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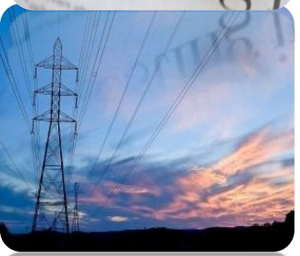


Key findings of the SARI/EI study

On

Developing the framework and guidelines for non-discriminatory open access regime in transmission and grant of open access to initiate power trading and facilitate Cross Border Electricity Trade (CBET) in the South Asian countries

19TH July 2017

Pokhara, Nepal

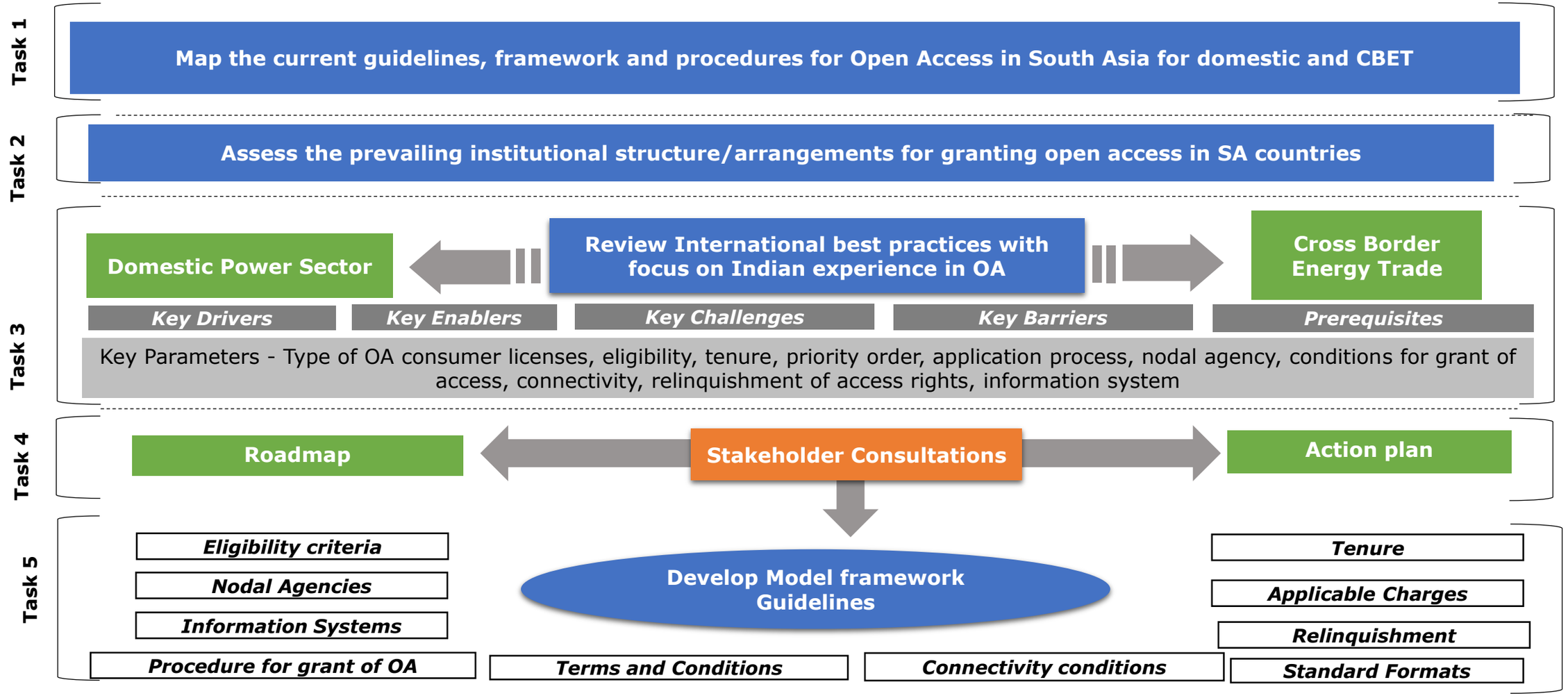
Agenda

1. Background
2. Open Access Framework
3. Key Findings
4. Open Access Framework and Guidelines

Background

- Objective and Scope
- Approach for the Assignment

Overall approach

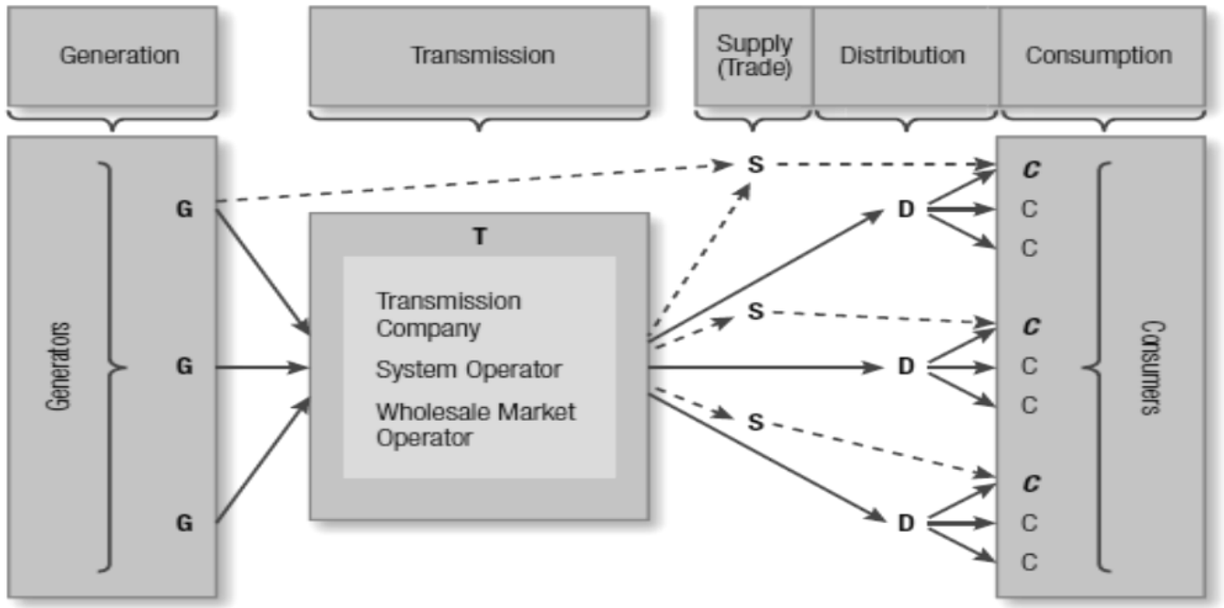


Open Access Framework

What is Open access?

- Open access to the power grid is an essential element of introducing competition to 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 open access allows for multiple and diverse power supply contracts that take advantage of the load and time diversity and contribute to better utilization of resources

An Example of Power Sector Structure Allowing Open Access to Power Grids

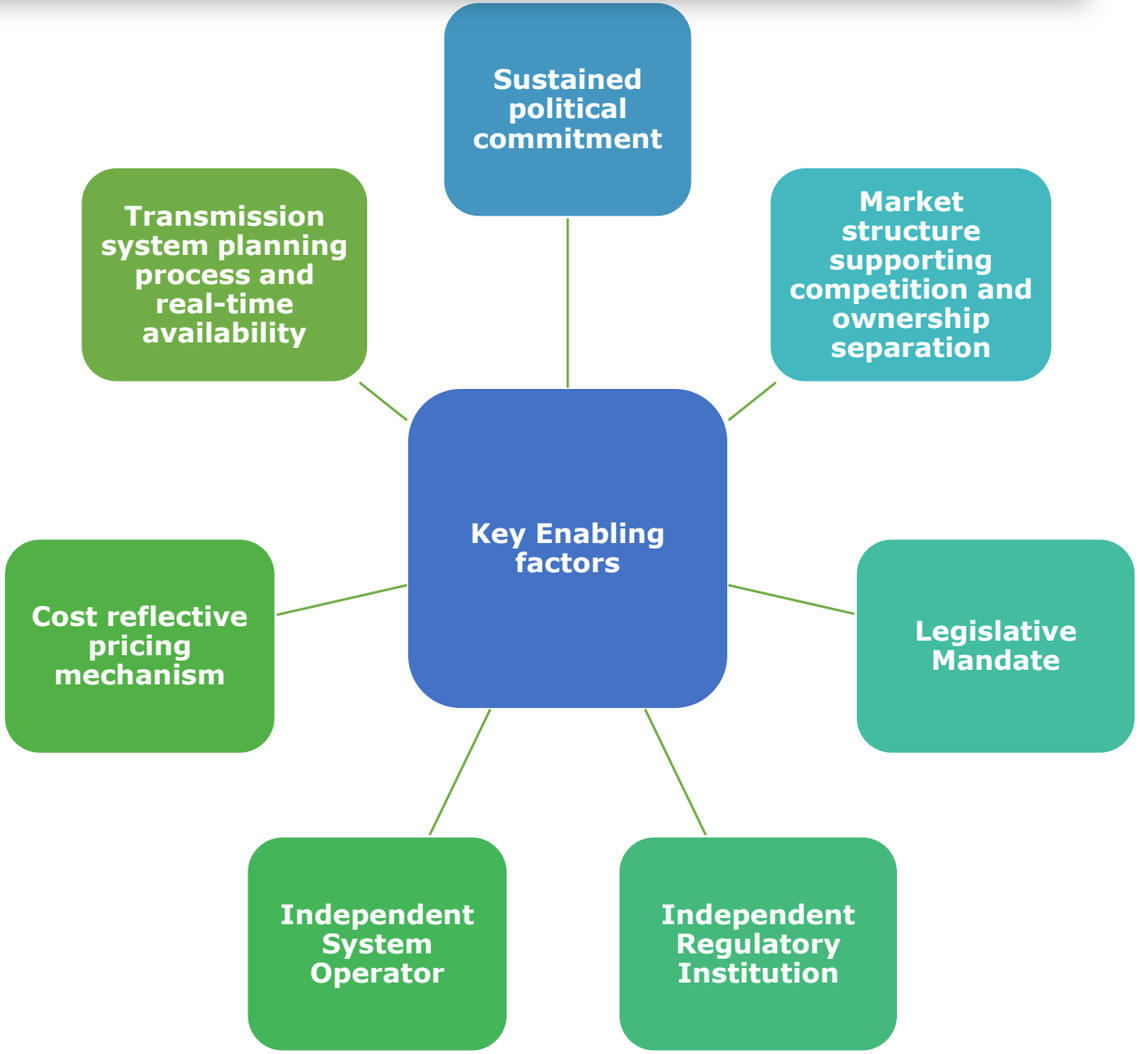


C = Consumption; D = Distribution; G = Generation; S = Supply (Trade); T = Transmission
Font coding used for market levels:
Bold G, T, S, and **D** = Wholesale
Bold Italic C = Contestable retail (open access eligible)
Plain C = Captive retail

Open access refers to the possibility for any party selling or buying electricity, for a cost-reflective fee and subject to transparently defined system security constraints, to connect to and make use of transmission and distribution systems, regardless of who owns and operates the power grid

Open access: Enabling Factors

- Strong **sustained political commitment** to liberalization and competition in electricity sector allowing multiple generation companies, including private generators, to exist
- **Legislation that mandates** open access, supports competition, and allows separate contracting for energy and network services - grant generators and wholesale buyers the right to nondiscriminatory access to the grid
- A Market structure that supports **ownership separation** (legal unbundling) or, at a minimum, functional unbundling of transmission and distribution from generation
- A professionally strong and autonomous **regulatory body** committed to **promoting and protecting** competition
- An independent and efficient **transmission system operator** 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
- Transparency of information on the **real-time availability** of transmission capacity



Open access is an evolutionary process and not a discrete event

Steps to establishing an initial or minimal open access regime

- Enforcing the generators' legal right to access the grid to sell their capacity and energy
- Wholesale buyers' right to contract with the generators, either directly or through an authorized market operator
- Establishing transparent rules, procedures, and protocols for grid and market operations
- Setting up of independent system operator

Evolutionary Phases

Open Access Stages	Initial phase	Evolving phase	Mature phase
Transmission	Bundled	Functional Unbundling	Fully Unbundled
Eligible Consumer	• Big Captive • DISCOM	Medium captive	• Small captive • Households
Power Market	Long term PPA (Bilateral)	Short-term (day ahead and term	Real time market

Maturity of Open Access with time

Key Findings

- Open Access Framework - essentials
- South Asian Regional Assessment
- Case Study

Open Access framework – Key essentials

Institutional Framework	**Power Market Structure allowing for** • Competitive suppliers • Independence of Transmission Operation • System Operator – Neutral and unbiased • Power Trading as a distinct activity - Competitive and transparent structure
Legal and Policy Framework	**National and State Laws allowing** • Non discriminatory open access in transmission • Delicensing of generation, promoting private sector • Timelines and roadmap for transition to full open access • Long term planning
Regulatory Framework	**Independent regulatory authority with power to develop** • Technical standards – Grid code, connectivity standards • Commercial guidelines – transmission tariff, Congestion pricing • Procedure to obtain open access • Removal of operational hurdles and conflict management
Operational Framework	**Guidelines, processes and procedures to implement** • Allocation of roles and responsibilities – determination of Available capacity • Monitoring and compliance mechanism – non-availability, capacity hoarding • Scheduling and dispatch in real-time - Load despatch

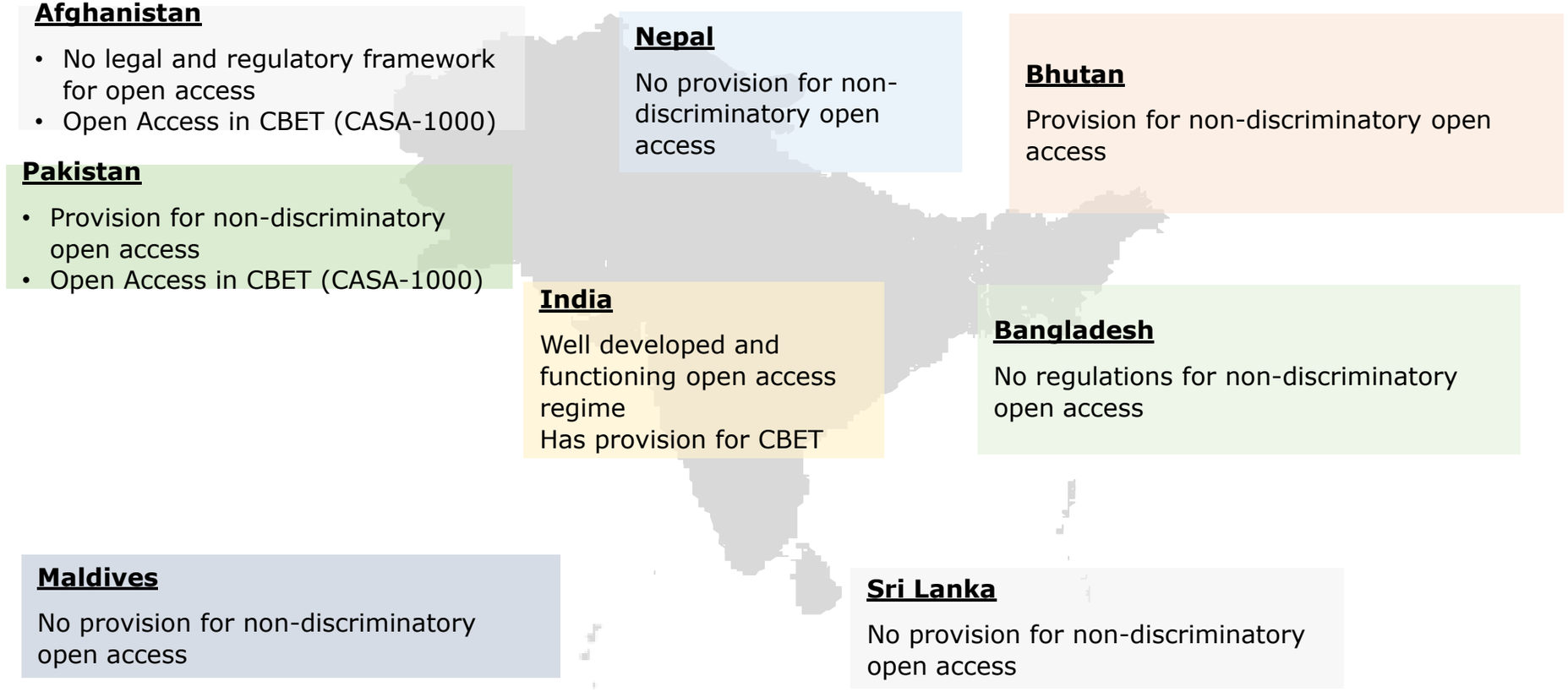
South Asia Open Access – Overview

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	Partial
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*	No	No	No	No
Pakistan	Yes	No	NEPRA	No	No	No	No
Sri Lanka	No	No	PUCSL	No	No	No	No

* Only for Retail Tariff Determination

Current scenario of open access regimes in South Asia

Other than India, none of the South Asian countries have institutionalized open access framework.



Afghanistan

- No legal and regulatory framework for open access
- Open Access in CBET (CASA-1000)

Pakistan

- Provision for non-discriminatory open access
- Open Access in CBET (CASA-1000)

Nepal

No provision for non-discriminatory open access

Bhutan

Provision for non-discriminatory open access

India

Well developed and functioning open access regime
Has provision for CBET

Bangladesh

No regulations for non-discriminatory open access

Maldives

No provision for non-discriminatory open access

Sri Lanka

No provision for non-discriminatory open access

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Key gaps exist in SAC for enabling open access framework

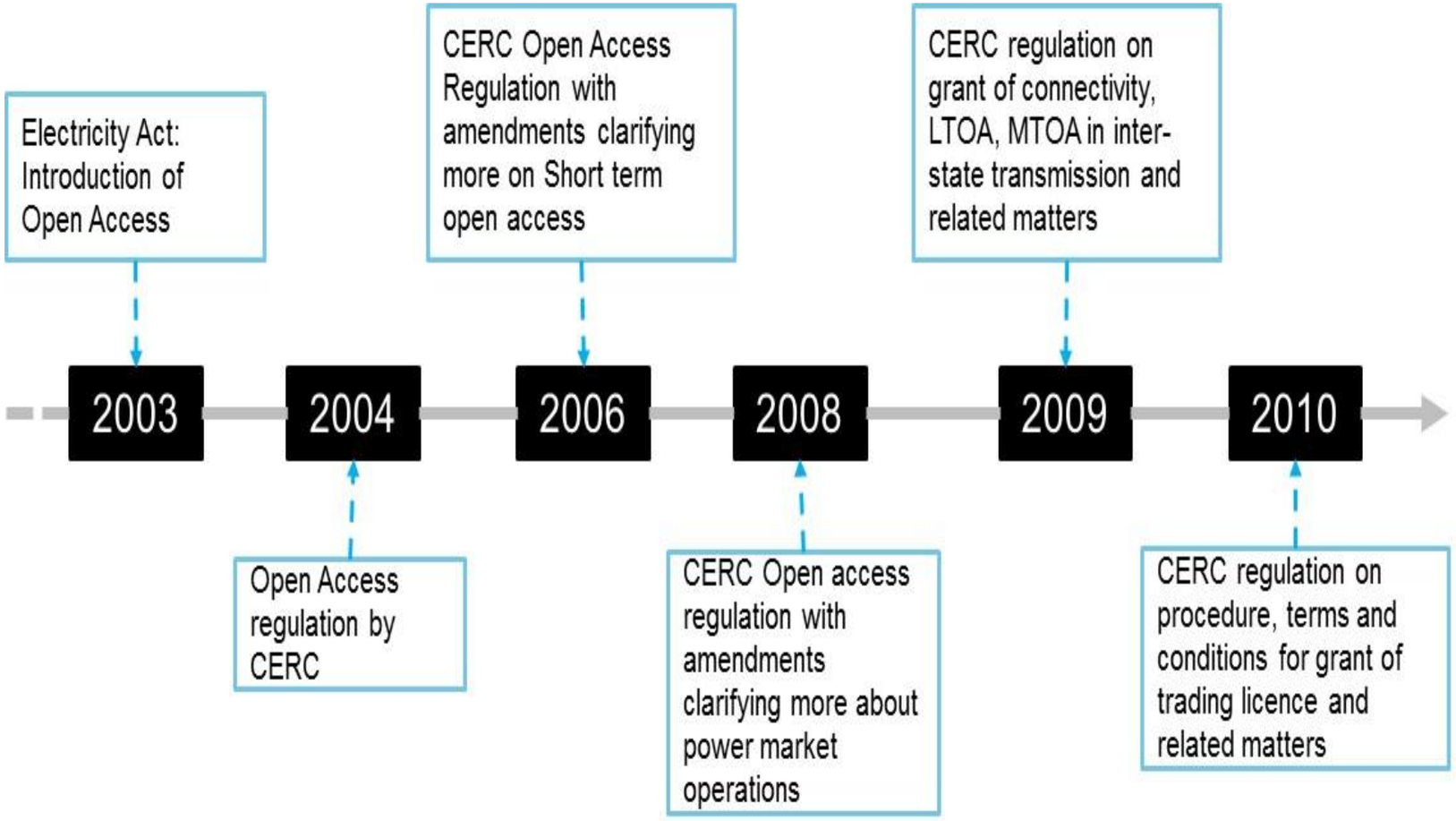
	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Institutional Framework								
Power Market Structure	○	◑	◑	●	○	○	◑	◔
Independent Transmission Operator	○	◑	◑	●	○	○	◑	◔
Independent System Operator	○	◑	◑	●	○	○	◔	◔
Legal and Policy Framework								
Legal Provision	○	◑	◔	◕	○	○	◔	○
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

Open Access framework in India has evolved over time

"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"

Section 2(47) of Indian Electricity Act 2003



Key Institutions

Policy	Ministry of Power, GOI	State Governments	National Electricity Policy State Policies
Regulations	Central Electricity Regulatory Commission (CERC)	State Electricity Regulatory Commission (SERC)	Transmission Tariff Regulations
Transmission Planning	Central Electricity Authority (CEA)		National Electricity Plan/ Technical Standards
	Central Transmission Utility (CTU)	State Transmission Utility (STU)	5 Year Plan
Transmission Licensee	PGCIL	IPTC*	State Transco	Transmission Service Agreement (TSA)
System Operation	NLDC	RLDC	SLDC	Scheduling & Energy Accounting
Commercial	National Power Committee (NPC)	Regional Power Committee (RPC)	Energy Accounts Dispute Resolution

- 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

Transmission Open Access vis-à-vis evolving competitive power market

Policy actions

EA 2003 introducing

- Non-discriminatory open access transmission
- Sec 63 - ERCs to follow competitive bidding process
- Sec 79(2) - CERC to advise GoI on promoting competition
- Section 60 – Controlling abuse of market power

Competitive Bidding Guidelines - 2005/06

- Generation
- Transmission

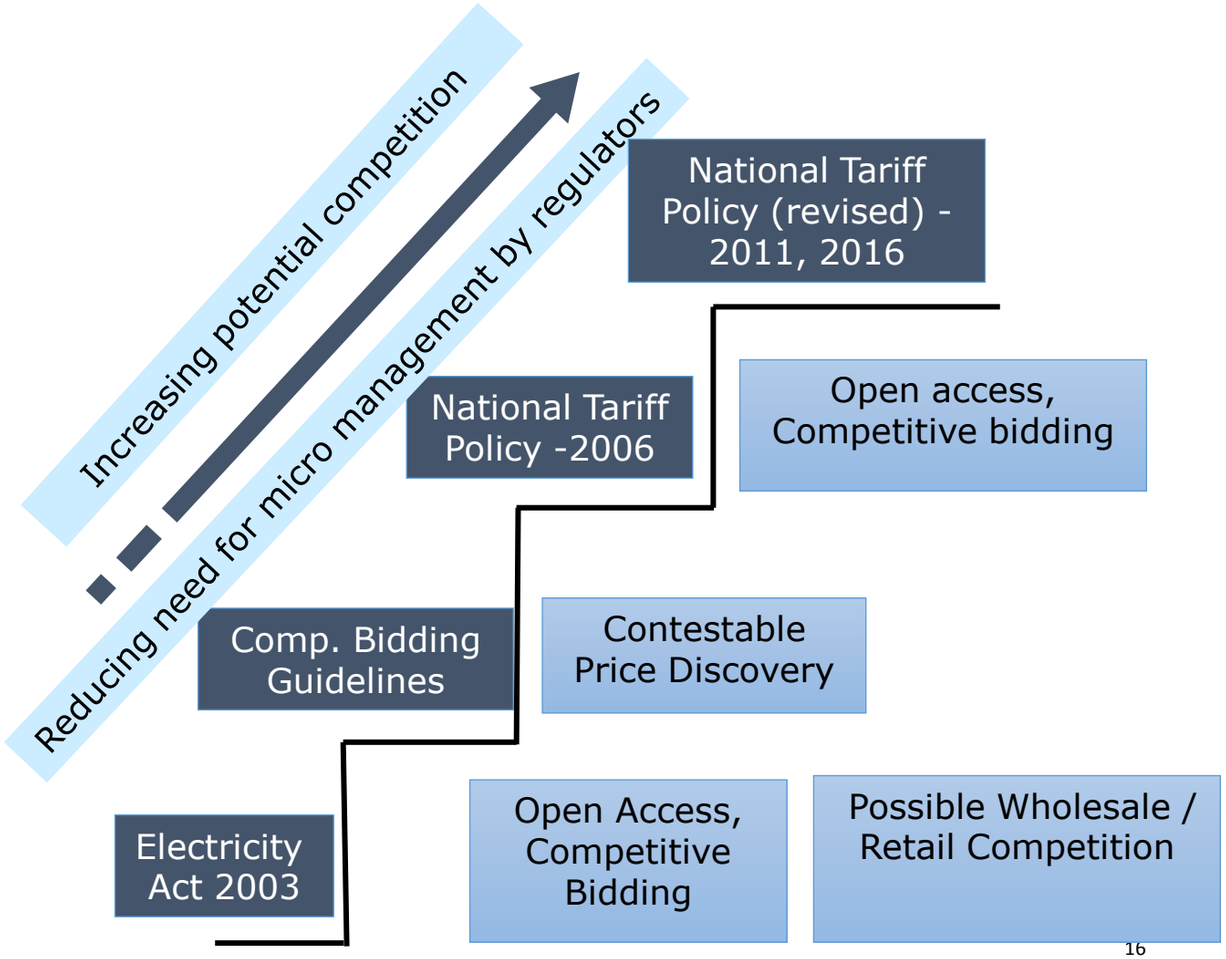
National Tariff Policy – 2006

- Promoting retail competition
- Power procurement through transparent competitive bidding mechanism
- Transmission investment through competitive bids
- Bidding deferred for Public Sector Projects till 05-Jan-2011

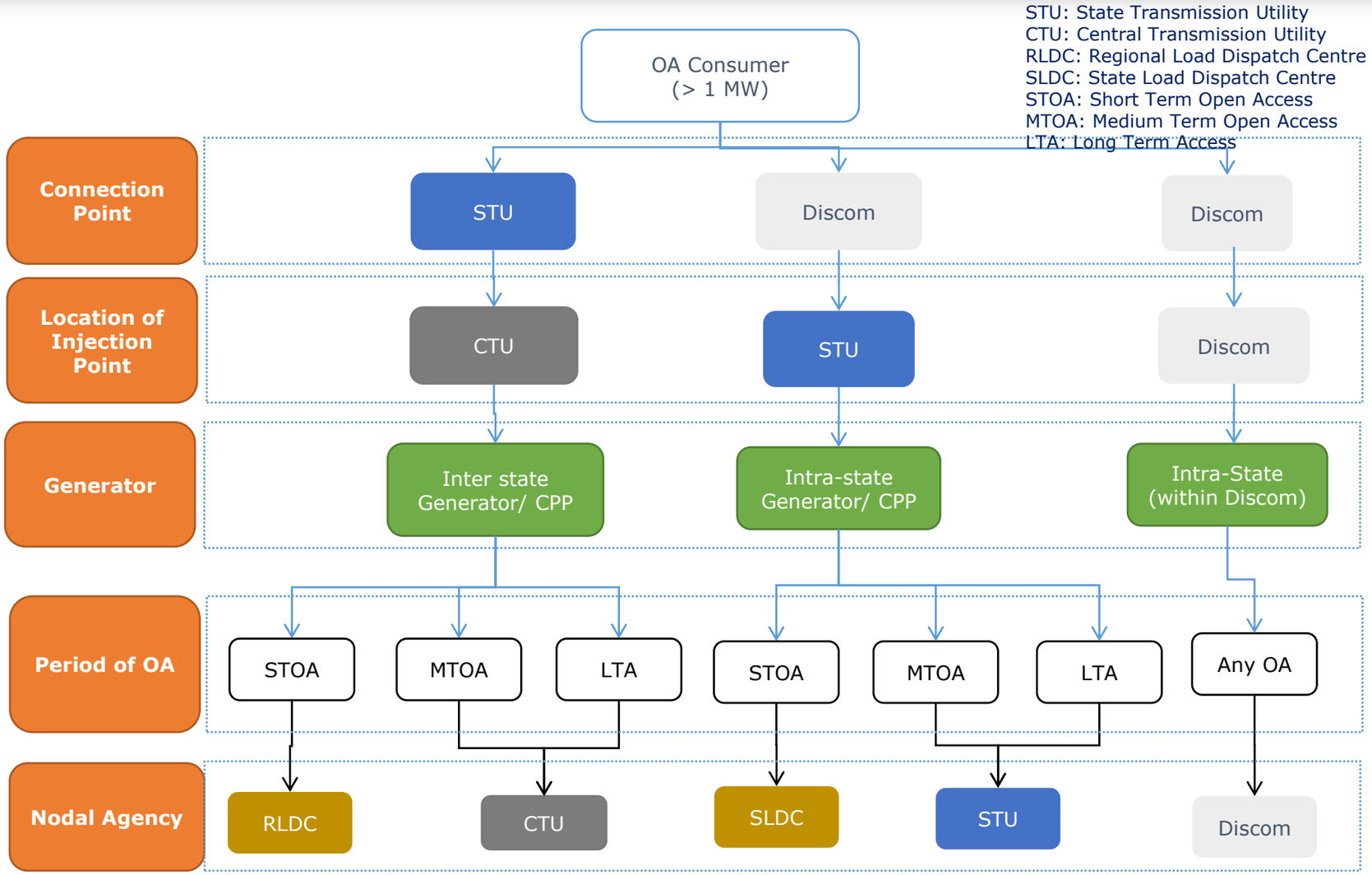
National Tariff Policy (revision) – 2011, 2016

- Competitive bidding route for CTU projects w.e.f. 06-Jan-11
- Competitive bidding route for STU after 2 years
- Exemptions for first two 1200 kV HVDC & for urgent works

Evolving market structure in Indian power sector

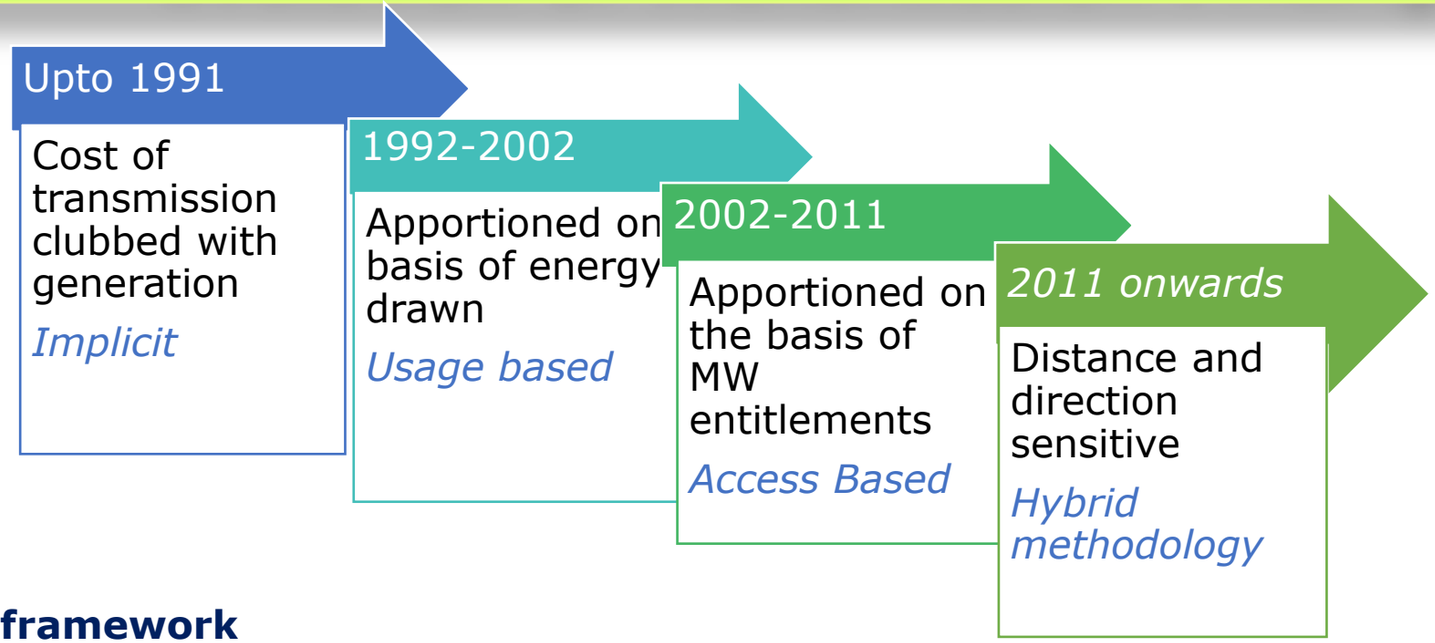


Open Access Consumer Categories



- **Long-term OA customer**
  - A long-term open access customer is one who avails open access for a period of 7 years to 25 years
- **Medium-term OA customer**
  - A medium-term open access customer is one who avails open access for a period of 3 months to 7 years
- **Short-term OA customer**:
  - A short-term open access customer is one who avails open access for a period upto three months at one time

Evolution of Transmission Pricing



Change in pricing framework

- Synchronous integration of Regions
- Changes caused by law and policy - Electricity Act; National Tariff Policy
- Open Access and Competitive Power Markets - Pricing Inefficiencies, Market Players' concern
- Pan caking effect
- National Grid / Trans-regional ISGS
  - Changing Network utilization
  - Agreement of beneficiaries a challenge
  - Ab-initio identification of beneficiaries difficult

Open Access Transactions : Charges & Losses

PoC charges

- Inter-State Transmission charges payable by the open access consumer

Transmission Charges or STU Charges

- Payable to the state transmission utility for the use of the transmission system for availing power through open access

Wheeling charges

- Charge to the Discom for conveyance of electricity through open access as determined by the SERCs

Cross Subsidy Surcharge

- Subsidising open access consumer has to pay a cross subsidy surcharge to the Discom. – As approved by SERC

Others

- Additional Charges, if any – As approved by SERC
- NLDC application fee, scheduling and operating charges, SLDC Charges
- IEX transaction charges/Trading Margin
- Reactive Charges – As approved by CERC and SERC

Point of connection (PoC) loss

- Inter-State transmission system loss

Transmission loss or state loss

- Consumer to absorb apportioned energy losses in the transmission system as per the relevant regulations

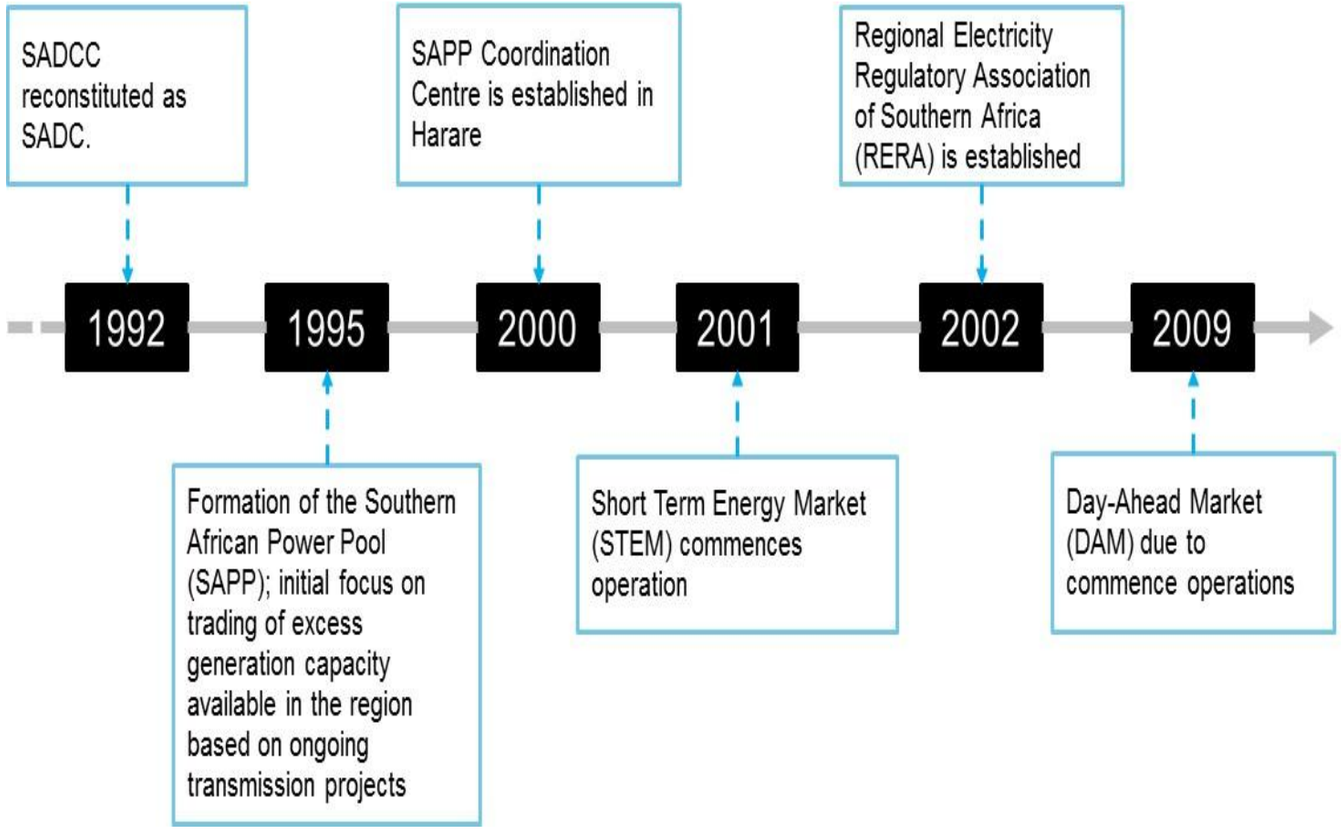
Wheeling loss

- Technical losses in the distribution system determined at various voltage levels by SERCs

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
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, Intra-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

Case Study: South African Power Pool (SAPP)



Early Years

- Bilateral Contracts

From 2001

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

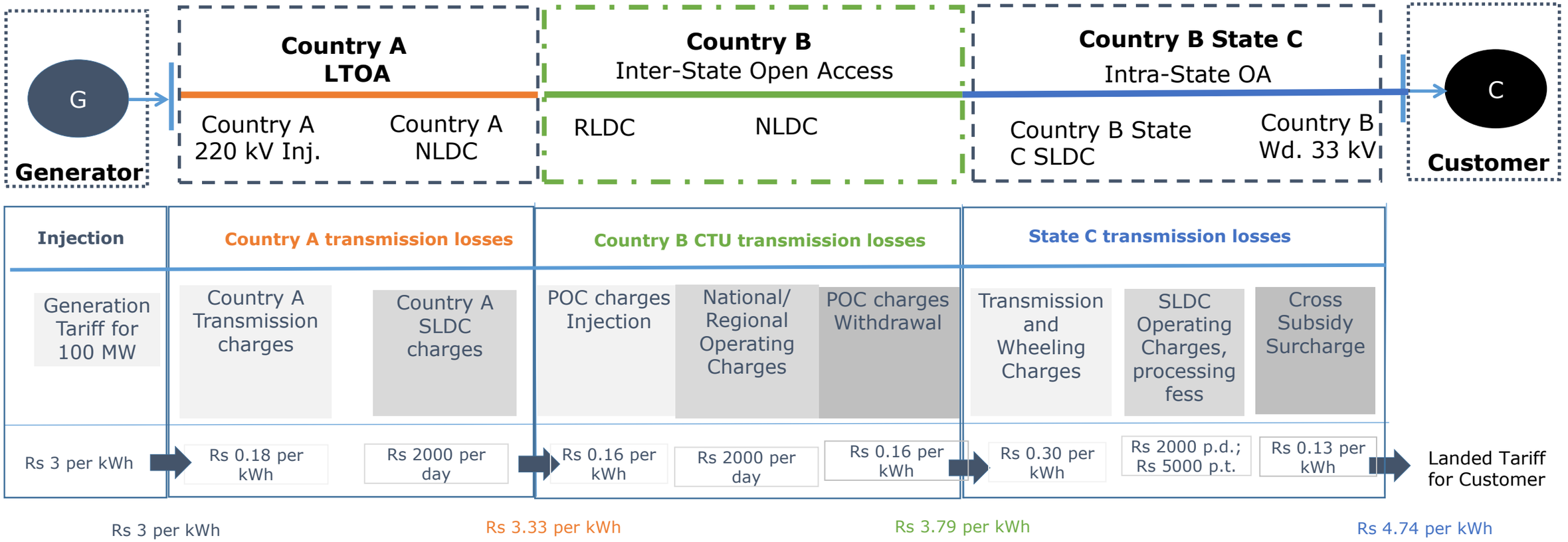
Current and future

- 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

South Asian Context

Case: Bilateral LTOA between two countries

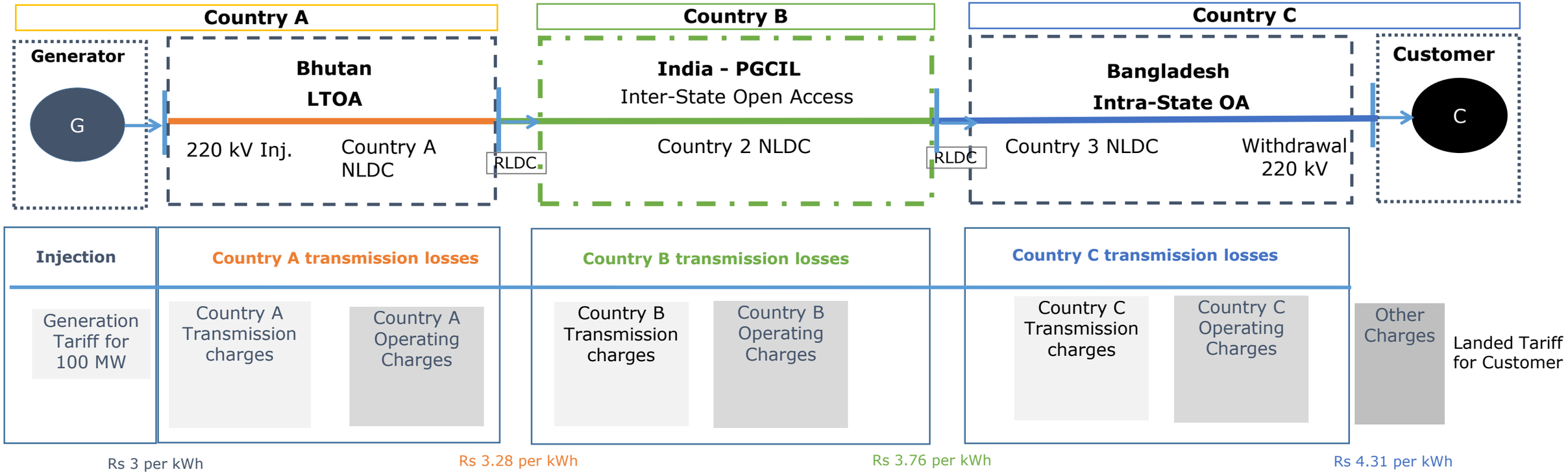
Customer is situated in Country B procuring power from generating station in Country A



South Asian Context

Case: Regional LTOA between two countries

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



Developing Open Access Framework : Key requirements

- Specifying the Open Access eligibility criteria
  - Contract demand
  - Type of consumers
  - Type of OA – Short, Medium and Long Term
- Roles and responsibilities of Transmission Company
  - Independence of operations
  - Computation of Available Transmission Capacity (ATC)
  - Segregation of costs
- Identification of Infrastructure requirements
  - Installation of Special Energy Meters (SEMs)
  - Energy Accounting System
- Commercial Framework
  - Payment terms
  - Payment security for availing Open Access

Regional Open Access Regulations

- Specify Open Access Categories – Short, Medium and Long Term
- Identify regional institutes for
  - Independence of operations
  - Computation of Available Transmission Capacity (ATC)
  - Determination of costs at inter-regional level
  - Standardization of infrastructure
- Commercial Framework
  - Transmission Service Agreement
  - Connection Agreement
  - Regulations specifying payment terms, settlement timelines

Open Access Guidelines and Framework

Preamble

- These non-discriminatory open access guidelines have been developed to aid in the evolution of an efficient market where more number of electricity buyers and sellers can participate both in the domestic and in CBET contexts
- The objective of these guidelines is to provide Government agencies, utilities, empowered entities of South Asian countries with a common course of action that can be referred to for decision making on open access requirements for domestic and CBET in their respective countries
- These guidelines apply to CBET in the South Asian countries
- These guidelines are non-binding in nature and are aimed to provide national governments and regulators of SAC with a consistent set of guidelines applicable to open access regime
- The guidelines deal only with limited areas where need for such common guidelines has been felt by the SAC and are not meant to be comprehensively dealing with all matters related to the open access regime
- South Asia Forum of Electricity Regulators (SAFER) shall be the institutional body in the regional level, working towards enabling the guidelines and facilitating required changes to be made in the national regulatory framework. Such entity shall work in close coordination with the SAARC secretariat and various bodies under the same.

Summary of Regional Open Access Guidelines

1	**Introduce enabling provisions for open access**	• Introduction of open access in the legislative framework for electricity across SAC • Phased implementation of open access • Introducing changes in the power market structure to aid and enable open access
2	**Define Open Access Eligibility Criteria**	• Categories of open access: Long, medium and short term • Connectivity criteria: threshold capacity, voltage levels
3	**Fixation of open access charges and conditions**	• Technical, commercial and legal eligibility criteria for open access • Setting up of principles for determination of charges evolving into uniform pricing methodology • Terms and conditions for open access
4	**Procedure for grant and revocation of OA**	• Grant of open access (short, medium and long term) including timelines • Application Fees • Standard Formats
5	**Establishing the Commercial Mechanism**	• Standard Agreements and Formats • Payment and Settlement Mechanism • Dispute Resolution
6	**Developing the Operational Mechanism**	• Detailed procedure for determining the technical feasibility of open access • Manner of prioritization of applications • Manner of curtailment in case of congestion
7	**Institutional framework for regional coordination**	• Utilization of SAFER as a platform for regulatory harmonization and dispute resolution

Guideline 1: Introduce enabling provisions for Open Access

Context: South Asian countries other than India lack in legislative and regulatory frameworks for Open Access. In some cases, the minimum required enabling conditions for open access are also not present.

1

- The legislative framework for electricity shall be amended to introduce the concept of open access to transmission and distribution networks in a phased manner, with the modalities of phasing to be determined by the federal regulatory body / Government.
- Basic provisions regarding grant, amendment, revocation and renewal of open access, and the duties and obligations of persons availing open access shall be incorporated either in the legislative amendments / through regulations.

2

- The open access framework shall be based on the following guiding principles:

Non-discriminatory access to the electricity network

Cost reflective pricing for the use of networks

Insulation to the legacy entities from losses on account of allowing open access

Primacy to system security and domestic energy security

Guideline 1: Introduce enabling provisions for Open Access

3

- The legislative and regulatory framework for open access shall be exhaustive enough to cover CBET.
- The open access framework for CBET shall be robust enough to treat cross border open access in a similar manner to open access in domestic market, the only difference being the treatment of interface points between the networks of different countries as the injection / drawal points.

4

- The enabling provisions shall be defined in the CBET open access regulations and national regulations will have similar conditions for the CBET transactions in the region
- Necessary changes in the power market structure of respective country to support open access. This shall include:
  - Constitution of national level system operator, either by segregating the system operation function from the transmission utility, or as a new entity. The system operator shall be constituted preferably as an independent entity.
  - Organizational and financial ring fencing of the system operator from other businesses of the system operator, its parent entities or its subsidiaries.
  - Reconstitution of legacy entities, to prevent the system operator and transmission utilities from indulging in power trading

Guideline 2: Define Open Access Eligibility Criteria

Context: SAC countries have different licensing rules and procedures, a harmonized licensing framework ensures a non discriminatory open access without any entry restriction

1

- Categories of open access consumers based on tenure
  - Short term: Less than 1 year
  - Medium Term: 1 – 5 years
  - Long Term: more than 5 years
- Connectivity criteria
  - Threshold capacity: 50 MW
  - Voltage levels: Transmission Voltage levels (66 kV and above)

2

- Eligibility criteria may be specified separately for international and international transactions, and further separately for short, medium and long term open access.
- The enabling provisions shall be defined in the CBET open access regulations and national regulations will have similar conditions for the CBET transactions in the region

Guideline 2: Define Open Access Eligibility Criteria

3

- The eligibility criteria may include:

Technical	Connectivity, availability of sufficient margin in the network, availability of interface meters and associated systems for proper energy accounting, adherence to technical standards for connectivity to the grid etc.
Commercial	Ability to furnish payment security and deposits, absence of payment default to the power utilities.
Legal	Adherence to mandatory conditions stipulated as part of the phased introduction of open access by the regulator / Government, such as the category of participating entity, connected voltage and open access quantum.

Guideline 3: Fixation of open access charges and conditions

Context: Along with the fundamental provisions for open access, there are detailed aspects that need to be considered such as how many types of open access shall be there, what shall be the eligibility criteria for open access, and how the pricing for open access may be done.

1

SAC will ensure the following

- Segregation of transmission charges
- Independence of system operator and determination of system operation charges

2

- Transmission charges for use of transmission network, wheeling charges for use of distribution network (in case open access is allowed on distribution networks) and system operation charges may be determined in a cost-reflective manner.
- In the long term, regulatory may strive to adhere to a transmission pricing regime which is sensitive to distance, direction and quantum of power flow.

Guideline 3: Fixation of open access charges and conditions

3

The terms and conditions for open access shall include:

- Adherence to technical standards and codes
- Adherence to the scheduling framework, dispatch instructions and restrictions imposed by the system operator
- Maintaining the stipulated performance guarantees
- Timely payment of fees and charges
- Curtailment in case of congestion in the grid

4

SAFER shall manage the process of implementation of guidelines in **close coordination with various regional bodies including the proposed** regional **electricity regulatory authority, the SAARC secretariat, technical committees, forums and other relevant SAARC entities** & programs in the area of facilitating power trade

Guideline 4: Procedure for grant and revocation of OA

Context: A well defined procedure for grant, amendment, revocation and renewal of open access can help in reducing subjectivity in the process, thereby improving fairness of the process.

1

- Procedure for connectivity and for grant, revocation, amendment and renewal of open access shall be laid out by the regulatory agency / Govt. preferably as part of the regulations.
- Nodal agencies shall be identified for each category of open access, which will receive the application and take decisions on the application.
- While the procedure is to be specified by the regulatory agency / Govt., the transmission utility / system operator may be identified as the nodal agencies for processing open access applications.

2

- The procedure shall clearly specify entities that may be approached for approvals and clearances for open access, along with required application fee and charges.
- The procedure may specify timelines for each entity to process the requests related to open access.
- The nodal agencies shall strive to operationalize IT based systems for faster processing of open access applications.

Guideline 5: Establishing the Commercial Mechanism

Context: In the absence of a well defined commercial framework, the scope for disputes between participating entities of open access will be higher.

1

Commercial framework shall lay down standard agreements and other terms such as:

- Standard Transmission Service Agreement
- Connection Agreement
- Regulations specifying payment terms, payment security and settlement timelines

2

The system operator shall be mandated to publish weekly / monthly energy accounts that shall form the basis for energy accounting among open access participants.

3

There shall be co-ordination forums for initial efforts towards dispute resolution, failing which other legal remedies may be allowed.

Guideline 6: Developing the Operational Mechanism

Context: A robust operational guideline for open access will reduce the scope for ambiguities and confusion among the open access participants and nodal agencies.

1

- The respective nodal agencies for open access shall be responsible for preparing the operational guidelines for open access, which shall then be got approved from the regulator.
- The operational guidelines shall cover aspects such as:
  - Detailed procedure for determining the technical feasibility of open access
  - Manner of prioritization of applications
  - Manner of curtailment in case of congestion
  - Detailed procedure for undertaking network capacity augmentation

2

The respective nodal agencies shall strive to maintain a comprehensive open access registry, which shall have details of participating entities, energy transaction details and payment details.

Guideline 7: Institutional framework for regional coordination

Context: Power markets in SAC are at various levels of evolution as far as enabling of open access is concerned. In order to bridge this gap, it is proposed to coordinate the efforts through the SAFER. This body will provide a common platform for all SA countries to discuss and decide upon basic requirement and functionalities for open access power transaction amongst them.

1

The proposed regional regulatory forum – SAFER may be adopted as a common platform for all SA countries to discuss and decide upon basic requirement and functionalities for open access power transaction amongst them.

2

- SAFER would work with national governments, system operators and power utilities for ensuring smooth open access status in the CBET projects.
- SAFER shall manage the process of implementation of guidelines in close coordination with various regional bodies including the SAARC secretariat, technical committees, forums and other relevant SAARC entities & programs in the area of facilitating power trade
- SAFER to act a as a neutral, apolitical platform for experts to assemble, brainstorm, strategize and recommend specific steps to address the multiple barriers to CBET

Implementation framework

Recognition and approval of guidelines by national regulators	Identification of amendments in the current regulations/ new regulations	Notification of new regulations/ changes w.r.t CBET	Regional Guidelines adopted for CBET
Guidelines proposed will be in the form of a on-binding framework guiding CBET. Gradually a legal status may be accorded to OA Guidelines	National regulators shall identify changes required in the national regulations for enabling the CBET open access guidelines	National regulations and CBET Open Access Regulatory Guidelines will be updated and modified to ensure consistency	• Regular updation and improvement in guidelines • Adoption by **National Governments and Regulators giving a Legal status** • **Becomes binding on all CBET transactions**

The above steps will require consensus building and hence will need to be facilitated through a strong sponsor. The study proposes South Asia Forum of Electricity Regulators (SAFER) to manage this process

Thank You

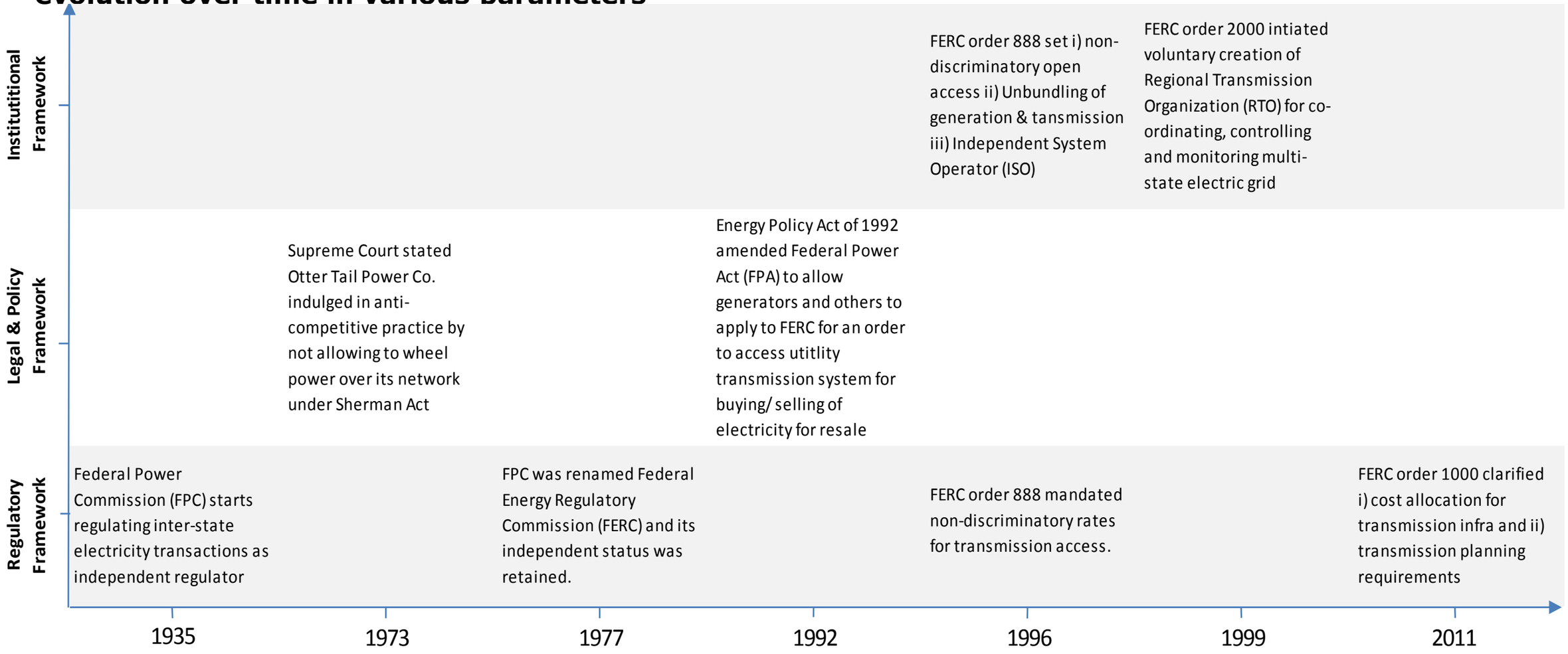
International experience: Summary

Parameter	Example	International practice
Transmission unbundling	USA, India	• Transmission is functionally unbundled in USA which means tariffs provided by a transmission company to its generation company should be same as it provide to other 3rd party also there should not be discrimination in quantum or schedule for dispatch. • India has over the years unbundling process at central and state level with varied levels of unbundling
Neutral system operator	USA, India, Brazil	• In USA and Brazil, system operator is a neutral not-for-profit agency and responsible for marinating schedule and dispatch in unbiased manner. • India is on the way to have completely neutral system operator (POSOCO)
Eligibility for open access	Brazil, India, USA	• Brazil started with eligibility of 10 MW and above customer which gradually reduced to 3 MW then 50 kW. • India started with open access for 10 MW and above customers and now have 1 MW customers as eligible one.
Generation	USA	• USA have quota (in GWh) allocated for open access

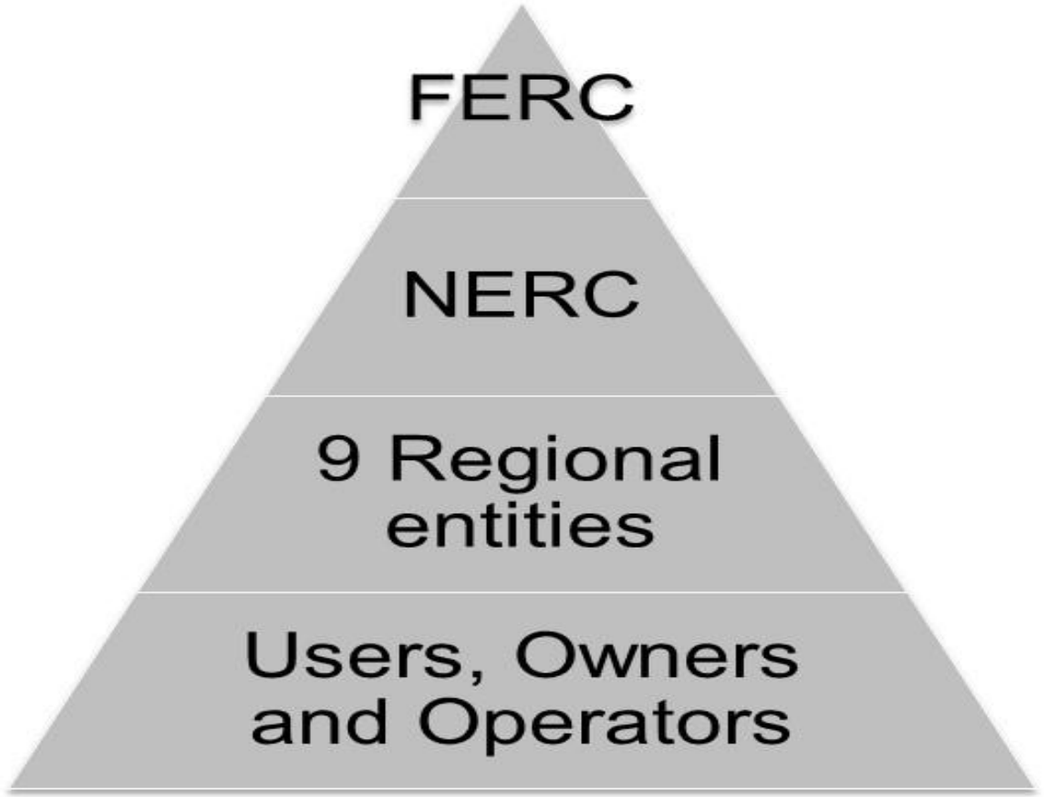
- In all these cases it took several decades to move from beginning of open access to mature open access regime.

Open Access - USA Example

USA has one of the best open access in domestic market in the world. Following figure shows its evolution over time in various parameters



Open Access - USA Example



FERC has ultimate authority over all matters including approval of budgets and business plan of NERC and regional entities in USA

NERC is international authority spanning across Canada, USA and part of Mexico. It develops and enforces mandatory reliability standards.

There are total of 9 regional entities in the form of ISO/ RTO i.e. 7 ISOs and 4 RTOs (2 of which are common.

Users, Owners and Operators are governed by FERC for wholesale or inter-state transactions while State regulatory commission govern retail

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Open Access - Brazil Example

Brazil has gradually evolved its open access regime starting with eligible customers at 10 MW and lowered it down to the 50 kW eventually