provide security in the form of an irrevocable bank guarantee (BG), in favor of the CTU, equivalent to two months estimated average monthly billing, three months prior to the scheduled date of commissioning of the generating units as indicated in Annexure-1. Initially, the security mechanism will be valid for a minimum period of three years and will be renewed from time to time, till the expiry of the Open Access.

(d). The estimated average transmission charges will be reviewed every six months and, accordingly the amount of security will be enhanced/reduced by the long-term transmission customer.

(e). In case the long-term transmission customer defaults in the payment of the monthly charges of the CTU bills, the CTU will be entitled to encash/adjust the BG immediately.

(f). In case of encashment/adjustment of the BG by the CTU against non-payment of monthly charges by the long-term transmission customer, the amount should be immediately replenished/recouped by the long-term transmission customer, before the next billing cycle.

3.0. The CTU agrees to provide LTOA, required by the long-term transmission customer, as per the details mentioned above and in accordance with the applicable regulatory framework.

However, during the tenure of this agreement, if any of the covenants and conditions recited in this agreement are found to be inconsistent with the provisions of the applicable legal/regulatory

framework, then, not withstanding anything contained in the agreement referred to above, the said rules and regulations will prevail.

4.0. The long-term transmission customer will not relinquish or transfer its rights and obligations specified in the Bulk Power Transmission Agreement, without prior approval of the CTU and the regulatory authority and subject to the payment of compensation in accordance with the regulations issued from time to time.

5.0

(a). In case the developer fails to construct the generating station/dedicated transmission system or makes an exit or abandons its project, the CTU will have the right to collect the transmission charges and/or damages as the case may be, after approval of the regulatory authority. The developer will furnish a BG for an amount which will be equivalent to INR 5 lakh/MW, to compensate such damages. The BG will be furnished in favor of the CTU within three months of the signing of this agreement.

(b). This BG will be initially valid for a period of six months after the expected date of commissioning the schedule of generating unit/units mentioned in Annexure-1, or the actual date of commissioning, whichever is earlier. The BG will be encashed by the CTU in case of adverse progress of the individual generating unit/units assessed during the coordination meeting as per point six. However, the validity should be extended by the concerned long-term transmission customer as per the requirement to be indicated during the co-ordination meeting.

(c). The CTU will build/augment the transmission system, keeping view of the various commissioning schedules, however, till the completion of the identified transmission elements, the transfer of power will be based on the availability of the system on a short-term basis.

(d). In the event of delay in commissioning of the concerned transmission system from its schedule on the part of the CTU, the CTU will pay proportionate transmission charges to the concerned LTOA customer, proportionate to its commissioned capacity (which otherwise would have been paid by the concerned LTOA customer to the CTU), provided generation is ready and the CTU fails to make alternate arrangement for the dispatch of power.

6.0. In order to monitor/review the progress of the generating units, along with its direct evacuation lines and also the common transmission system, a joint coordination meeting with the representative developer and the CTU will be held at regular intervals (preferably quarterly) after signing of this agreement.

7.0. All differences/disputes between the parties, arising out of or in connection with this agreement, will be resolved in terms of the redressal mechanism provided under the legal and regulatory framework.

8.0. The parties will ensure due compliance with the terms of this agreement. However, no party will be liable for any claim for any loss or damage whatsoever arising out of failure to carry out the terms of the agreement, to the extent that such a failure is due to force majeure events such as war, rebellion, mutiny, civil commotion, riot, strike, lock out, fire, flood, forces of nature, major accident, act of God, change of law, and any other causes beyond the control of the defaulting party. But any party claiming the benefit of this clause will satisfy the other party of the existence of such an event and give written notice of 30 days to the other party to this effect. The transmission/drawal of power will be started as soon as practicable by the parties concerned after such an eventuality has come to an end or ceased to exist.

9.0. In the event of the finalization of the beneficiaries by the developer, the liability of the payment of charges may be allowed to be taken over by the beneficiaries, effective only from the date of signing of the agreement by the concerned beneficiary with the CTU for the validity period of OA.

10.0. This agreement will be valid from the date of signing of this agreement till the validity of OA, subject to its revision, as may be made by the parties to this agreement, provided that this agreement maybe mutually extended, renewed, or replaced by another agreement, on such terms and for such a further period as the parties may mutually agree.

In witness whereof, both the parties have executed this agreement through their authorized representative.

(Signatures)

Annexure I: Scheduled Commissioning Date for Open Access

Gen. Project Capacity (MW)	**LTOA Applied for (MW)**	**Scheduled Commissioning (Unit wise)**	**Long Term Access Applied for:**		
			Region / Beneficiary 1	Region/ Beneficiary…	Region/ Beneficiary n

Annexure II: Transmission Scheme to be executed by the Project Developer

Annexure III: Transmission Scheme to be executed by the CTU

Bibliography

1. Afghanistan Power Sector Master Plan, ADB, 2013
2. Afghanistan DABS Overview, 2013 and 2014
3. Power Sector Strategy for the Afghanistan National Development Strategy, Afghanistan Ministry of Energy and Water
4. Bangladesh Energy Regulatory Commission Act, 2003
5. Bangladesh Electricity (Amendment) Act, 2012
6. Bangladesh Electricity Grid Code, 2012
7. Bangladesh Power Sector Master Plan, 2010 and 2016
8. Bhutan Electricity Act, 2001
9. Bhutan Grid Code Regulation, 2008
10. Overview of Energy Policies of Bhutan, Department of Energy, Ministry of Economic Affairs, Bhutan, 2009
11. Bhutan Tariff Determination Regulation, 2007 (updated in 2013)
12. Indian Electricity Act, 2003
13. Indian Electricity Grid Code, 2010 (and subsequent amendments)
14. CERC Open Access in Inter-state Transmission Regulation, 2008 (and subsequent amendments)
15. CERC Power Market Regulation, 2010 (and subsequent amendments)
16. CERC Sharing of ISTS Charges and Losses Regulation, 2010 (and subsequent amendments)
17. Tariff Approval Petition, Jaipur Vidyut Vitran Nigam Limited, Jaipur, 2016
18. Determination of Point of Connection (PoC) Rates and Transmission Losses for the period of January to March, CERC, 2016
19. Charges Payable for the Open Access on Transmission and Distribution System in Rajasthan, 2016–17
20. Rajasthan Electricity Regulatory Commission (Terms and Conditions for Open Access) Regulations, 2016
21. Applicable PoC Losses for 2017
22. Nepal Electricity Act, 1992
23. Nepal Electricity Rules, 1993
24. Nepal Hydropower Development Policy, 2001

25. Agreement Between India and Nepal on Electric Power Trade, Cross-Border Transmission Interconnection and Grid Connectivity
26. Mechanism of Determining Tariff for Hydropower Projects, NEPRA (Pakistan)
27. Policy Framework and Package of Incentives for Private Sector Transmission Line Projects in Pakistan
28. Regulation of Generation, Transmission, and Distribution of Electric Power Act, 1997 (and subsequent amendments)
29. Grid Code 2005, National Transmission and Dispatch Company Ltd. (Pakistan)
30. Pakistan National Power Policy, 2013
31. Pakistan National Power System Expansion Plan,2011–2030
32. National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998
33. National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999
34. Sri Lanka Electricity Act, 2009 (and subsequent amendments)
35. CEB Grid Code of Sri Lanka, 2014
36. Regulatory Manual of Public Utility Commission of Sri Lanka, 2009 and 2014
37. Procedure No. 1210 and 3200 of Operating Procedure, California ISO
38. California Independent System Operator Corporation, Fifth Replacement FERC Electric Tariff
39. Petition of the California Independent System Operator Corporation for Waiver of Open Access Same-Time Information System Requirements
40. FERC Order No. 888, 890, 1000 and 2000
41. Electric Rule No. 22 of Pacific Gas and Electric Company
42. Electric Service Area Maps of Pacific Gas and Electric Company
43. Pacific Gas and Electric Company Wholesale Distribution Tariff (WD Tariff) FERC Electric Tariff Volume No. 4
44. Application for a Generator and a Supply Connection at the Same Point of Supply to the ESKOM Network
45. Wheeling Energy: Enabling Mechanism's in the Current Environment
46. Regulatory Rules on Network Charges for Third-Party Transportation of Energy by NERSA
47. SAPP DAM Rule Book
48. SAPP Market Monthly Performance Reports
49. International Experience with Private Sector Participation in Power Grids: Brazil Case Study, ESMAP and World Bank
50. Electricity Services Toolkit, UNCTAD
51. Source Websites: FERC, NERC, PGE, PJM, New York ISO, California ISO, CERC, RVNL, POSOCO, NERSA, ESKOM, SAPP, Itaipu, ANEEL, and ONS

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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.

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About IRADe

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