SAARC Energy Centre, Islamabad

Pakistan

THE REPORT

Video Conference on "Roadmap for the implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)"

22nd September, 2020

Organized by
SAARC Energy Centre Islamabad

September 22, 2020

SAARC Energy Centre
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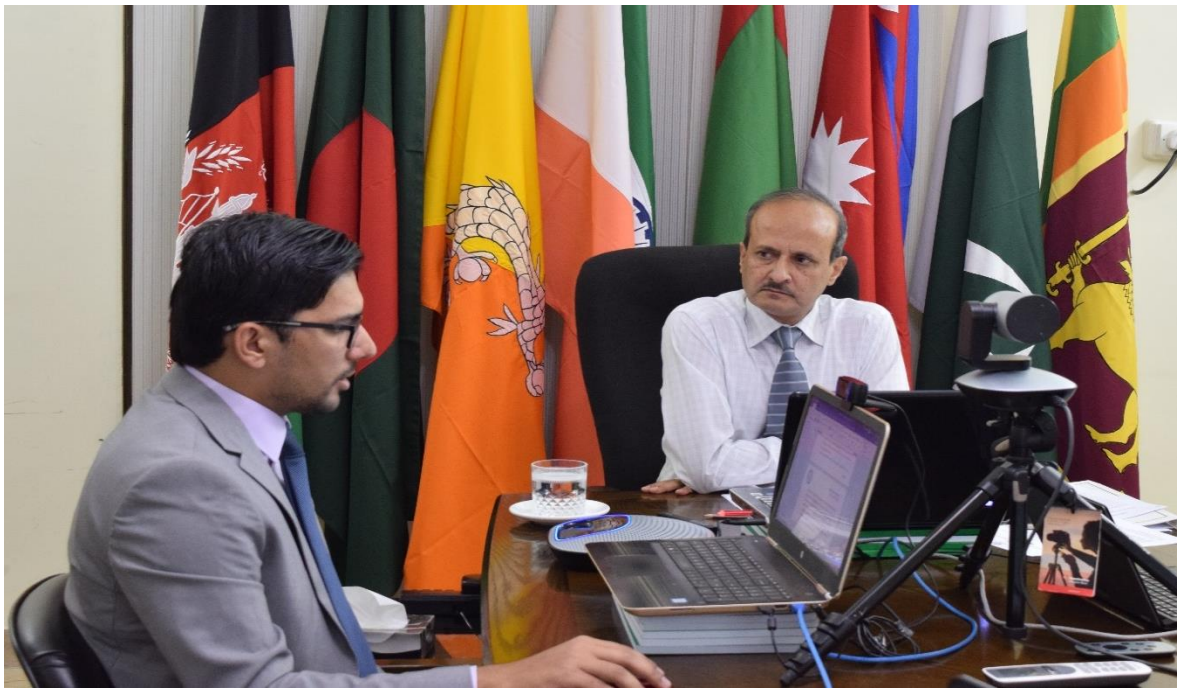

Introduction

1. SAARC Energy Centre (SEC), Islamabad successfully conducted a video conference on "Roadmap for the implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)" on Tuesday, 22nd September 2020. The agenda of this event is available at Annexure-I.

2. SAARC Framework Agreement on Energy Cooperation (Electricity) – shall be referred to as *Framework Agreement* here onwards – signed in 2014, was a landmark moment to move closer to the realisation of SAARC Energy Ring, as envisioned by SAARC Leaders in 2004. Through this agreement, the SAARC member states *recognised* the importance of electricity trade, *realised* the benefits of such trade and were *convinced* of the need to increase economic cooperation. The objective of this agreement is to enable cross-border electricity trade (CBET) on voluntary basis subject to the laws, rules and regulations of the SAARC member states. The salient features of this agreement include the following:

   a. Non-discriminatory access to transmission grids
   b. International coordination in transmission interconnection planning, system operations, and energy accounting
   c. Promotion of information sharing between Member States
   d. Encouraging member states to undertake power sector reforms in their respective jurisdictions, to promote competition
   e. Member States shall towards exempting the cross-border electricity trade from export/import duties/levies

3. Focus of this video conference was to share the information on ongoing efforts for the implementation of the *Framework Agreement* to the participants and sensitise the

policy/decision makers on the importance and benefits of this agreement. The topics of discussion were: Overview of power sector in South Asia and current status of CBET; Importance of the *Framework Agreement* and its salient features; Challenges – technical, commercial, system operation and institutional – for implementation of the *Framework Agreement*; Outlook of CBET, emerging trends and way forward; efforts of SEC, ADB and SARI/EI in promoting the cause of the *Framework Agreement*.

Participation

4. The webinar was attended by 76 professionals representing public sector organizations, academia, private sector, and other stakeholders within and outside SAARC region. The speakers from SEC, ADB, India and Pakistan shared their knowledge pertaining to importance of the *Framework Agreement*, steps taken by member states for its implementation and the challenges faced along the way. The participants list is available at Annexure-II.

Description

5. SEC Programme Coordinator, Mr. Ahmad Talha, Research Fellow (Technology Transfer) started the video conference with welcome remarks. Subsequently, he invited Dr. Shoaib Ahmad, Deputy Director (Coord.), to deliver opening remarks on behalf of Director SEC. After the Opening Remarks, the Program Coordinator read out the agenda of the video conference which comprised of presentations by the resource persons. Each presentation was followed by a brief Q & A session. The Program Coordinator read out conclusions, which were gathered during the video conference. At the end, Dr. Shoaib Ahmad, Deputy Director (Coord.), delivered the closing remarks, on behalf of Director SEC, whereby offered remarks of appreciation to all the participants and presenters.

Technical Proceedings

6. Six resource persons from SEC, ADB, India and Pakistan shared their knowledge in the video conference. All the presentations delivered during the webinar are available at SEC's website. Details of the resource persons are available at Annexure-III and their presentations at Annexure-IV. A brief information on the content of the delivered presentations is as follows:

Presentation 1 – Draft Roadmap for SAARC Framework Agreement and Role of SEC

Mr. Ahmad Talha, Research Fellow (Technology Transfer), SAARC Energy Centre (SEC), Pakistan.

7. Mr. Ahmad Talha – currently working as Research Fellow (Technology Transfer) – has about 7 years of working experience in the power sector. He has been responsible for designing electrical and protection systems for high voltage substations; electrical balance of plant design for power plants; electrical distribution network for oil and gas fields. He holds a Master's degree in Sustainable Transportation and Electrical Power Systems – a joint degree programme by University of Oviedo, Spain; Sapienza University of Rome, Italy; University of

Nottingham, UK. He has also authored four research papers for reputable international conferences.

8. Mr. Ahmad started his presentation with a brief introduction to SEC. He apprised the participants on the background of the *Framework Agreement* and energy integration in the SAARC region as envisioned by SAARC leaders through SAARC Energy Ring. He also shared the draft roadmap, prepared by SEC, for implementation of the *Framework Agreement* and the pre-requisites for this roadmap. The interventions, suggested by SEC to facilitate implementation of the *Framework Agreement* were also a part of his presentation. In the end, he shared a summary of the studies, completed so far by SEC, related to different articles of the *Framework Agreement*.

Presentation 2 – Roadmap for the Implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)

Mr. Jiwan Acharya, Principal Energy Specialist, ADB
Mr. Subhrajit Datta Ray, Director Energy, Utilities & Resource practice, PwC Pvt. Ltd., India
Mr. Sambit Kumar Dash, Associate Director Energy, Utilities & Resource practice, PwC Pvt. Ltd., India

9. Mr. Jiwan Acharya is working in Energy Division of South Asia Department of Asian Development Bank (ADB) as Principal Energy Specialist. He currently focuses on developing and implementing energy efficiency, renewable energy and other broader energy sector projects in India and Nepal. He is also serving as focal person for Regional Cooperation and Integration for Energy in South Asia. He is a key member of ADB's Energy Sector Group and Climate Change Team and was responsible for overseeing ADB's several key initiatives including Energy for All, and Low Carbon Technology Transfer, among others.

10. Mr. Subhrajit Datta Ray is a Director with the Energy, Utilities & Resource practice of PricewaterhouseCoopers Pvt. Ltd., India. He brings over 14 years of experience in power sector engagements in South Asia, South East Asia and Central Asia, across areas such as power sector policy and regulatory, cross border power trade, institutional strengthening and capacity development, bid advisory support and sector planning. He also advised Council of Experts of Energy Regulators (Electricity) (CEERE) in conducting knowledge sharing sessions on case studies in regulatory evolution in various other regions globally.

11. Mr. Sambit Kumar Dash is an Associate Director with the Energy, Utilities & Resource practice of PricewaterhouseCoopers Pvt. Ltd., India. He brings in over 11 years of experience in power sector engagements across South Asia and South East Asia, in areas related to cross border/regional projects. Mr. Sambit has extensively worked with multilaterals in promotion of regional cooperation in SASEC and Greater Mekong Sub Region (GMS). He has assisted ADB in strengthening the power sector's key frameworks and systems to enhance Bhutan's hydropower development. Mr. Sambit is presently advising ADB in developing an Energy

Framework Agreement for South Asian countries to enhance cooperation among the member nations.

12. Mr. Jiwan started the presentation by highlighting ADB's effort to promote cross border electricity trade in South Asia. He shared the highlights of some of the important studies conducted by ADB to promote CBET in South Asia from 2005 - 2017. He also talked about the support extended by ADB to SAARC Council of Experts of Energy Regulators (CEERE) regarding implementation of the *Framework Agreement*. He concluded his part of the presentation by sharing information related to ADB's technical assistance to SASEC member nations in promoting power trade in the region and the progress achieved so far under this assistance programme.

13. Mr. Subhrajit carried the discussion forward by presenting an overview of the power sector in South Asia, the benefits offered by regional cooperation and the need for a regional framework agreement. He emphasized the need for energy cooperation in South Asia in the light of sustainable development goals. He discussed the salient features of the *Framework Agreement* in detail. He talked about the impact of this agreement on bilateral CBET agreements in particular and on the power sector in the SAARC region in general. Technical challenges, namely harmonisation of technical regulations and open access to transmission systems, in implementation of the *Framework Agreement* and ways to overcome these challenges were also discussed.

14. Mr. Sambit covered the barriers related to commercial, system operation and institutional aspects of the *Framework Agreement*. He also presented challenges in establishment of a regional power exchange. On commercial front, he apprised that CBET needed to move from bilateral to multilateral trade and commercial form of CBET, with the involvement of private sector, should be encouraged to realise competitive price discovery. Talking about system operation challenges, Mr. Sambit talked about formulation of common grid code, common procedure for energy accounting and mechanism for congestion management. He concluded by presenting way ahead for regional power market and aspects that need to be catered to implement the *Framework Agreement* in its true spirit.

Presentation 3 – Deepening Power System Integration & Cross Border Electricity Trade in SAARC Region: Current Status & Future Outlook

Mr. Rajiv Ratna Panda, South Asia Regional Initiative for Energy Integration (SARI/EI), India.

15. Mr. Rajiv Ratna Panda is an energy expert, management, research, public policy, and strategy professional with multi-regional energy system expertise & experience. He currently works as Head-Technical, USAID's South Asia Regional Initiative for Energy Integration (SARI/EI) at Integrated Research and Action for Development (IRADe). He provides technical inputs/advice as well as the policy, regulatory, legal and market inputs/advice for enhancing

CBET, power system integration, transmission system and grid integration, regional power market design & development and energy security in South Asia & BIMSTEC region. He was instrumental in developing regional regulatory guidelines for CBET, conceptualizing the development of regional regulatory/ technical institutional mechanism for deepening energy cooperation in the SA & BIMSTEC region.

16. In his presentation, he started the discussion with economic outlook of the SAARC region and status of cross border electricity trade in South Asia. He highlighted some of the challenges faced by the SAARC Member States in the areas of energy access and clean energy development. Discussion on current status and future outlook of CBET were the focal areas of his presentation. He talked in detail about the benefits offered by four key emerging trends – transition from bilateral to trilateral CBET, renewable energy based CBET, commercial form of CBET and regional power market development – with regards to future of CBET in the SAARC region. He emphasised on the importance of political will, implementation mechanism, open access to transmission systems, harmonisation of grid codes and regional coordination forums to realise regional power market. He concluded his presentation with a brief on action plan for implementation of the *Framework Agreement* and sharing the studies, related to various articles of the *Framework Agreement*, carried out by SARI/EI.

Presentation 4 – Competitive Wholesale Power Market (CTBCM) of Pakistan

Mr. Abrar Hussain, Central Power Purchasing Agency (CPPA-G), Pakistan.

17. Mr. Abrar Hussain is an electrical engineer who has worked both in private and public sectors of Pakistan and well versed in legal, regulatory, planning and technical aspects of both developing and developed countries. He has diversified experience of market development, power sector planning and power projects. He is leading market development activity in CPPA-G and working with MRC international consultants. He has exposure of both North American Pool markets and European Exchange Power Markets. Under his guidance, Pakistani electricity market has expected COD on March 2022.

18. Mr. Abrar began his presentation with a history of power sector reforms and electricity market development in Pakistan. He shared the electricity market design features from around the globe. He covered in detail the steps taken by different Pakistani institutions as well as legal, policy and regulatory framework improvements undertaken to develop competitive electricity market in Pakistan. He talked about the market model being developed in Pakistan and its salient features. In the end, he apprised the participants about the implementation plan and monitoring framework of electricity market in Pakistan.

Wrap up and Conclusion

Mr. Ahmad Talha, Research Fellow (Technology Transfer), SAARC Energy Centre

19. Mr. Ahmad Talha thanked everyone for attending the video conference. He informed the participants that there is great potential for energy trade between SAARC countries. Following are the main conclusions derived from the discussion:

a. Ratification of SAARC Framework Agreement by all member states is crucial.
b. Focus should now be on the implementation of SAARC Framework Agreement. Steps must be taken by individual member states to develop complimentary regulatory frameworks and harmonised grid codes/standards that facilitate regional electricity trade. Appropriate regional forums can facilitate the dialogue in this regard.
c. Strengthening CBET ties will help in ensuring sustainable development, transition towards clean and green energy and meeting the climate change mitigation goals.

Closing of Webinar

Dr. Shoaib Ahmad, Deputy Director (Coord), SAARC Energy Centre

20. Dr. Shoaib Ahmad, on behalf of the Director SEC, thanked all the resource persons for delivering excellent presentations and their excellent response to the queries raised by the participants. He informed all the participants that the presentations and recording of the video conference proceedings will be available on SEC's website. He requested the participants to submit suggestions/comments for any further improvement of these video conferences and suggest new topics to SEC. He closed the video conference with a thank you note to everyone attending the Video Conference.

Annexures

Annexure-I

Video Conference Agenda

Video Conference on
"Roadmap for the implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)"

Tuesday, 22 September 2020

1100 – 1105	Introduction
1105 – 1110	Opening Remarks
1110 – 1125	**Draft Roadmap and Activities Conducted by SEC** *Mr. Ahmad Talha, Research Fellow (Technology Transfer), SEC.*
1125 – 1225	**Roadmap for the Implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)** *Mr. Jiwan Acharya, Principal Energy Specialist, Asian Development Bank* *Mr. Subhrajit Datta Ray (Director) and Mr. Sambit Kumar Dash (Associate Director), Power & Utilities, PricewaterhouseCoopers Private Limited, India.*
1225 – 1245	Q & A
1245 – 1315	**Deepening Power System Integration & Cross Border Electricity Trade in SAARC Region: Current Status & Future Outlook** *Mr. Rajiv Ratna Panda, Head Technical, South Asia Regional Initiative for Energy Integration (SARI/EI IRADe).*
1315 – 1330	Q & A
1330 – 1400	**Competitive Wholesale Electricity Market in Pakistan** *Mr. Abrar Hussain, Team Lead Market Design & Development, Central Power Purchasing Agency (CPPA-G), Pakistan.*
1400 – 1415	Q & A
1415 – 1420	Conclusion and Recommendations
1420 – 1430	Closing of Webinar

Information for the participants:

1. All times mentioned in the agenda are according to Pakistan Standard Time (PKT). The participants from other Member States may attend this video conference by following their own national time. The time conversion for all Member States is provided below for reference:

Country	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Sri Lanka
Local time	(PKT-00:30)	(PKT+01:00)	(PKT+01:00)	(PKT+00:30)	PKT	(PKT+00:45)	(PKT+00:30)

2. The participants can ask questions by typing questions under *Questions* tab or clicking the *Raise Hand* option in the Attendees pane of the main window of GoToWebinar application. You may send in your questions at any time during the presentations; we will collect these and address them during the Q&A session at the end of each presentation.

3. All participants can also submit comments/views and/or observations on this event to SAARC Energy Centre through email to Mr. Ahmad Talha, Research Fellow (Technology Transfer) (rftt@saarcenergy.org).

List of Participants

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Annexure-II

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Annexure-II

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Annexure-III

List of Presenters/Resource Persons

S. No.	Name	Designation	Organization	Email address
1.	Mr. Jiwan Acharya	Principal Energy Specialist	Asian Development Bank	jacharya@adb.org
2.	Mr. Subhrajit Datta Ray	Director	PricewaterhouseCoopers Private Limited (PwC), India	subhrajit.datta.ray@pwc.com
3.	Mr. Sambit Kumar Dash	Associate Director	PricewaterhouseCoopers Private Limited (PwC), India	sambit.k.dash@pwc.com
4.	Mr. Rajiv Ratna Panda	Head Technical	SARI/EI IRADe, India	rajivratnapanda@irade.org
5.	Mr. Abrar Hussain	Team Lead Market Design & Development	Central Power Purchasing Agency (CPPA-G), Pakistan	abrar.hussain@cppa.gov.pk

Presentations Delivered During the Video Conference

1. **"Draft Roadmap and Activities Conducted by SEC" by Mr. Ahmad Talha,**
   Research Fellow (Technology Transfer), SAARC Energy Centre.

SAARC ENERGY CENTRE

Energy for Peace & Prosperity

Brief Introduction to SAARC Energy Centre (SEC)

22/09/2020

SAARC Energy Centre

- Establishment: 2006
- Initiate, promote and facilitate cooperation in energy sector of the SAARC Member States for benefit of all
- SAARC Member States; supervised by a Governing Board comprising all the Member States
- Professional staff selected from the SAARC Member States
  Expert services through outsourcing

22/09/2020

SEC Mandate

- → Initiate, coordinate and facilitate regional, joint and collective activities on energy in the SAARC region
- → Provide technical inputs
- → Help in the integration of regional energy strategies by providing relevant information and expertise
- → Be a catalyst for the economic growth and development of the South Asia region

22/09/2020

SAARC ENERGY CENTRE

Energy for Peace & Prosperity

Background of SAARC Framework Agreement on Energy Cooperation

22/09/2020

SAARC Vision on Energy

Domestic energy development and bilateral cooperation alone will not solve power crisis of South Asia.

Engagements have to be multi-lateral

22/09/2020

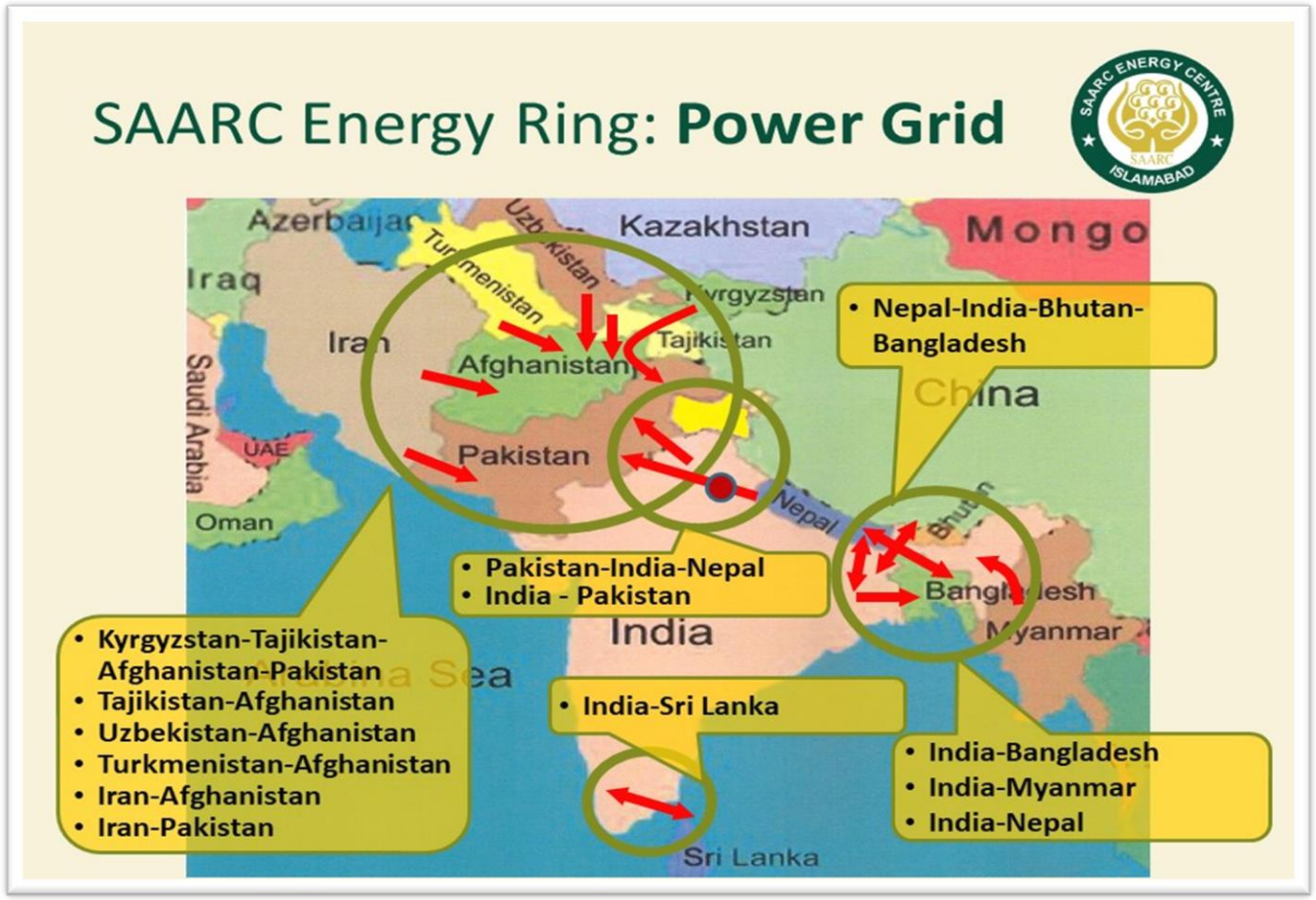
SAARC Energy Ring

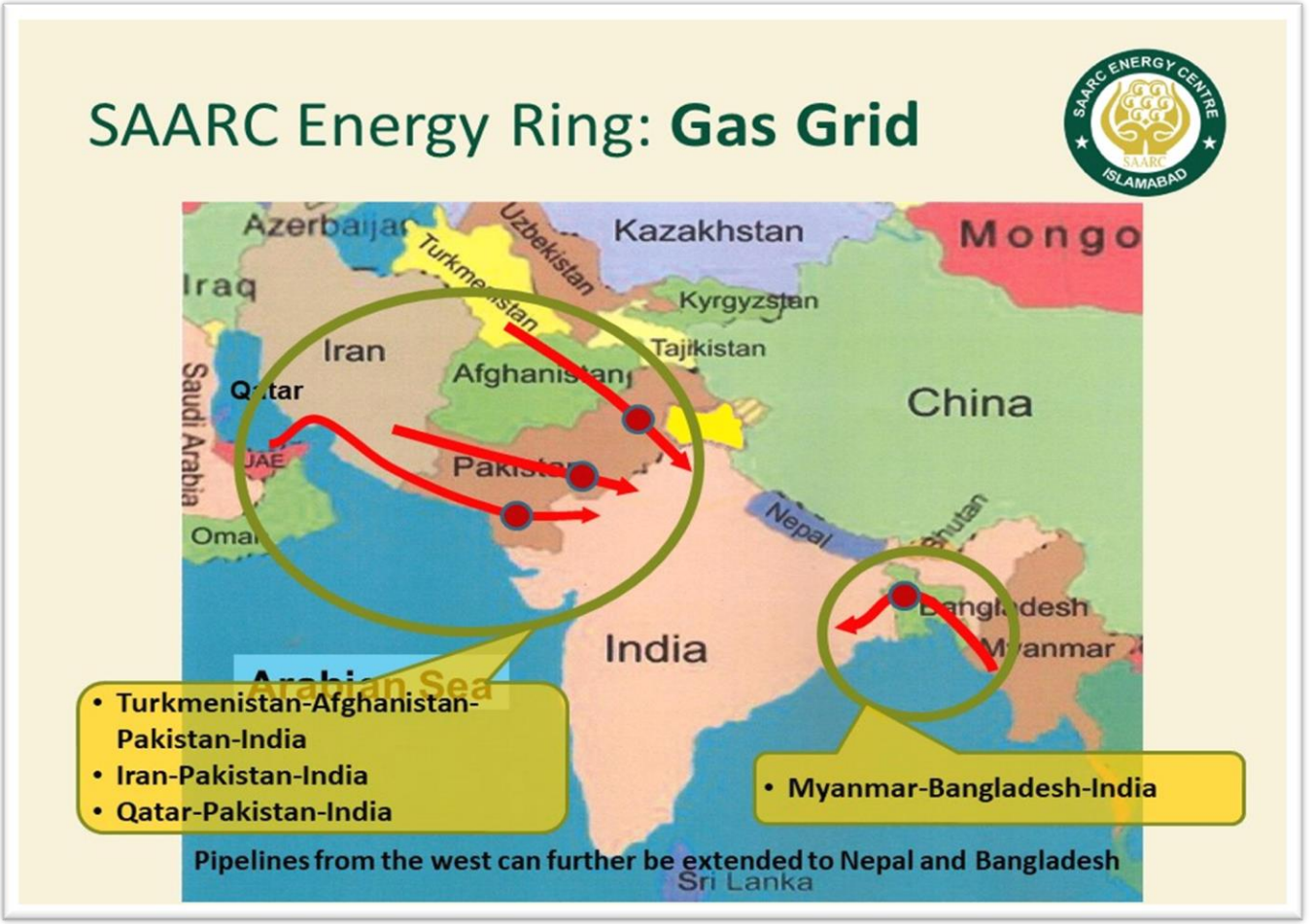
→ **SAARC Energy Ring: Envisioned by the SAARC Leaders at the 12th SAARC Summit in 2004.**

→ Four Inter-governmental Expert Groups engaged to pursue the concept:

- Oil and Gas
- Electricity
- Renewable Energy
- Technology Transfer (including Coal & Energy Efficiency)

22/09/2020


SAARC Energy Ring: Power Grid
SAARC ENERGY CENTRE ISLAMABAD
Azerbaijan
Kazakhstan
Mongo
Iraq
Iran
Afghanistan
Pakistan
China
Saudi Arabia
UAE
Oman
Nepal
India
Sri Lanka
Myanmar
• Nepal-India-Bhutan-Bangladesh
• Pakistan-India-Nepal
• India - Pakistan
• Kyrgyzstan-Tajikistan-Afghanistan-Pakistan
• Tajikistan-Afghanistan
• Uzbekistan-Afghanistan
• Turkmenistan-Afghanistan
• Iran-Afghanistan
• Iran-Pakistan
• India-Sri Lanka
• India-Bangladesh
• India-Myanmar
• India-Nepal


SAARC Energy Ring: Gas Grid
SAARC ENERGY CENTRE ISLAMABAD
Azerbaijan
Kazakhstan
Mongo
Iraq
Iran
Kyrgyzstan
Tajikistan
Saudi Arabia
China
Nepal
India
Sri Lanka
• Turkmenistan-Afghanistan-Pakistan-India
• Iran-Pakistan-India
• Qatar-Pakistan-India
• Myanmar-Bangladesh-India
Pipelines from the west can further be extended to Nepal and Bangladesh

Major Pre-Requisites for SAARC Energy Ring

- Enabling Environment: Harmonization of Regulatory Regimes
- Power Interconnections/ Transmission Lines, Pipelines, Regional Energy Generation
- Establishment and Operation of Regional Power/Gas Market

22/09/2020

SAARC Framework Agreement for Energy Cooperation (Electricity)

→ Signed in November 2014 at the 18th SAARC Summit:

- Unrestricted cross-border trade
- Commercial negotiation of PPAs
- Non-discriminatory open access
- Private sector trading
- Participation in power exchanges

22/09/2020

SAARC Framework Agreement for Energy Cooperation (Electricity)

→ Through this agreement, SAARC Member States have

- **Recognized** the importance of electricity in promoting economic growth and improving the quality of life
- **Realized** the common benefits of cross border electricity exchanges and trade among the Member States leading to optimal utilization of regional electricity generating resources, enhanced grid security, and electricity trade arising from diversity in peak demand and seasonal variations
- **Convinced** of the need to increase economic cooperation and create new opportunities in electricity sector

22/09/2020

SAARC ENERGY CENTRE

Energy for Peace & Prosperity

Draft Roadmap and Relevant Activities of SEC

22/09/2020

SAARC Council of Experts of Energy Regulators (Electricity)

→ The Second Meeting of SAARC Energy Regulators in 2016 recommended the formation of SAARC Council of Experts of Energy Regulators (CEERE) with the help of ADB.

→ Overall aim of the CEERE is to provide enabling regulatory environment for materializing SAARC Energy Ring through implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)

→ As its active member, SEC developed and presented roadmap for CEERE and suggested potential interventions for successful implementation of SAARC Framework Agreement.

22/09/2020

Critical Pre-requisites for Agreement Implementation

A. Ratification of Framework Agreement by the Member States
- Ratification by all the Member States is critical.

B. Enabling Environment for Cross Border Electricity Trade
- Identification of areas where interventions are required
- Referring to the best regional and international practices

C. Capacity Building
- Need assessment
- Explore training opportunities
- Manage financial resources
- Organize training options

Potential Interventions for Enabling Requirements

Undertaken by SEC
Undertaken by ADB

#	Intervention Title	SFA Reference
1.	Study/Action Paper on Assessing the Gaps in CBET related Laws, Regulations, Export/ Import Duties.	**Article 4: Duties and Taxes**
2.	Study to define & adopt minimum set of data/information for operating CBET infrastructure	**Article 5: Data Updating and Sharing**
3.	Workshops for knowledge sharing on unbundling/ modernization of Electricity sector	**Article 6: Promoting Competition**
4.	Establishing SAARC Power Planners Group for integrated operation of CBET Interconnections.	**Article 7: Planning of Cross-border Interconnections**
5	Study on gaps in relevant laws & regulations to build, own, operate & maintain the cross-border transmission & interconnections.	**Article 8: Build, Operate and Maintain the Associated Transmission Systems**

Potential Interventions for Enabling Requirements

Undertaken by SEC
Undertaken by ADB

#	Intervention Title	SFA Reference
6.	Establishing SAARC System Protection Professionals Group for coordinated network protection system to ensure reliably operate interconnected system.	**Article 10: Electricity Grid Protection System**
7.	Study on Gaps in Laws & Regulations pertaining to entering into service agreements with the transmission providers for the purpose of CBET.	**Article 9: Transmission Service Agreements**
8.	Development of coordinated scheduling, dispatch, energy accounting and settlement procedures for reliable operation of inter-connected grid.	**Article 11: System Operation and Settlement Mechanism**
9.	Workshops for knowledge sharing on mechanism and SOPs for open transmission access.	**Article 12: Transmission Access**

Potential Interventions for Enabling Requirements

Undertaken by SEC
Undertaken by ADB

#	Intervention Title	SFA Reference
10.	Workshops for knowledge sharing on regional competitive power market in SAARC member states.	**Article 13: Facilitating Buying and Selling**
11.	An official blog space for each Member State at online Knowledge Sharing Platform on Regional Power Trade. Organizing executive exchange opportunities for SAARC experts and professionals.	Training of Professionals from Afghanistan conducted in 2019
12.	Adopting structure, functions and institutional mechanisms for regulatory regime related to electricity exchange and trade.	**Article 15: Regulatory Mechanism**
13.	Study to develop and adopt a Dispute Settlement Mechanism for resolving disputes on interpretation and/or implementation of framework agreement.	**Article 16: Dispute Settlement**

Studies Conducted by SEC

- ✓ Action Paper on Gaps in Laws, Regulations, Export/Import Duties, etc. with respect to CBET and Exchange of Electricity between Buying & Selling Entities
- ✓ Template for Dispute Settlement Mechanism between Member States
- ✓ Minimum Set of Standardized Technical Data Required for Regional Power Interconnections and Regional Power Trading

Summary of Intervention # 1 (Link)

#	Parameter	Description
1.	SFA Reference	Article 4: Duties and Taxes
2.	Intervention Title	Study/Action Paper on Assessing the Gaps in Laws, Regulations, Export/Import Duties, etc. with respect to Cross Border Electricity Trade (CBET) and Exchange of Electricity between Buying and Selling Entities
3.	Objectives	• Identify, collect and study the current, relevant documents • Study and determine the gaps with respect to initiation of CBET • Suggest critical exemptions for **consideration by the relevant governments**
4.	Deliverables	• Set of existing Laws, Regulations, Export/Import Duties, etc. on CBET • Recommendations for the exemption

Summary of Intervention # 2 (Link)

#	Parameter	Description
1.	SFA Reference	Article 5: Data Updating and Sharing
2.	Intervention Title	Research study for defining and making consensus on minimum set of technical data and information on the electricity sector along with their updating frequency, within the perspectives such as Transmission Planning, Planning of Cross Border Interconnections, Protection Systems, System Operation an Settlement Mechanisms
3.	Objectives	• Identify, collect & study best regional/international practices • Develop a minimum set of technical data to be shared by the Member States, on a periodical basis • **Share, discuss and seek consensus of the defined set of technical data among the Member States**
4.	Deliverables	A set of technical data to be shared by the Member States for enabling CBET

Summary of Intervention # 13 (Link)

#	Parameter	Description
1.	SFA Reference	Article 16: Dispute Settlement
2.	Intervention Title	Developing, Sharing and Seeking Approval by the Member States of a template for Dispute Settlement Mechanism' for amicably resolving any dispute arising out of interpretation and/or implementation of framework agreement
3.	Objectives	Facilitating the Member States aiming at smooth implementation of framework agreement.
4.	Deliverables	A template for Dispute Settlement Mechanism

THANK YOU
FOR YOUR ATTENTION

22/09/2020

"Roadmap for the Implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)" by Mr. Jiwan Acharya[1], Mr. Subhrajit Datta Ray[2], Mr. Sambit Kumar Dash[3]

[1] Principal Energy Specialist, South Asia Energy Division, ADB.

[2]Director, Power & Utilities, PricewaterhouseCoopers Private Limited (PwC), India

[3]Associate Director, Power & Utilities, PricewaterhouseCoopers Private Limited (PwC), India

Roadmap for the implementation of SAARC Framework Agreement on Energy Cooperation (Electricity)

September 2020

Strictly private and confidential

Presented by :
- Jiwan Acharya, Asian Development Bank
- Subhrajit Dutta Ray, PwC
- Sambit Dash, PwC

pwc

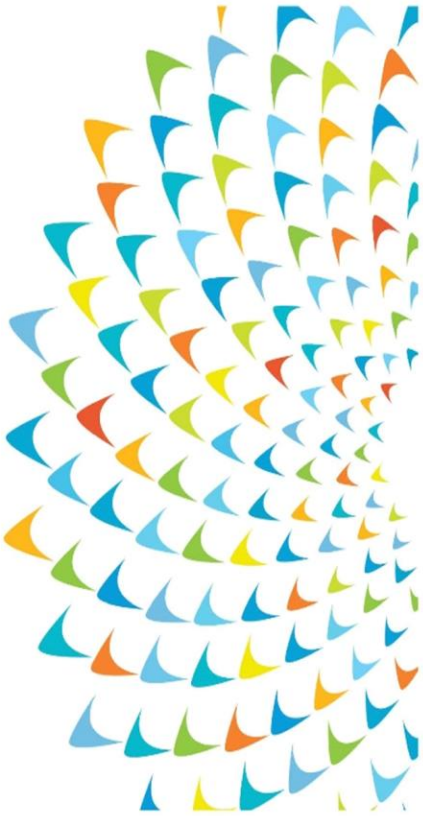
ADB

Contents

Contents

2

ADB Support to promote CBET in South Asia



ADB

Contents

ADB support to promote regional energy cooperation in South Asia

SAARC Regional Energy Trade (SRETS), 2005-2010	Study on South Asia Regional Power Exchange (SARPES), 2011-2013	Study of the SASEC Electricity Transmission Master Plan (SETMAPS), 2014-17
Objective	Objective	Objective
Regional trade and cooperation agreement, roadmap for harmonization of legal & regulatory frameworks Alternative financing mechanisms for regional projects, institutional roles	Green-field interconnection possibilities within SAARC region till 2020, draft market rules for regional power trade and exchange, recommendations for regulatory framework compatibility	Develop the regional cross-border electricity transmission plan Also considered the regional generation plan (conventional and RE) and evacuation requirements

ADB has financed several regional and interconnection projects in South Asia, e.g. the Dagachhu and Nikachhu hydropower projects in Bhutan, India-Bangladesh interconnections, etc.

ADB is also providing support to the SAARC Council of Experts of Energy Regulators (CEERE) on various regulatory coordination issues related to implementation of the SAARC Framework Agreement

ADB

Contents

ADB Regional TA to support SASEC member nations in enhancing power trade in the region

Key Objective: Enhancing regional cooperation in energy sector among the member nations in accordance with the SASEC vision and SASEC operational plan

Activities to be carried out under the TA

Regional Project assessments	Developing a regional master plan	Capacity Building through knowledge sharing workshops	Support CEERE in conducting studies for operationalisation of SAARC Framework Agreement	Regional Framework for Energy Cooperation
Feasibility, costing, safeguards, project benefits	*Update the master plan prepared under SETMAPS*			*Enable members to participate in regional power market*

Progress achieved under the TA

- Work towards signing of Regional Power Trade Framework Agreement for increased regional cooperation among SASEC nations
- Assessment of project development options and preliminary viability analysis of various regional flagship projects
- Knowledge sharing on "Best practices on on Cross-border Electricity Trade and Regulatory Cooperation" in the 3rd and 4th CEERE workshop in Colombo

ADB

Contents

ADB support to facilitating CBET through SASEC Power Trade Working Group (SPTWG)

Objective

Facilitating increased cross border power trade among member countries through development of regional projects and suggest measures to overcome challenges w.r.t multi country power trading

To work in coordination and complement the activities of other groups e.g. SAARC Energy Centre/ SAFIR etc

Key Responsibilities

Assist in mobilizing funds for priority projects	Facilitate discussions among planning agencies, regulators and utilities	Capacity Building & Knowledge Management	Maintain and update SASEC priority projects
- Discussions on project development options - Scouting potential funding sources	- Support in identifying issues with respect to regulatory/policy/ commercial, etc.	- Oversee studies and share best practices on policy, regulatory, technical and commercial/ financial aspects	- Review progress and support in identifying key issues/ challenges

ADB

1 South Asian Power Sector Overview

South Asian Power Sector Overview

September 2020
7

Contents

Opportunities to leverage complementarities in SAARC power sector through regional cooperation

SAARC Power Sector Scenario

Countries	Installed Capacity (MW)	Peak Demand (MW)	Per Capita Electricity Consumption (kWh)	Power Import (MW)	Power Export (MW)
Afghanistan	520	600	149	-	-
Bangladesh	21,000	14,500	336	1,160	-
Bhutan	2,326	400	2,976	-	~2,300
India	3,63,000	1,78,000	1,208	~2,300	~1,660
Maldives	400	-	725	-	-
Nepal	1,177	1,320	190	~500-520	-
Pakistan	36,010	25,000	435	1,000	-
Sri Lanka	4,103	2,616	658	-	-

- Wide variety of generation sources across the sub-region
- Dominance of single energy source for power generation in most of the member countries
- Cost of generation and supply widely varies across the SA nations with countries like Nepal & Bhutan having access to cheap hydro power and India having access to abundant renewable energy
- Member nations have time (peak/offpeak) and seasonal complementarities which may be leveraged through regional co operation
- Scope for channelizing revenue from power export for socio-economic development
- Scope for reducing carbon footprint (increasing RE penetration) - opportunity to support fluctuation from RE with traditional sources

Need for a regional framework agreement to develop energy resources ,meeting electricity demand and enhanced economic benefits for the SAARC region

8

Contents

SAARC Framework Agreement for Energy Co-operation(Electricity)

SAARC Framework Agreement for Energy Cooperation (Electricity) was first signed in 2014 at the 18th SAARC Meeting .The member nations are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka

Objective: Enable cross-border trade of electricity on voluntary basis subject to the laws, rules and regulations of the respective Member States

Salient Features of the SAARC Framework Agreement

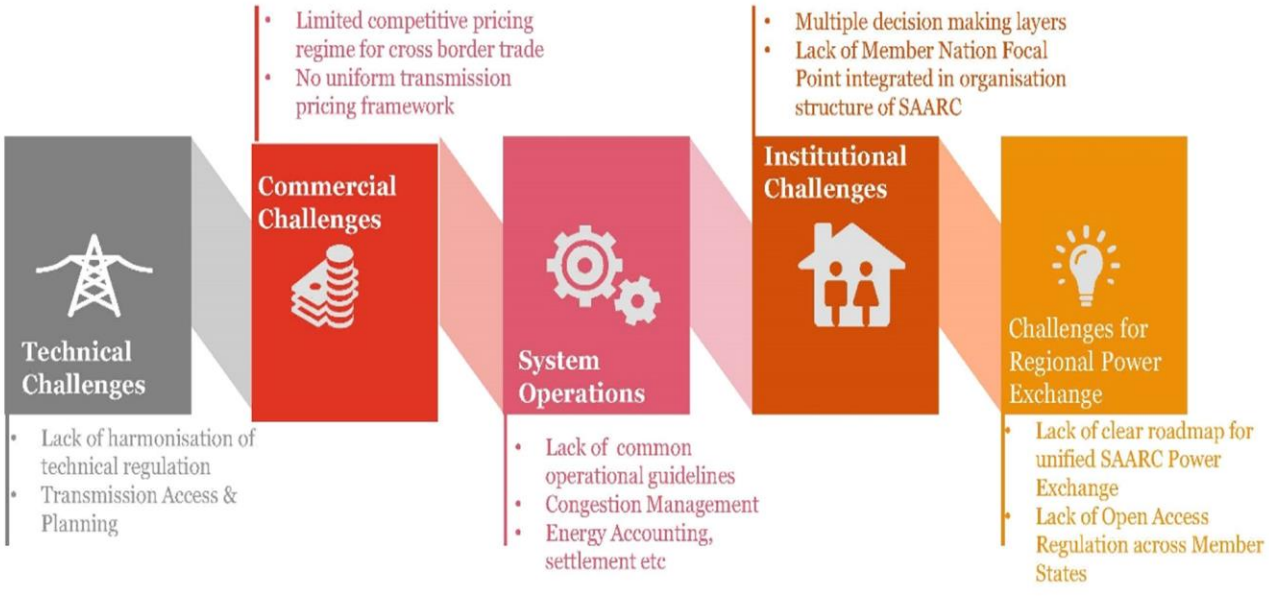
Non-discriminatory access to transmission grids for the purpose of CBET	International coordination in transmission interconnection planning, system operations, and energy accounting	Promotion of information sharing between Member States	Encouraging member states to undertake power sector reforms in their respective jurisdictions, to promote competition	Member states to develop structure functions and institutional mechanisms to resolve regulatory issues

- **SAARC Framework Agreement has been ratified by all member states except Pakistan**
- **Multilateral/trilateral trade is yet to be established among SAARC member nations**

9

Contents

Barrier and Challenges for implementation of framework agreement for CBET



10

Technical Challenges

Existing Issues/Challenges among SAARC nations 1/3

1 Technical Challenges

SAARC Framework Agreement	Current Status	Challenges
Article 7 Planning of Cross-border interconnections: Enable the transmission planning agencies of the Governments to plan the cross-border grid interconnections through mutual agreements between the concerned states Article 8: Build, Operate and Maintain: Enable the respective transmission agencies to build, own, operate and maintain the associated transmission system of cross-border interconnection falling within respective national boundaries	• Currently only Bilateral transmission arrangements exist • There is lack of regional transmission planning and project implementation to optimize investments on a regional level • National institutions drives development of inter-connections • Cross border inter-connections planned on a case-to-case basis	No guidelines available in transmission planning for trilateral/multi country power trade No guidelines or clarity for cross country investment Absence of a regional transmission master plan

Contents

Existing Issues/Challenges among SAARC nations 2/3

1 Technical Challenges

SAARC Framework Agreement	Current Status	Challenges
Article 10: Electricity Grid Protection System Enable joint development of coordinated network protection systems incidental to the cross-border interconnection	No common grid code or network regulation. Each country guided by its national electricity laws/policies	Absence of harmonisation may lead to difficulties in system operation with proposed significant increase in power trade
Article 12:Transmission Access Enable non discriminatory access to the respective transmission grids as per the applicable laws, rules, regulations and applicable inter-governmental bilateral trade agreements.	• Apart from India, open access framework is not operationalized in other SAC • No open access required for power export for IND-NEP and IND-BAN as Nepal, Bangladesh are buyers. • Bhutan has dedicated transmission lines for export of power	Lack of open access regulation in SA countries will hinder access of transmission and distribution infrastructure to facilitate CBET

13

Contents

Technical Framework for regional cooperation in GMS region

GMS program was started in 1992 with assistance of ADB

RPTCC established as per Article 4 of the IGA signed in 2002

RPTOA, drafted by the RPTCC was approved in 2005

Working Groups established under RPTCC for project and market development aspects

Key Achievements till Date

- Roadmap on transmission pricing methodologies
- Technical assistance to countries on regulatory issues, i.e. transmission company, system operation, wheeling charges, etc.
- GMS performance standards adopted as a reference document in June 2016
- Regional transmission regulations adopted as reference document in Dec 2017
- Work in progress
  - Standard regional metering and communication arrangements
  - GMS Grid Code
  - Regional master plan and FS for priority interconnectors

14

Contents

Existing Issues/Challenges among SAARC nations 3/3

Addressing technical Challenges-Way forward

1	Harmonisation of Regulatory framework and grid networks	✓ Recognition of Cross Border Trade in each country's laws and regulations ✓ Introducing clarity in regulations for promoting cross country investments for the much needed infrastructure ✓ Formulation of Common Grid Code covering connection arrangements, operating parameters and scheduling /dispatching code etc. initially starting with partial adoption by member states and subsequently modification of national grid codes and move towards a full adoption
2	Open Access	✓ Introduction of open access in the legislative framework of nations where it does not exist ✓ Treatment of open access for cross border power trade ✓ Define features and eligibility criteria for connectivity and open access (types of open access, tenure and priority of open access) ✓ Fixation of Open access charges ✓ Procedure for grant of connectivity of open access including details of nodal agencies, processing timelines etc ✓ Establishing the operational and commercial mechanisms
3	Creation of Regional Transmission Infrastructure Plan	✓ Formulation of a coordinated Regional Planning for the development of infrastructure under various project development regimes ✓ Development of a regional coordination mechanism of planners for synergistic development of national vis-à-vis regional specific infrastructure ✓ Development of National Transmission Plan to include details of CBET transmission infrastructure

15

3 Commercial Challenges

Commercial Challenges

September 2020

16

Contents

Existing Issues/Challenges among SAARC nations

2 Commercial Challenges

SAARC Framework Agreement	Current Status	Issues/Challenges
Article 3 Scope Member States may enable Buying and Selling Entities to negotiate the terms, conditions, payment security mechanism and tenure of electricity trade under the Government regulatory mechanisms of the concerned states Article 9: Transmission Service Agreements Member nations may facilitate entities to enter into TSA with transmission service Provider	▪ For projects developed under Inter-Governmental Agreement, the tariff is determined through G to G negotiations ▪ Gradual evolution from G-G to commercial CBET (~30% of the power trade) ▪ Transmission pricing currently governed by bilateral TSA. ▪ Transmission pricing involving Indian & interconnected grid is done as per CERC regulations	• Along with the prevalent G2G model for power sale, there is need for more commercial focus and competitive price discovery • Need of standard framework for Transmission Charges/ Pricing • Need for development of model/standard TSA • Need for framing uniform guiding principles on transmission cost sharing /transit fee arrangement

17

Contents

Existing Issues/Challenges among SAARC nations 3/3

Addressing Commercial Challenges-Way forward

1	Competitive Pricing Discovery	✓ Gradual transition from G-G bilateral arrangements to more competitive market driven arrangements ✓ Promotion of power trade through exchanges to improve price discovery and improve transparency
2	Common Norms for transmission pricing, payment security, and other commercial terms	✓ Setting up principles and mechanism for determination of economically efficient transmission pricing mechanism and gradually introduce concept of local specific pricing ✓ Evolution of an appropriate transit fee mechanism with a possible start using cost plus principles

International Example: GMS

- Presently transmission methodology varies across countries; in case of using third country network wheeling charge for that country as well as system loss to be recovered through end tariff. RPTCC under GMS Secretariat presently working on **common CBET transmission pricing methodology**
- Methodologies agreed to enhance present postal stamp method prevalent in some countries of Greater Mekong Region for transmission pricing are
  - Differentiation of charge by time of year to reflect hydrological variations
  - Differentiation of charges by capacity and energy,
  - Introduction of charges to generators and consumers
- **Electricity Tariff** for power export and **wheeling charge** is determined as per bilateral PPAs. **Cost plus model** is used for determination of tariff

18

System Operation Challenges

Existing Issues/Challenges among SAARC nations

3 *System Operation Challenges*

SAARC Framework Agreement	Current Status (As-Is)	Challenges
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 inter-connected grids and to prepare scheduling, dispatch, energy accounting and settlement procedures for cross border trade.	Schedule and Dispatch • The National System Operators (NSO) are involved in each transaction for scheduling & despatch related activities	▪ Different procedures and timelines of different NSOs may creates issues in cross border transaction of power
	Energy Accounting & Settlement Actual energy data is used for billing of variable charges (fuel cost of generation) in all SAC except India. In India, billing of variable charges is based on Scheduled Energy	▪ Lack of common procedure in energy accounting and settlement may lead to lack of transparency
	Congestion Management In many SACs, congestion in transmission system is typically managed either by generation or load control. There is no specific provision detailed for congestion management in respective Grid Codes	▪ In the absence of a regional commercial mechanism for Congestion planning in advance, many times curtailment in transaction take place in CBET

Existing Issues/Challenges among SAARC nations

Addressing System operation Challenges-Way forward

Scheduling & Dispatch	Energy Accounting	Congestion Management
Formulation of common grid code to standardize operation and scheduling with pre defined timelines	• In case of multiple transmission interconnection points, it is envisaged that scheduling would be carried out separately for each transmission link through a defined procedure • A separate commercial mechanism for imbalance settlement may be established	Feasibility of implementing a commercial mechanism may be explored wherein, users causing congestion pay penalty and users relieving congestion receive incentive at predetermined rate

International Example: South African Power Pool

- Operating guidelines for SAPP issued in 2012. The areas covered are:
- System control: *Generation/ voltage/ time & freq. control, equipment*
- System security: *Active/ reactive supply, relay coordination, connection & operation of IPPs*
- Emergency operation protocol: *Over/ under generation, load surge, load shedding, system restoration,*
- Operating personnel: *Responsibility, training*
- Operations planning: *Normal, short/ long term emergency*
- Telecommunications: *Facility, controller*

Institutional Challenges

Contents

Institutional Challenges amongst SAARC Nations
Current Status and Challenges

SAARC Framework Agreement	Current Status
Article 15: Regulatory Mechanisms Member States shall develop the structure, functions and institutional mechanisms to resolve regulatory issues related to electricity exchange and trade Article 16: Dispute Settlement Dispute arising out of interpretation and/or implementation of this Agreement shall be resolved amicably among the Member States. If unresolved, the Member States may choose to refer the dispute to the SAARC Arbitration Council	• Institutional structure of SAARC includes 7 layered organs • SAARC Summits is the apex body governing the decision making • Council of ministers from member states formulate and ratify the policies, regulations etc. • Third layer is Standing Committee of Foreign secretaries responsible for approvals and overall monitoring and coordination • The last 4 layers are responsible for implementation, monitoring and evaluation with allocation in a vertically hierarchical order

Challenges

- **Multiple layer operations and governance system prolonging the decision making and implementation process**
- **Absence of Nodal Points from each member nation embedded in the organisational structure of SAARC**

23

Contents

Institutional Challenges amongst SAARC Nations
As-is Situation of the SAARC Institional Structure

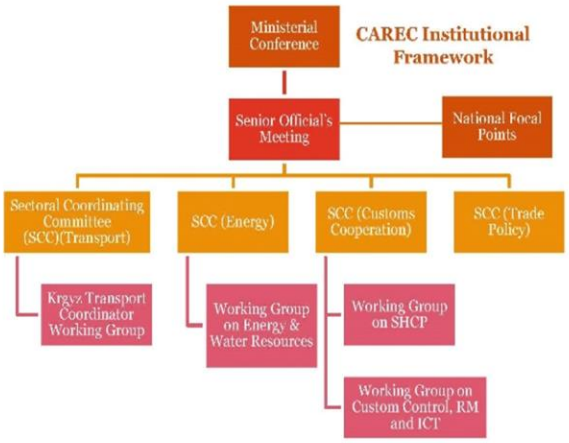
Order	Principal Organ	Key Features	Roles and Responsibilities
1	**SAARC Summits**	▪ Meetings of the Heads of State or Government of Member States ▪ Held biennially hosted by a Member State in alphabetical order	▪ Declaration consisting of decisions and directives ▪ Approval of reports of the Council of Ministers
2	**Council of Ministers**	▪ Comprises Ministers of Foreign /External Affairs of the Member States ▪ CoM meetings conducted before the Summit and between two Summits ▪ CoM reports submitted to meeting of Heads of State or Government	▪ Formulation of policies of the Association ▪ Review of progress of cooperation under SAARC ▪ Establishment of additional mechanism under SAARC
3	**Standing Committees**	▪ Comprises of the Foreign Secretaries of the SAARC Member States ▪ Standing Committee can meet ad hoc basis ▪ Conducted during Summit for CoM is convened in between two Summits	▪ Overall monitoring and coordination of programme ▪ Approval of projects and programmes and mobilize resources ▪ Determination of inter-sectoral priorities
4	**Programming Committees**	▪ Comprising of the Heads of SAARC Divisions of Member States ▪ Meets prior to the meetings of the Standing Committee	▪ Considers the Calendar of Activities ▪ Administrative and Financial Matters of the Secretariat
5	**Technical Committees**	▪ Comprises of 6 Technical Committees for SAARC activities ▪ Work on their respective areas to provide support to SAARC activities	▪ Implementation, coordination and monitoring of programmes ▪ Formulation of programmes and preparation of projects
6	**Working Groups**	▪ Carry out the directives emanating from SAARC higher bodies ▪ Comprises of 4 Working Groups	▪ Formulate and over see programmes and activities ▪ Coordinate, monitor and evaluate programmes
7	**Action Committees**	▪ Comprising of Member States concerned with the implementation of projects involving more than 2 but not all Members	▪ Support in the implementation of project as a support to WG

24

Contents

Benchmarking with Other Regional Body from Asia

CAREC has relatively flatter and shorter hierarchy with only 4 layers of decision making bodies or organs which can facilitate expeditious resolutions and approvals



Body	Scope of Work
Ministerial Conference	▪ Provide overall strategic guidance to the process of economic cooperation in the Central Asia Region ▪ Decide on new regional initiatives (involving two or more nations)
Senior Officials Meeting	▪ Effective implementation of the policy decision made by Ministerial Level Conference (MLC) by reviewing and articulating issues ▪ Making relevant recommendations and assessing issues
Sectoral Coordination Committee	▪ Set-up on an ad-hoc basis as determined by the MLC to coordinate sector wide issues, activities including plans for sector development. ▪ Works in close coordinate with National Focal Point
Working Groups	▪ Project specific working groups to facilitate the preparation, implementation, monitoring and progress
Focal Point	▪ Member nation designated point of contact responsible for coordination amongst concerned govt. agencies and other parties

Way Forward

- Learnings can be taken from other international cases to simplify and flatten the hierarchy to expedite the decision making process
- Introduction of an additional external body viz. the nodal focal point from all the member nations which can act as single contact point for all coordination, monitoring, oversight and decision making purposes for pertinent project nations
- Structured institutional mechanisms/committees/forums at the level of regulators,planning authorities etc

25

6 Challenges in Regional Power Exchange

Challenges in Regional Power Exchange

September 2020

26

Contents

Regional Power Market Challenges amongst SAARC Nations

Existing Cross Border Power Trade between member nations

Existing Bilateral Trade

India → Bangladesh (1160 MW)

Source	Type	Trader	Tenure
250 MW NTPC	G-G	NVVNL	25 years
250 MW Market	Comml	PTC	3 years
160 MW Tripura	G-G	NVVNL	5 years
500 MW Market	Comml	NVVNL Sembcorp	15 years
40 MW Market	Comml	PTC	2 years

Bhutan → India (2260 MW)

Capacity*/Source	Type	Trader	Tenure
1020 MW Tala	G-G	PTC	35 years
336 MW Chhukha	G-G	PTC	
60 MW Kurichhu	G-G	PTC	
126 MW Dagachhu	Comml	TPTCL	25 years
720 MW Mangdechhu	G-G	PTC	35 years

India → Nepal (500-520 MW)

Source	Type	Trader	Tenure
237 MW India	G-G	-	Long Term Contract
80-120 MW Market	Comml	PTC/NVVN	-
160 MW Market	Comml	NVVN	Renewed every year

Afghanistan → Pakistan (CASA - Project-1000 MW)

Source	Type	Trader	Tenure
Afghanistan → Pakistan (1000 MW)	CASA Project	Bilateral	Yet to commence

Emerging Trilateral Trade

900 MW Upper Karnali HPP

The Cabinet Committee on Public Purchase (CCPP) in Bangladesh has approved a proposal for importing about **500 MW electricity from the proposed 900 MW Upper Karnali Hydroelectricity Project being developed by GMR in Nepal.**

1125 MW Dorjilung Project

Bhutan, Bangladesh and India intend to propose 1125 MW Dorjilung project as a trilateral project . The DPR of the project has been approved by RGoB. Transmission interconnectivity options between Bhutan and Bangladesh through India is being currently explored

Bangladesh PSMP 2016

Bangladesh proposes to import >5 GW of hydropower from Bhutan, Nepal and Myanmar

27

Contents

Regional Power Market Challenges amongst SAARC Nations...(1/2)

Current State of Affairs to Progress towards Regional Power Market

SAARC Framework Agreement

Article 15: Regulatory Mechanisms
Member States shall develop the structure, functions and institutional mechanisms to resolve regulatory issues related to electricity exchange and trade

Article 16: 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 inter-connected grids and to prepare scheduling, dispatch, energy accounting and settlement procedures for cross border trade.

Current Status (As-Is)

Phase – I (Bilateral Power Trade)

This phase aims at establishing bilateral trade connections between member nations. Currently most of the CBET ties amongst SAARC nations is in Phase-I

Phase-II (Trilateral Power Trade)

This phase is gradual progress towards Trilateral/Quadrilateral connections to establish trilateral market setup in the region. SA region is slowly transitioning towards trilateral trade with joint initiatives e.g. GMR Upper Karnali Project, Dorjilung Hydro Power Project

Potential Status (To-Be)

Phase – III (Sub Regional Power Market)

The subsequent phase post trilateral market ties would be development of sub regional grids & sub-regional power markets which would lead to formation of clustered market within regions sharing common operating and technical standards

Phase – IV (Harmonized Regional Power Market)

Final phase is unification of sub-regional power markets or sub-regional clusters and formation of an integrated grid and common market pool with harmonised grid standards

28

Contents

Regional Power Market Challenges amongst SAARC Nations...(2/2)

Current State of Affairs to Progress towards Regional Power Market

Challenges	Way Ahead
Lack of clear roadmap for governing the transition of CBET from Bilateral to Trilateral/Multilateral	• Development of a comprehensive roadmap for the phase wise transition of the bilateral trade to trilateral and conclusively multilateral trade system • Development of a robust strategy for inclusion of nearly all the member nations to the PXs platform • Development of planning for the adoption of open access regime by all member nations
Lack of strategy for the progress of the Regional Power Exchange with involvement of more than four member nations i.e. beyond BBIN	
Lack of Open Access Regulation across Member Nations	

Regional Power Market Potential

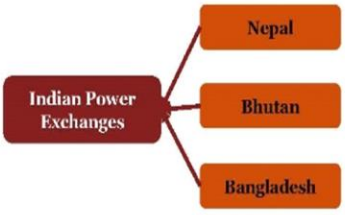
Option	Regional Power Exchange PXs offers a platform for multilateral Cross Border Electricity Trade facilitating an opportunity to leverage the generation of generation assets across SAARC Region
Value Proposition	Considering the electricity demand has diversity on seasonal, monthly, weekly and even daily level, PXs can play a transformational role to provide electricity at a fair, transparent and neutral platform with competitive price discovery
Regional Driver	Progressive regional power market initiatives to drive regional power market growth viz. Bangladesh having green power (hydro) power import from Bhutan-Nepal, trilateral power agreements (Bhutan-India-Nepal) etc.
Progress	In the SAARC region, India is currently playing a catalytic role by taking preliminary steps towards the development of Regional Power Exchange. Introduction RTM market and establishing rules and regulations allowing participation of other SA nations.

29

Contents

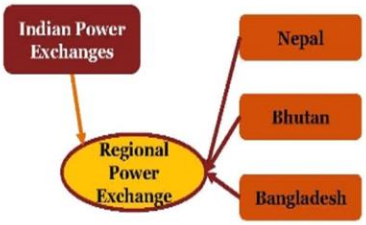
Potential Options of the Cross Border Trade of Electricity (CBTE) in SAARC Region

Option 1: Extend operations of established Power Exchanges in India



- Create separate bid area for each SAARC Member nation or include member nations in nearby existing bid area depending upon technical feasibility
- To begin with, include member nations having existing grid connectivity;
- Subsequently add other members as and when they get connected with Indian grid

Option 2: Set-up Regional Power Exchange



- Creation of a Regional Power exchange viz. Regional PXs where South Asian Nations can participate
- Regional PXs can receive bids from member nations and, depending upon technical feasibility, it can receive either separate direct bids from Indian sellers and buyers or only uncleared buy bids and sell bids from Indian PXs

Proactive Initiatives to facilitate CBTE

MoP Guidelines for Import/Export (Cross Border) of Electricity (2018)

- Import/export of electricity between India and neighboring countries possible through bilateral agreement, bidding route or mutual agreement route.
- Import/Export through bilateral agreement between two countries, the Government of India may designate an Entity for import/export of power
- Disputes involving multiple Entities of separate countries can be settled through the International Arbitration Centre

CEA Draft Conduct of Business Rules of Designated Authority for CBTE (2019)

- Indian entities trading in DAM in PXs will not require any approval from designated authority
- Approval from designated authority not necessary if import/export is taking place under the Inter Govt. Agreement signed by India and neighboring country for specific projects

CERC Cross Border Trade of Electricity Regulations, 2019

- Sale and purchase of power between India and neighbouring countries allowed under bilateral agreement, bidding route or mutual agreement
- Electricity trading licensee of India may trade in Indian PXs on behalf of entity of the SA nation by obtaining approval from MoP designated agency

30

7 Conclusion

Conclusion

September 2020
31

Contents

Conclusion and Way forward

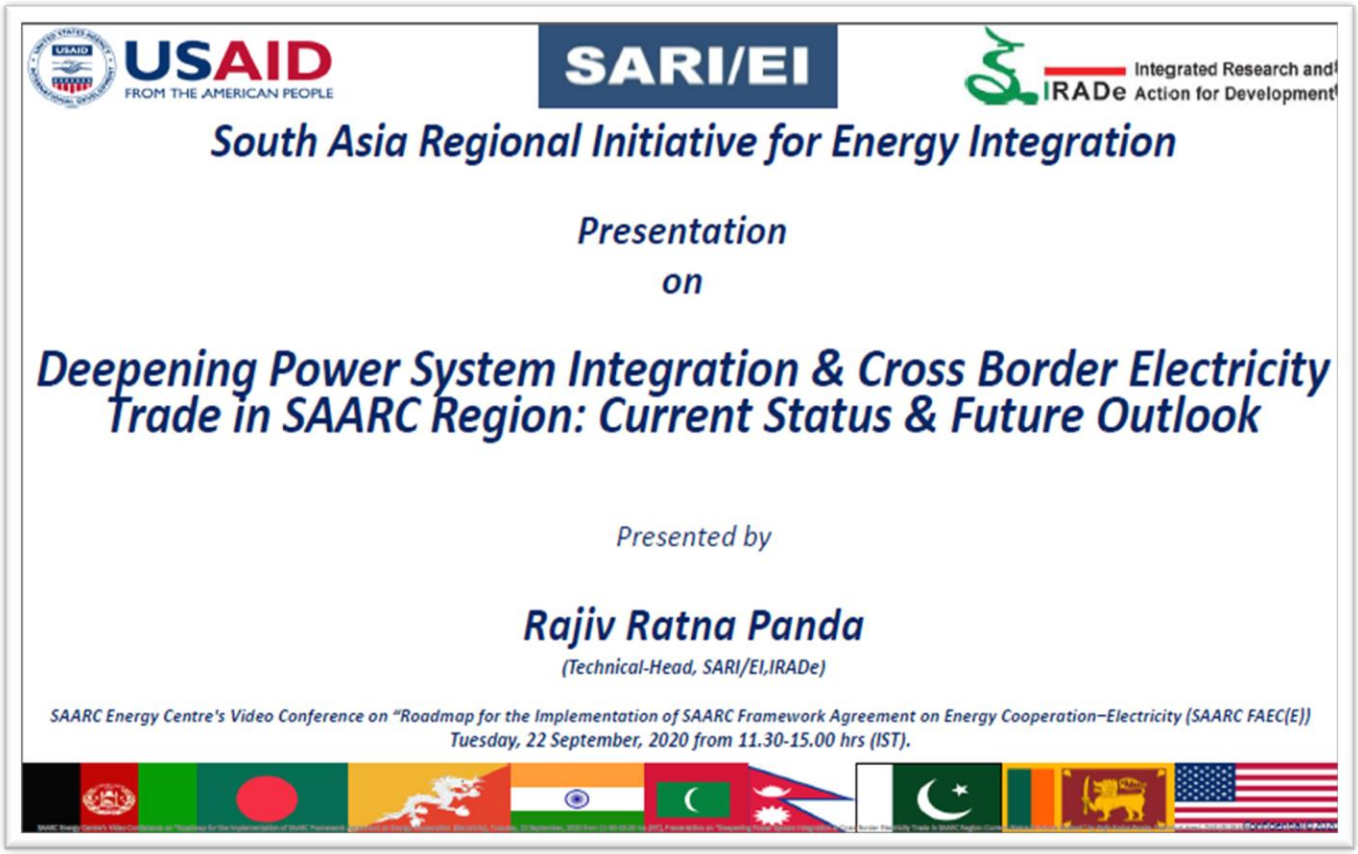
- Transitioning from Bilateral to Trilateral and conclusively to Multilateral CBET in South Asian Region
- Deepening CBET leads to Clean Energy Transition and Sustainability, Climate Change Mitigation
- Focus on power market development including ancillary services (establishment of regional PX)
- De-risking CBET infrastructure Projects, Enhancing Bankability of Projects, Investment Mobilisation
- Need to strengthen the process of Policy and Regulatory Harmonisation and Institutional Capacity

32

Thank you

2. **"Deepening Power System Integration & Cross Border Electricity Trade in SAARC Region: Current Status & Future Outlook" by Mr. Rajiv Ratna Panda,**

Head Technical, South Asia Regional Initiative for Energy Integration (SARI/EI IRADe).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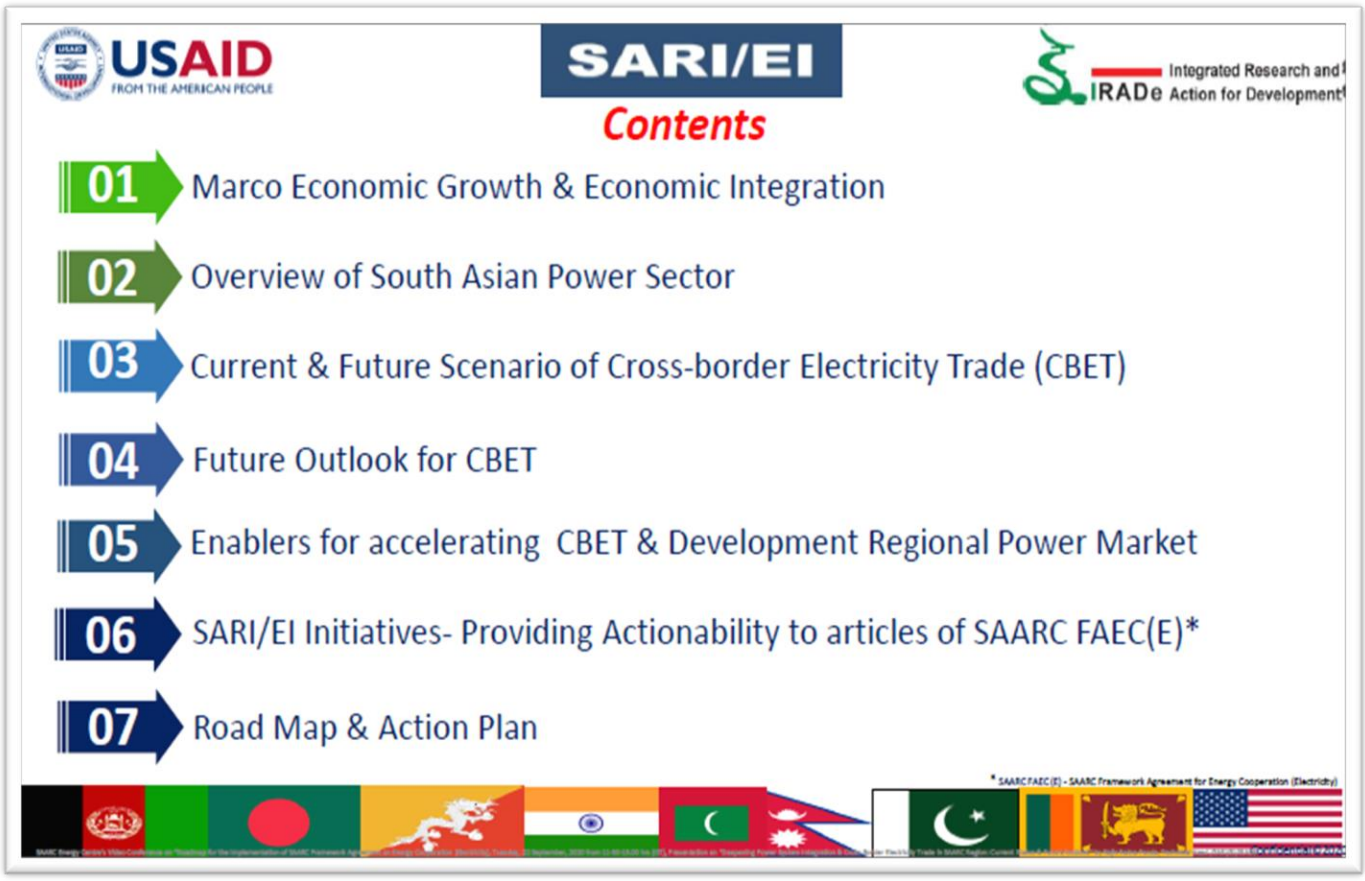
South Asia Regional Initiative for Energy Integration
Presentation
on
Deepening Power System Integration & Cross Border Electricity Trade in SAARC Region: Current Status & Future Outlook
Presented by
Rajiv Ratna Panda
(Technical-Head, SARI/EI,IRADe)
SAARC Energy Centre's Video Conference on "Roadmap for the Implementation of SAARC Framework Agreement on Energy Cooperation–Electricity (SAARC FAEC(E))
Tuesday, 22 September, 2020 from 11.30-15.00 hrs (IST).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IRADe Action for Development
Contents
01 Marco Economic Growth & Economic Integration
02 Overview of South Asian Power Sector
03 Current & Future Scenario of Cross-border Electricity Trade (CBET)
04 Future Outlook for CBET
05 Enablers for accelerating CBET & Development Regional Power Market
06 SARI/EI Initiatives- Providing Actionability to articles of SAARC FAEC(E)*
07 Road Map & Action Plan
* SAARC FAEC (E) - SAARC Framework Agreement for Energy Cooperation (Electricity)


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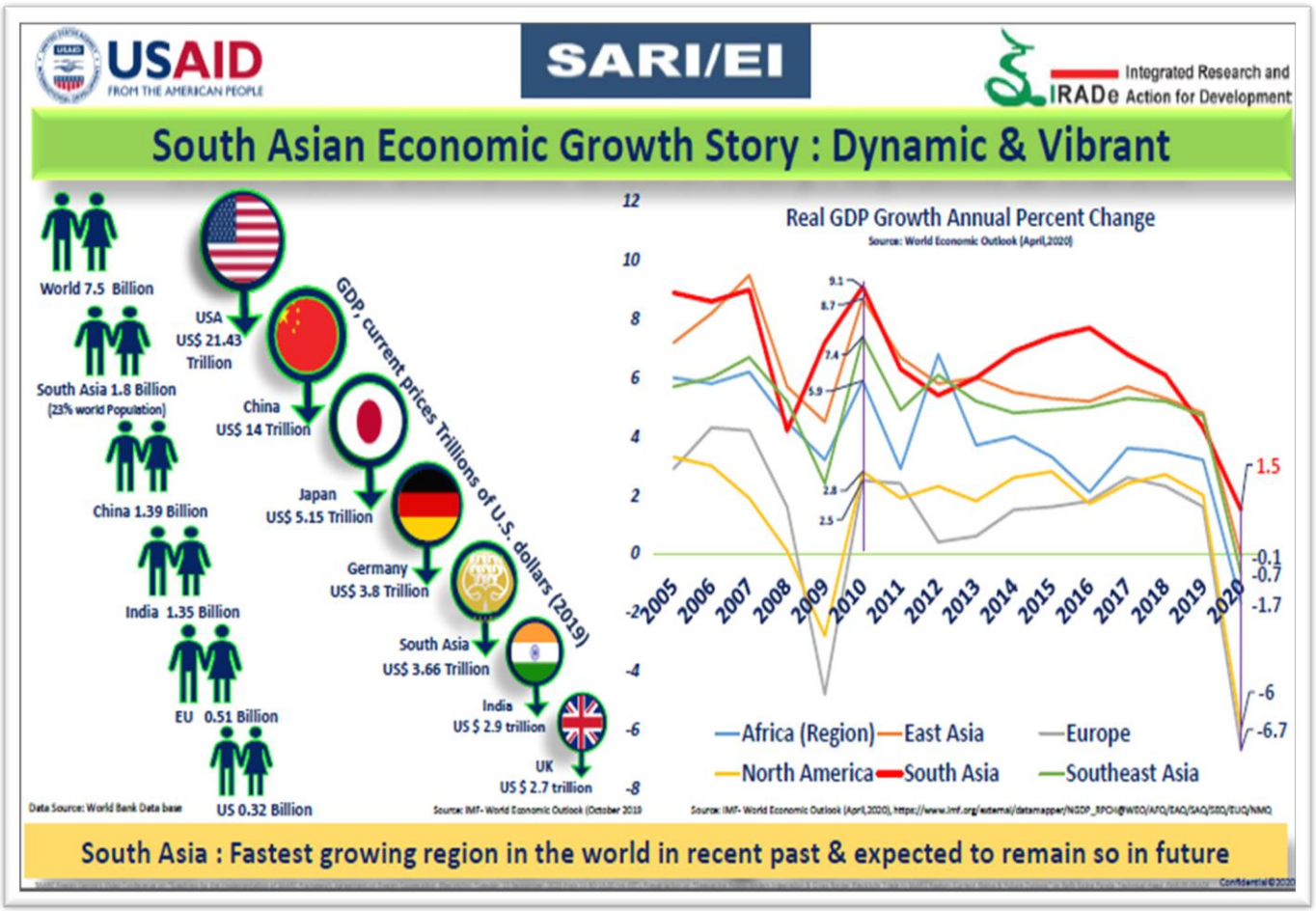
Marco-Economic Growth
&
Economic Integration of South Asia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South Asian Economic Growth Story : Dynamic & Vibrant
World 7.5 Billion
South Asia 1.8 Billion
(23% world Population)
China 1.39 Billion
India 1.35 Billion
EU 0.51 Billion
US 0.32 Billion
USA US$ 21.43 Trillion
China US$ 14 Trillion
Japan US$ 5.15 Trillion
Germany US$ 3.8 Trillion
South Asia US$ 3.66 Trillion
India US $ 2.9 trillion
UK US $ 2.7 trillion
GDP, current prices Trillions of U.S. dollars (2019)
Data Source: World Bank Data base
Source: IMF- World Economic Outlook (October 2019
Real GDP Growth Annual Percent Change
Source: World Economic Outlook (April,2020)
Africa (Region)
East Asia
Europe
North America
South Asia
Southeast Asia
South Asia : Fastest growing region in the world in recent past & expected to remain so in future

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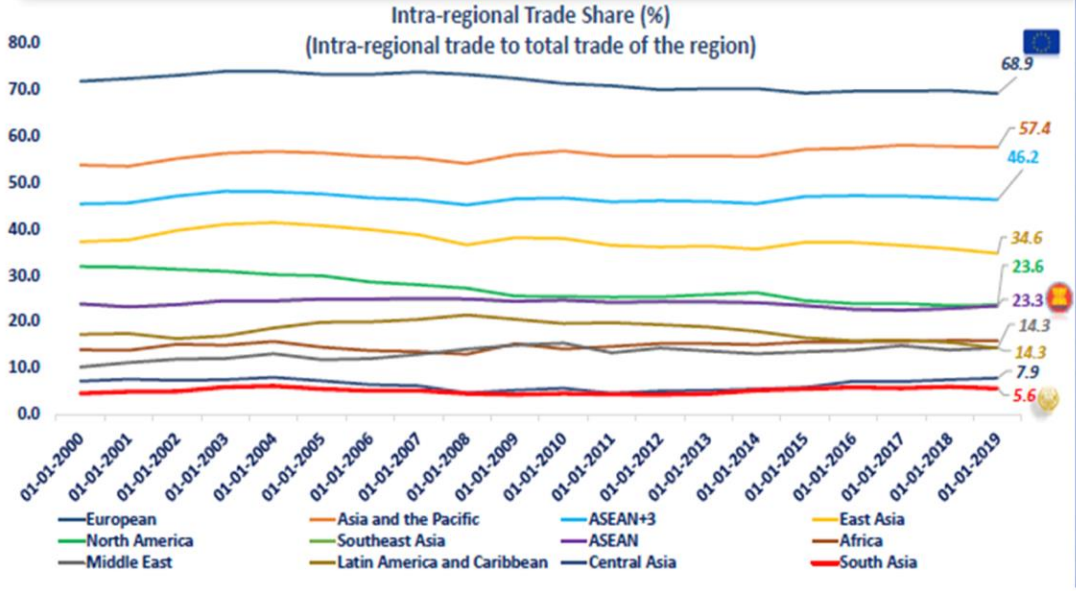
South Asia : Yet Least Integrated



Region	Intra-regional Trade Share (%) 2019
European	68.92
Asia & the Pacific	57.36
ASEAN+3	46.17
East Asia	34.61
North America	23.56
Southeast Asia	23.37
ASEAN	23.34
Africa	15.88
Middle East	14.34
Latin America & Caribbean	14.26
Central Asia	7.87
South Asia	5.59

Source: The Integration Indicators Database. https://aric.adb.org/database/integration ASEAN+3 consists of the 10 ASEAN member economies, the People's Republic of China (including Hong Kong, China), Japan, and the Republic of Korea.

5

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Overview of South Asian Power System

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South Asia Power System-Snapshot

Afghanistan
#Very small power system (~.6 GW)
#High Electricity Imports high
#Hydro and Oil Dominated

Bangladesh
#Mid size power system (~23 GW)
#High gas dependence
#Resource Crunch

Bhutan
#Small power system (~2.3 GW)
#Large Exporter of hydro power
#Champion of Hydro CBET in SA.

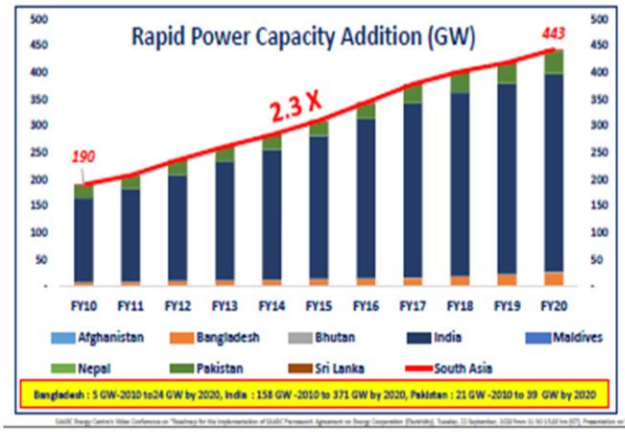
India
#Very Large System (~371 GW)
#Coal Dominated, RE -133 GW
Central to CBET in SA
Competitive Power Market (Only in SA)

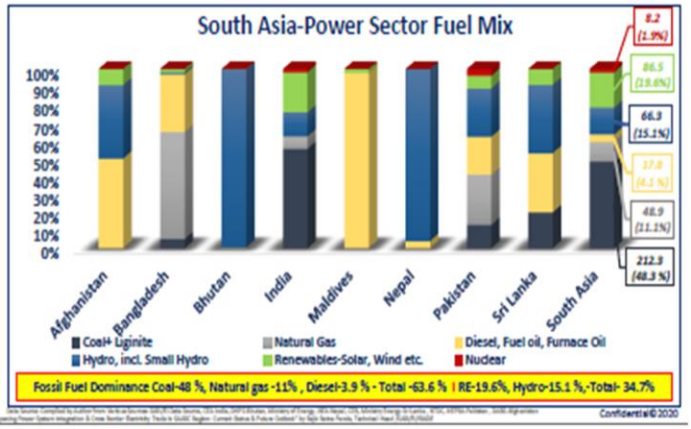
Maldives
#Fragmented & very small power systems (~.4 GW)
#Oil, Diesel dependent, Islands, Limited possibility of interconnection

Nepal
#Very Small power system (1.3 GW)
#Under utilized hydro (82 GW)
#Net importer of electricity now but potential to export in future

Pakistan
#Mid sized (39 GW) power system
#Gas and Oil dependent.

Sri Lanka
#Small power system (~4 GW)
Hydro and oil dominated
High Peak –off peak differential





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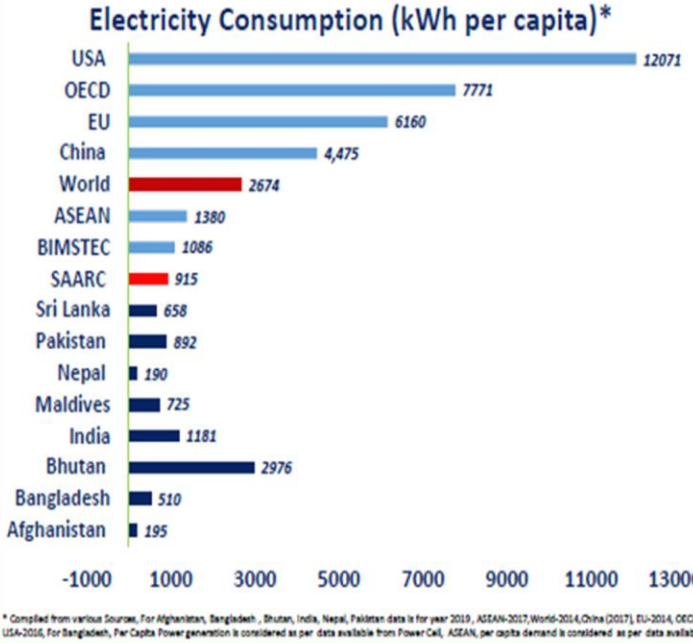
Yet Challenges Remain



Sustainability Ranking -The Sustainable Development Report 2020

Country	2020 SDG Index Score	2020 SDG Index Rank	SDG-7: Affordable & Clean Energy	SDG 7 :Trend- Affordable & Clean Energy	SDG-6 : Clean Water and Sanitation	SDG-6-Trend- : Clean Water and Sanitation
Bhutan	69.27	80	yellow	↗	red	↗
Maldives	67.59	91	green	↑	orange	↑
Sri Lanka	66.88	94	red	→	red	↗
Nepal	65.93	96	red	→	red	↑
Bangladesh	63.51	109	orange	↗	red	↗
India	61.92	117	red	↗	red	↑
Pakistan	56.17	134	red	→	red	↗
Afghanistan	54.22	139	orange	↗	red	↗

green	Goal Achievement	↑	On track or maintaining achievement
yellow	Challenges remain	↗	Moderately Increasing
orange	Significant challenges	→	Stagnating
red	Major challenges	↓	Decreasing

Note: Highest Score-Sweden (84.7), Total Countries covered 166, Citations: Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G., Woelm, F. 2020. The Sustainable Development Goals and COVID-19. Sustainable Development Report 2020. Cambridge: Cambridge University Press.

Low Per Capita Electricity Consumption, Affordable and Clean Energy Challenge

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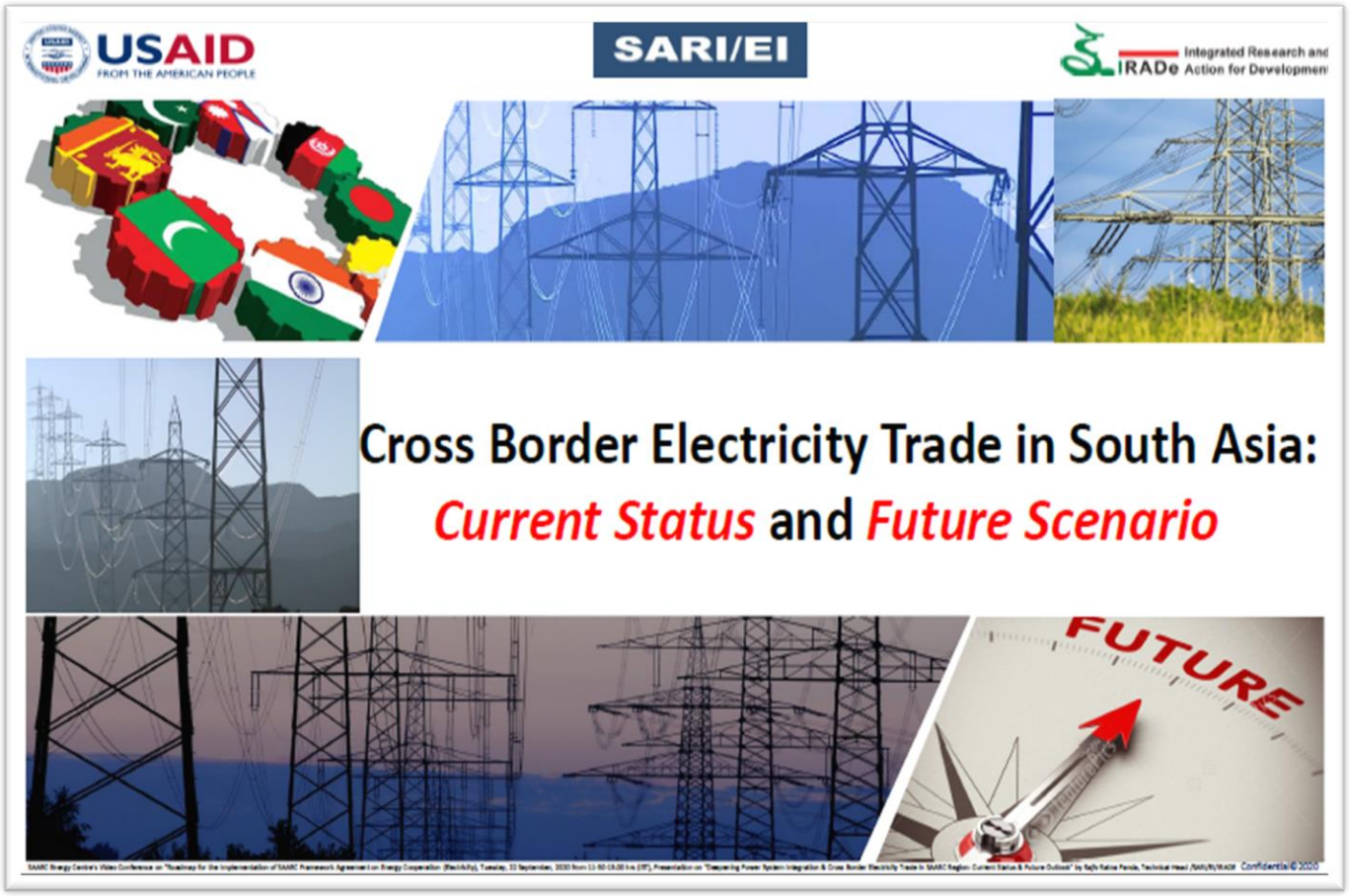
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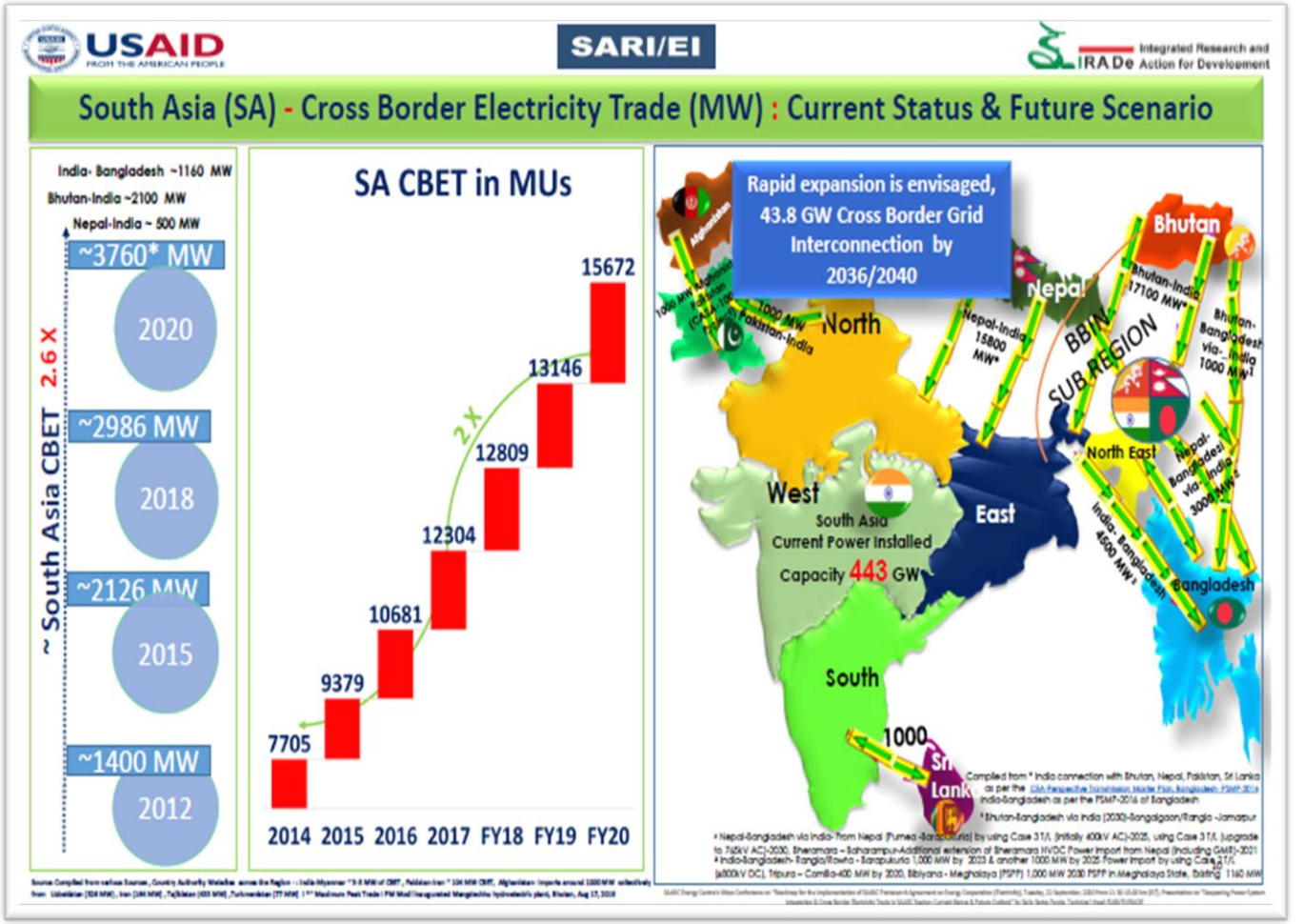
Cross Border Electricity Trade in South Asia:
Current Status and Future Scenario
FUTURE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Integrated Research and Action for Development
South Asia (SA) - Cross Border Electricity Trade (MW) : Current Status & Future Scenario
India- Bangladesh ~1160 MW
Bhutan-India ~2100 MW
Nepal-India ~ 500 MW
~3760* MW
2020
~2986 MW
2018
~2126 MW
2015
~1400 MW
2012
~ South Asia CBET 2.6 X
SA CBET in MUs
7705
9379
10681
12304
12809
13146
15672
2X
2014 2015 2016 2017 FY18 FY19 FY20
Rapid expansion is envisaged, 43.8 GW Cross Border Grid Interconnection by 2036/2040
Bhutan
Nepal
North
West
East
South
North East
BBIN SUB REGION
Bhutan-India 17100 MW*
Nepal-India 15800 MW*
1000 MW Pakistan-India
Bangladesh
South Asia Current Power Installed Capacity 443 GW
1000

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Cross Border Electricity Trade in South Asia:

Future Outlook

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Cross Border Electricity Trade (CBET) in South Asia: Future Outlook

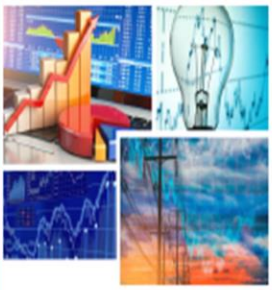
CBET Outlook 1

Transitioning from Bilateral to Trilateral CBET

CBET Outlook 2

Renewable Energy based CBET

CBET Outlook 3



Commercial form of CBET

CBET Outlook 4

Regional Power Market Development & Market Integration

12

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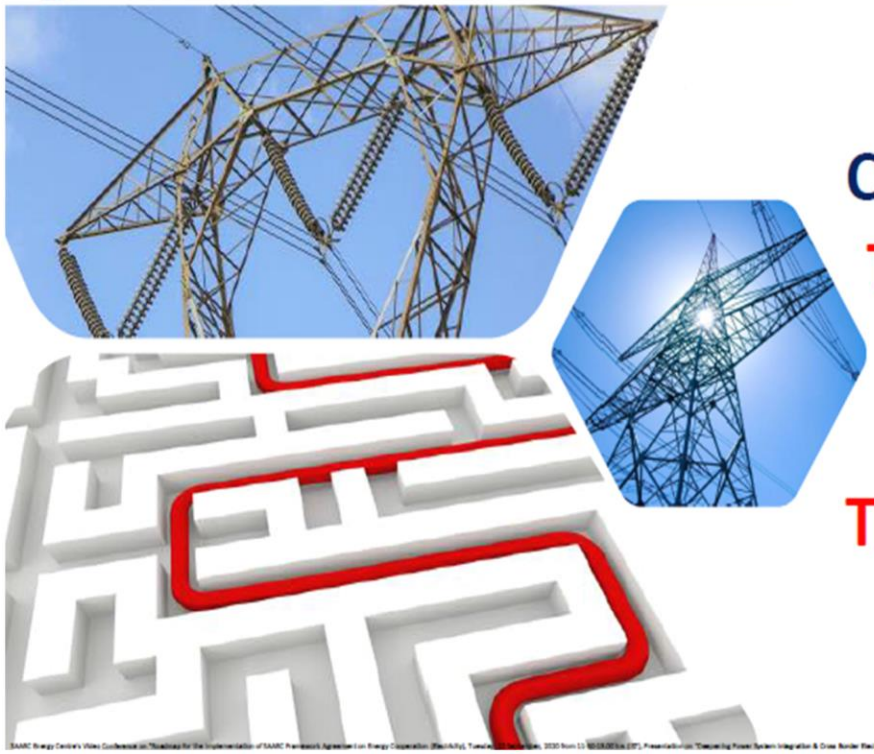

CBET Outlook -1

Transitioning from Bilateral to Trilateral CBET

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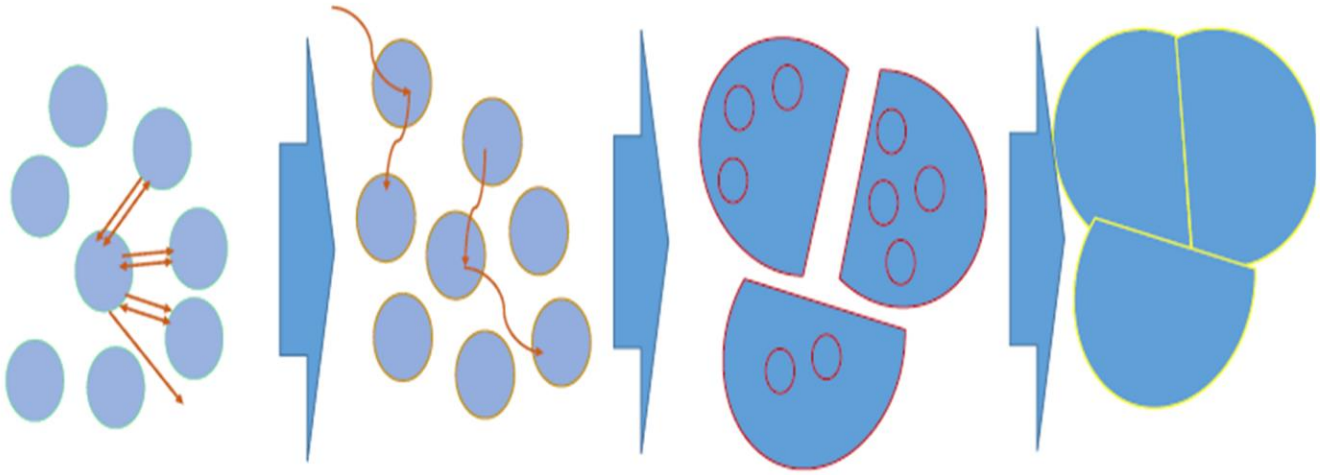
Power system Integration evolution across the Globe



Establishing Bilateral connections , bilateral market

Moving towards Trilateral/Quadrilateral Connection, Trilateral Market

Developing Sub regional Grids & Sub-Regional Power Market

Fully Interconnecting sub regional Grids & Creating Common Grid and Unified Market

SA CBET Outlook-1:-Moving from Bilateral to Trilateral

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Gradual Transition to Trilateral Cross Border Power Trade

404 MW Nyera Amari HPP is envisaged as a trilateral project- sale to both India & Bangladesh.

(DPR under preparation)

Bangladesh Master Plan# envisaged to import from Bhutan (1 GW) & Nepal (3 GW) through India

$2 billion ,1125 MW Dorjilung Project

(The DPR of the project approved by RGoB)

Bangladesh will import 500 MW of electricity from 900 MW Upper Karnali (GMR) in Nepal @ 7.72 cents/unit for 25 years##

(Price Negotiation is Concluded, Discussion on transmission is under discussion)

#Power System Master plan 2016 (final)-https://powerdivision.gov.bd/site/page/f58eb32d-cc0b-483e-b047-13eb81da8820/Power-System-Master-Plan-2016

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CBET Outlook-2

Renewable Energy based CBET

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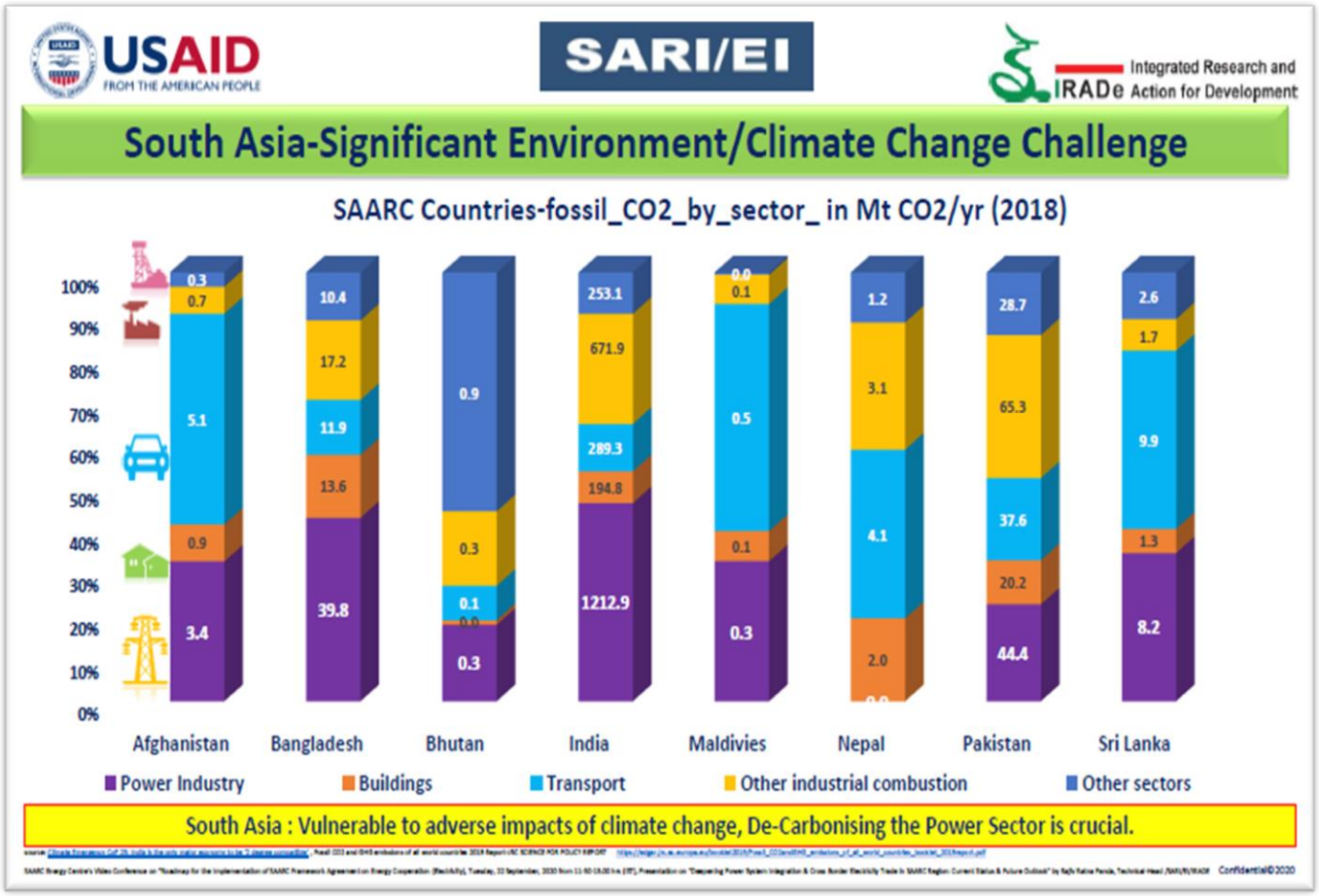
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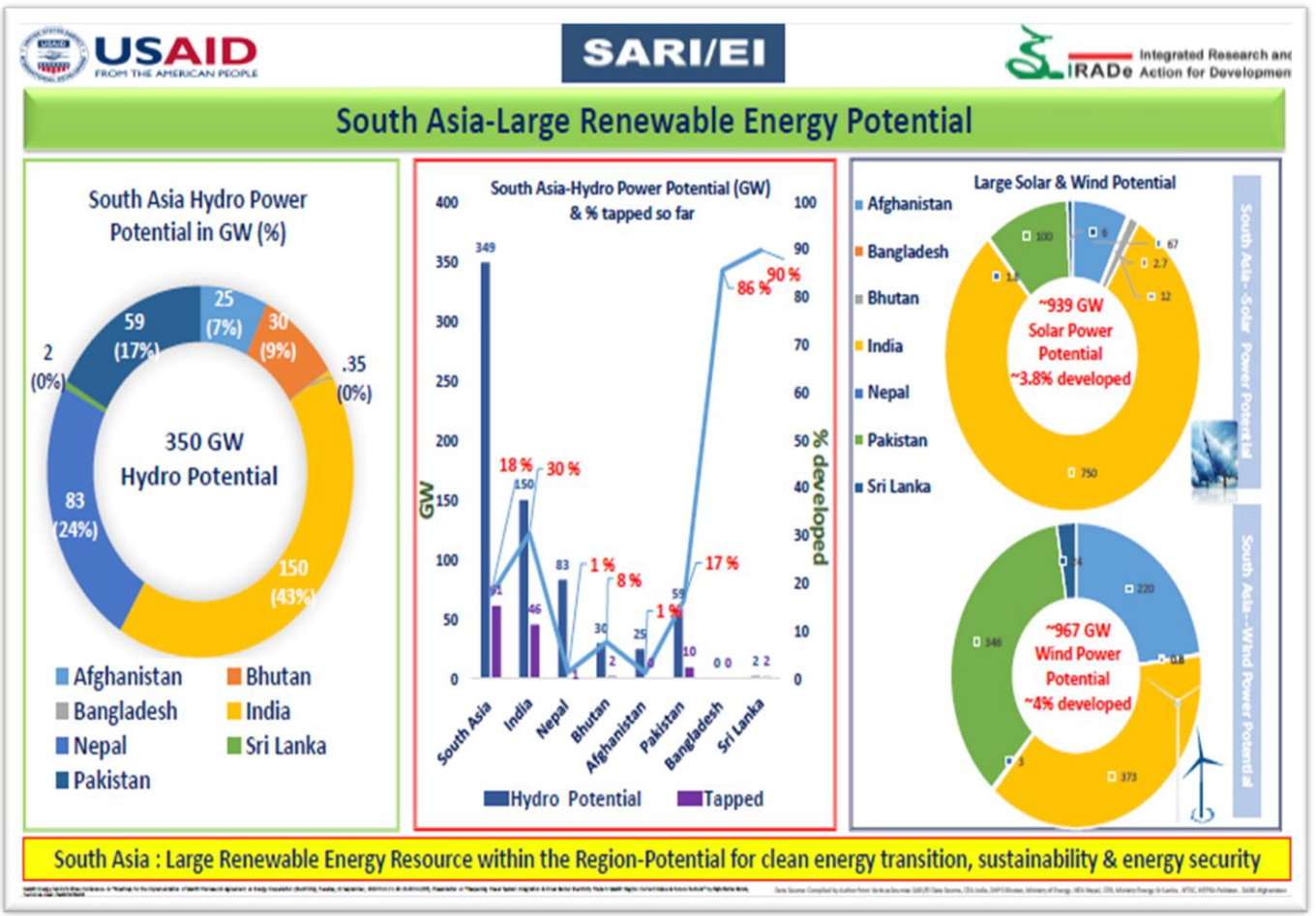
South Asia-Significant Environment/Climate Change Challenge
SAARC Countries-fossil_CO2_by_sector_ in Mt CO2/yr (2018)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.3
0.7
5.1
0.9
3.4
10.4
17.2
11.9
13.6
39.8
0.9
0.3
0.1
0.0
0.3
253.1
671.9
289.3
194.8
1212.9
0.0
0.1
0.5
0.1
0.3
1.2
3.1
4.1
2.0
28.7
65.3
37.6
20.2
44.4
2.6
1.7
9.9
1.3
8.2
Afghanistan
Bangladesh
Bhutan
India
Maldivies
Nepal
Pakistan
Sri Lanka
Power Industry
Buildings
Transport
Other industrial combustion
Other sectors
South Asia : Vulnerable to adverse impacts of climate change, De-Carbonising the Power Sector is crucial.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South Asia-Large Renewable Energy Potential
South Asia Hydro Power Potential in GW (%)
25 (7%)
30 (9%)
.35 (0%)
150 (43%)
83 (24%)
2 (0%)
59 (17%)
350 GW Hydro Potential
Afghanistan
Bangladesh
Nepal
Pakistan
Bhutan
India
Sri Lanka
South Asia-Hydro Power Potential (GW) & % tapped so far
GW
% developed
349
150
83
30
25
59
10
0 0
2 2
31
46
1
2
6
18 %
30 %
1 %
8 %
1 %
17 %
86 %
90 %
South Asia
India
Nepal
Bhutan
Afghanistan
Pakistan
Bangladesh
Sri Lanka
Hydro Potential
Tapped
Large Solar & Wind Potential
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
~939 GW Solar Power Potential ~3.8% developed
100
6
67
2.7
1.5
12
750
South Asia--Solar Power Potential
~967 GW Wind Power Potential ~4% developed
74
220
0.8
346
3
373
South Asia--Wind Power Potential
South Asia : Large Renewable Energy Resource within the Region-Potential for clean energy transition, sustainability & energy security

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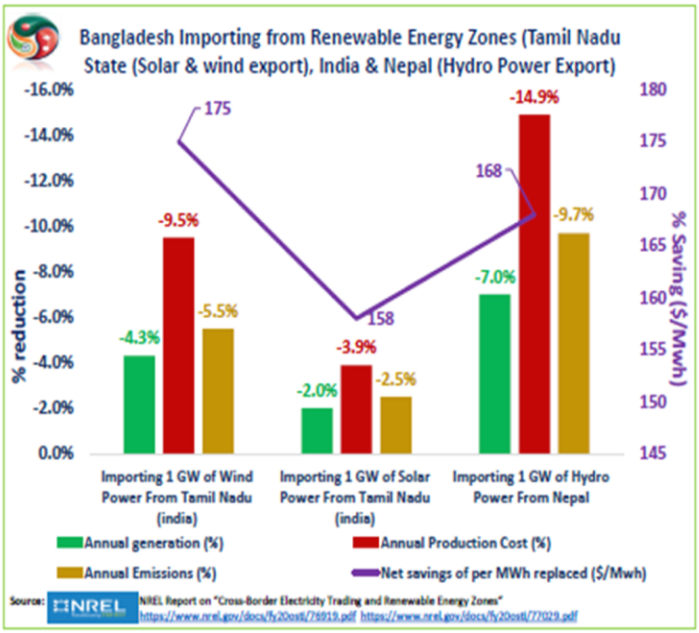
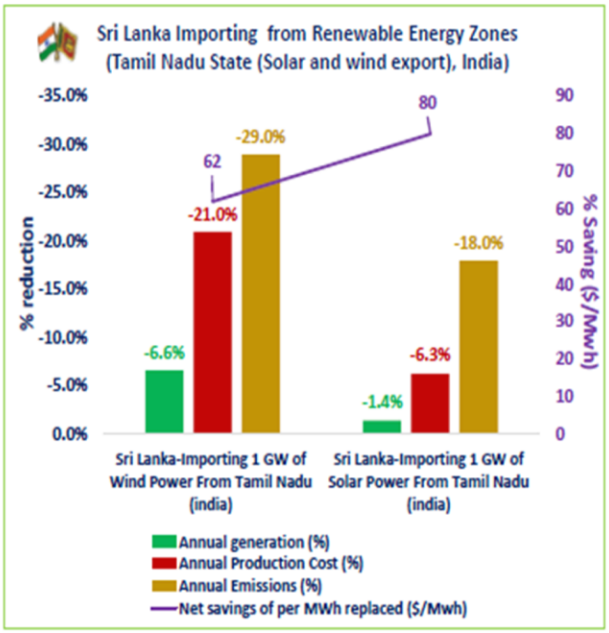
South Asia : Cross Border Electricity Trade From Renewable Energy Zones





South Asia : GW scale RE based trilateral CBET offers cost saving, clean energy transition:-leads to enhance energy affordability & sustainability

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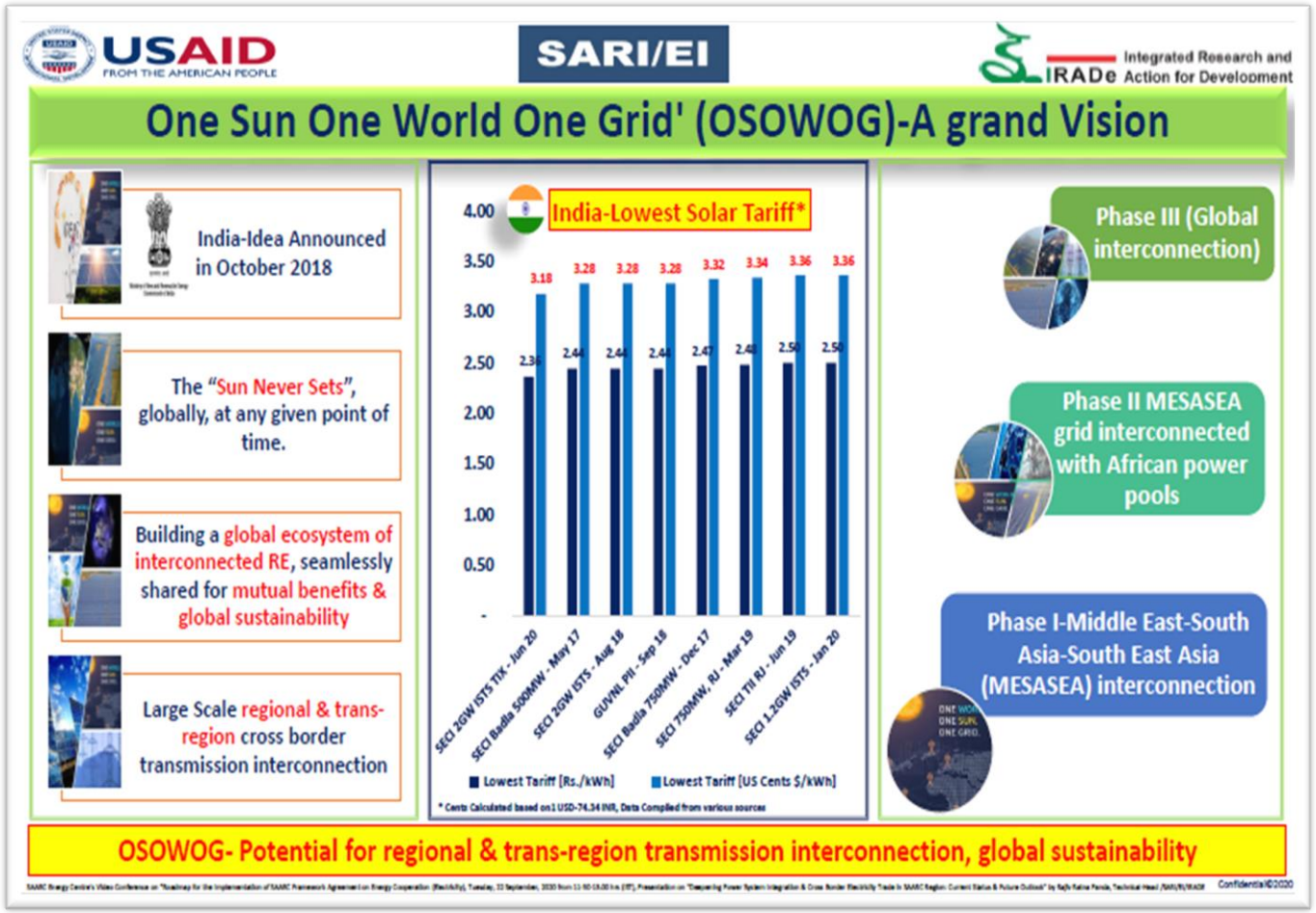
One Sun One World One Grid' (OSOWOG)-A grand Vision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One Sun One World One Grid' (OSOWOG)-A grand Vision
India-Idea Announced in October 2018
The "Sun Never Sets", globally, at any given point of time.
Building a global ecosystem of interconnected RE, seamlessly shared for mutual benefits & global sustainability
Large Scale regional & trans-region cross border transmission interconnection
India-Lowest Solar Tariff*
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
-
3.18
3.28
3.28
3.28
3.32
3.34
3.36
3.36
2.36
2.44
2.44
2.44
2.47
2.48
2.50
2.50
SECI 2GW ISTS TIX - Jun 20
SECI Badla 500MW - May 17
SECI 2GW ISTS - Aug 18
GUVNL PH - Sep 18
SECI Badla 750MW - Dec 17
SECI 750MW, RJ - Mar 19
SECI TII RJ - Jun 19
SECI 1.2GW ISTS - Jan 20
Lowest Tariff [Rs./kWh]
Lowest Tariff [US Cents $/kWh]
* Cents Calculated based on 1 USD-74.34 INR, Data Compiled from various sources
Phase III (Global interconnection)
Phase II MESASEA grid interconnected with African power pools
Phase I-Middle East-South Asia-South East Asia (MESASEA) interconnection
OSOWOG- Potential for regional & trans-region transmission interconnection, global sustainability
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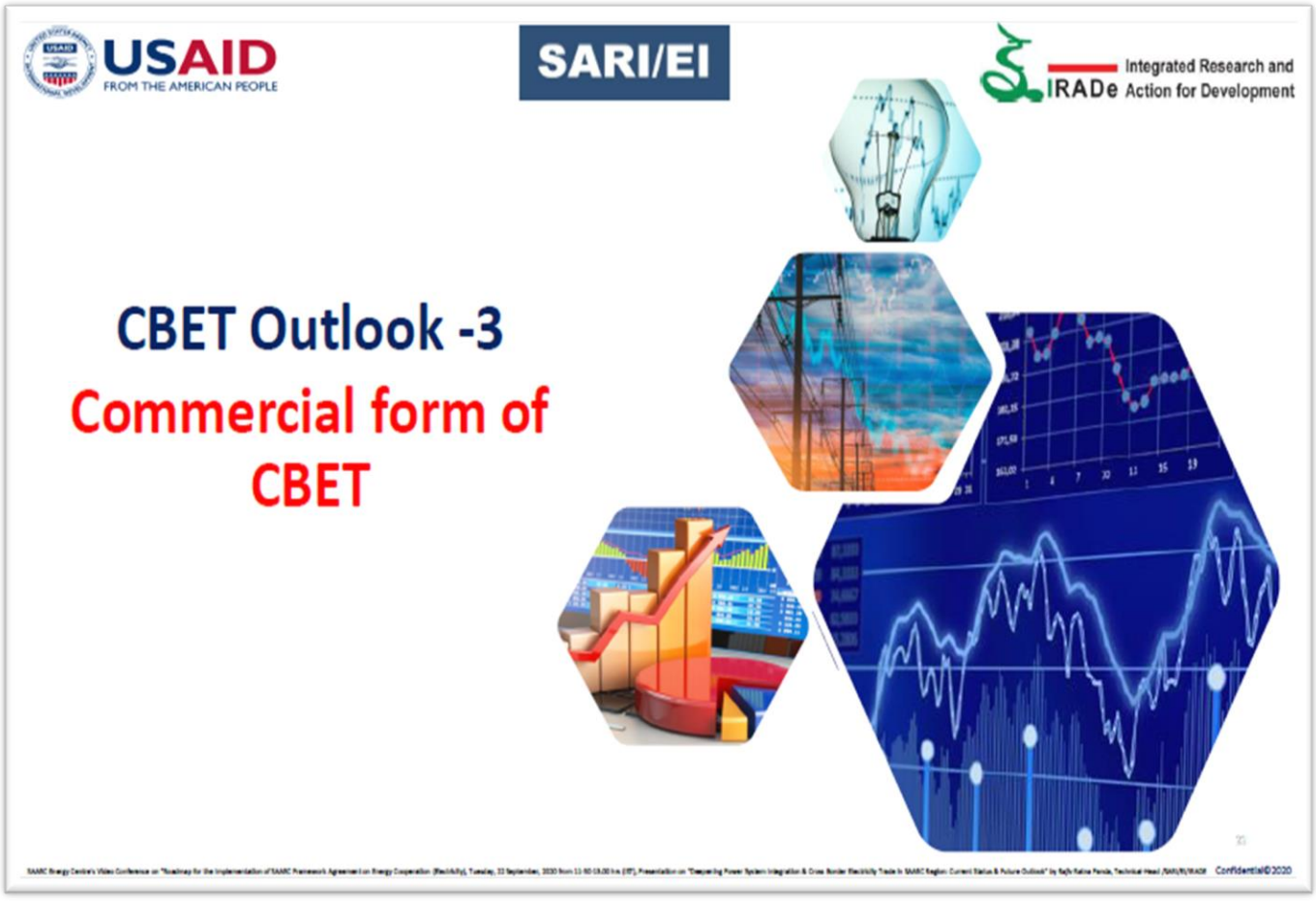
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CBET Outlook -3
Commercial form of CBET
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South Asia : Commercial form of Cross Border Electricity Trade

- Initially all CBET, G-G negotiated tariff
- Comml. CBET 2010-0 MW, 2020-1266 (~33%*)
- Commercial approach brings business value
- Competition, better price discovery
- Foster mindset change, will help to transit to market

Commercial CBET

2020 1226 MW

2010 0 MW

Country	Source	Type	Trader	Tenure Years
Bhutan- India (~2262 MW) G-G-2136 Comml-126	1020 MW Tala	G-G	PTC	35
	336 MW Chhukha	G-G	PTC	
	60 MW Kurichhu	G-G	PTC	
	720 MW Mangdechhu	G-G	PTC	
	126 MW Dagachhu	Commercial	TPTCL	25
India – Bangladesh (~1160 MW) G-G-410 Comml-790	250 MW NTPC	G-G	NVVNL	25
	160 MW Tripura	G-G	NVVNL	5
	250 MW Market	Commercial	PTC	3
	500 MW Market	Commercial	NVVNL/ Sembcorp	15
	40 MW Market	Commercial	PTC	2
India-Nepal (~587 MW) G-G-237 Comml-350	237 MW India	G-G		Long Term
	80-190 MW Market	Commercial	PTC/NVVN	—
	160 MW Market	Commercial	NVVN	Renewed Every year

South Asia : Commercial form of CBET leads to the busines case, help in fostering private sector engagement & investment

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CBET Outlook -4

Regional Power Market Development & Market Integration

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Regional Power Market & Power Exchange (PX)-Transitioning to Market form of CBET in SA

Demand Diversity- Daily, weekly ,Monthly, Seasonal

PXs– Fair, Transparent, Neutral Market Place-

Competitive price discovery

PXs offers a platform for trilateral/multilateral CBET

SARI-Study on Gains from BBIN Multilateral electricity Trade(Capex reduces by USD 17 billion due to regional trade)

SARI/EI-Study-SARPEX- Pilot Market Exercise- DAM in PX Platform. Bangladesh, Nepal, Bhutan in PXs, the quantum of MCV increased in the range of 5-7% (2015-16).

New power market initiatives in India also offers an opportunity to leapfrog in Cross Border Front.

Seasonal complementarity– Monthly Electricity Load Profiles across South Asia [2]

	January	February	March	April	May	June	July	August	September	October	November	December
Bangladesh												
India-North East												
Bhutan												
India-East												
Nepal												
India-North												
India-West												
Pakistan												
India-South												
				Low	Medium	High						

Regional Power Market Development

[1] Source: World Bank Study

[2] Government of India (GoI) ,Ministry of Power (MoP) guidelines- Import/Export Cross Border Electricity

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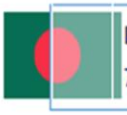
SA Regional Power Market -Benefits of Regional Grid Balancing & RE Grid Integration

Rapid Renewable Energy Expansion in the horizon in SA

175 GW by 2022

450 Gw[1] 2030



Bangladesh

7.9 Gw[2] by 2041

Sri Lanka

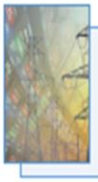
50% Generation[4] from RE by 2030

Pakistan

16 Gw[3] by 2040

Hydro Power through CBET for optimised grid balancing

CBET as a tool for flexibility, managing RE Intermittency



Opportunity-Developing Regional Power Market (Trading of balancing services, Ancillary Market)

One Sun One World One Grid' (OSOWOG)-A grand Vision

Successful 9 PM, 9 Minute-A generation flexibility of ~ 400 MW was achieved from hydropower plants in Bhutan[5]

New power market initiatives in India also offers an opportunity to leapfrog

In 2016, 80% of Denmark's wind generation[6] was balanced through CBET through the utilization of Norway's hydro resources

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Enablers for accelerating CBET & Development of Regional Power Market

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Enablers for accelerating CBET & Development of Regional Power Market

Political

- Regional Outlook/Vision
- Political Consensus
- Intergovernmental agreement(s)
- Implementation Mechanism
- Power Market Reform

Regulatory

- Permissibility to use intermediary transmission network under open access
- Rules for identification of transmission capabilities & congestion
- Rules for measurement of imbalance and settlements
- A conducive & friendly ecosystem for investors

Technical and Commercial

- Harmonisation of grid codes & standards, Grid Connectivity
- Transmission pricing & transit charge
- Co-ordinated Regional Transmission Grid Planning
- Settlement & payment mechanism
- Dispute resolution mechanism

Institutional

- Institutional arrangements
- Regional Coordination Forums are desirable
- Will foster long term sustainability

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SARI/EI Initiatives- Providing Actionability to articles of SAARC FAEC (E)

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SARI/EI Published Studies: An effort to Provide Actionability to articles of SAARC FAEC(E)

Article 12-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.}

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

An important ingredient for Competitive Power Market development

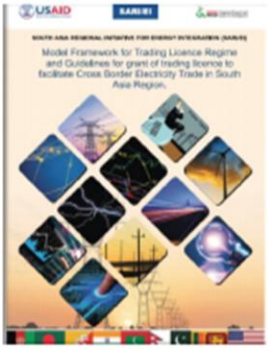
- Report Suggested a detailed Model Regional Open Access Framework & Guidelines (on 7 key areas)
- Implementation Roadmap- Regional Level Action & Country specific Action Plan

Article 13- Facilitating Buying & 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.}

Model Framework for Trading Licence Regime and Guidelines for grant of trading licence to facilitate CBET in SA Region

Trading License an important Regulatory tool for promoting power trading

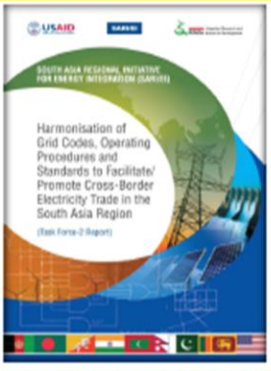


- Report Suggested detailed Model Framework & Guidelines (on 7 key areas) for trading license regime in South Asia
- Implementation Roadmap- Regional Level Action & Country specific Action Plan

Article 7- Planning of Cross-Border Interconnections, Article 10-Electricity Grid Protection System & Article 11- System Operation & Settlement Mechanism

Harmonisation of Grid codes, Operating Procedures and Standards to facilitate/promote CBET in SA Region: Framework Grid Code Guidelines

Important for safe, secure and reliable power system integration & operation



- Report Suggested a very detailed set of Framework Grid Code Guidelines on Planning, Connection, Operation and Scheduling & Dispatch Guidelines.
- Suggested Regional Technical Institutional Mechanism.

SA-South Asia

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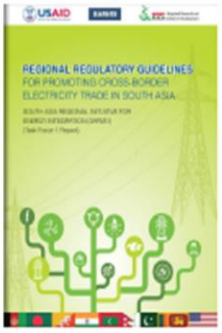
Integrated Research and Action for Development

SARI/EI Published Studies: An effort to Provide Actionability to articles of SAARC FAEC(E)

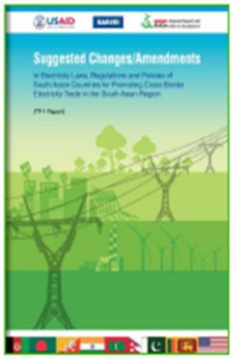
Article 15 - Regulatory Mechanisms: Member States shall develop the structure, functions and institutional mechanisms for regulatory issues related to electricity exchange and trade.

Regional Regulatory Guidelines (RRGs) for Promoting CBET in SA Region



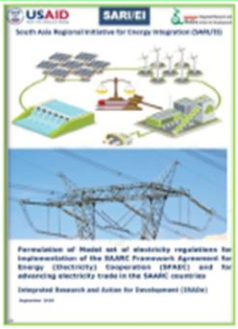
- Report Suggested a Regional Regulatory Guidelines covering 9 key regulatory areas.
- Suggested Regional Regulatory Institutional Mechanism (SAFER)
- Implementation of RRGs

Suggested Changes/Amendments in Electricity Laws, Regulations and Policies of SA Countries for Promoting CBET in the SA Region



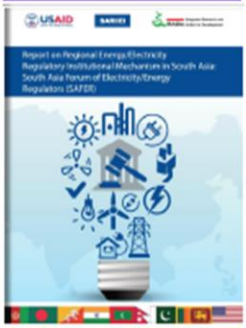
- Key ingredients for CBET
- Clause/section wise suggested changes/amendments in EL&R&P framework-Country Wise

Model set of electricity regulations for implementation of the SAARC Framework Agreement for Energy (Electricity) Cooperation & for advancing CBET in SAARC countries



- Report Suggested a detailed Model SAARC Electricity Regulation for Regional Power Trade (SERRPT)
- Addressing all the Regulatory aspects of CBET.
- Regulatory Changes for SERRPT Implementation.
- Conducted as a part of SAARC Council of Experts of Energy (Electricity) Regulators.

Regional Energy/Electricity Regulatory Institutional Mechanism in SA: South Asia Forum of Electricity/Energy Regulators (SAFER)



- Report Suggested the detailed structure, function and role of SAFER.
- Financial, operational aspects, Road map & strategy

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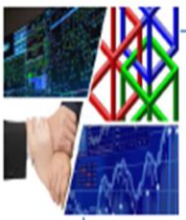
SARI/EI Ongoing Studies: An effort to Provide Actionability to articles of SAARC FAEC(E)

Coordinated Regional Generation & Transmission Master Plan (CRGTMP)

Article 7 Planning of Cross-border interconnections

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



Model Regional Framework for Trilateral & Multilateral Power Trade (MRFTMPT)

Article 2 Objective

{Member States may enable cross-border trade of electricity on voluntary basis subject to laws, rules and regulations of the respective Member States and based on bilateral/trilateral/mutual agreements between the concerned states.}

South Asia Energy Knowledge Resource Database (SAEKRD)

Article 5 Data updating and sharing

{Member States may share and update technical data and information on the electricity sector in an agreed template.}

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Institutionalizing the Process of CBET: SARI/EI Initiatives

South Asia Forum of Electricity Regulators (SAFER)

Technical Support to SAFIR Working Group & SAARC council of experts of energy (electricity) Regulators

South Asian Forum of Transmission Utilities (SAFTU)

South Asian Forum of System Operators (SAFSO)

South Asian Forum for Electricity Market (SAFEM)

South Asian Forum for Energy Investment (SAFEI)

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Road Map and Action Plan

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10 Point Roadmap & Action Plan for Deepening CBET in SAARC Region

01	Focus on Implementation of articles of various inter-governmental agreements (bilateral, trilateral, multilateral)
02	Strengthening & facilitating the process of Policy & Regulatory Harmonisation/Coordination
03	Focusing on Complementary Regulatory framework development for CBET in each SA countries
04	Transitioning to Regional System Planning- Generation and Transmission Master Plan
05	Instrument/Tools for De-Risking CBET Projects; enhancing bankability, Investment mobilisation
06	Focusing on power market development including ancillary service market
07	Institutionalizing the Process of CBET-SAFER, SAFTU, SAFSO,SAFEM, SAFEI
08	Valuing CBET for Clean Energy Transition, Decarbonisation & Sustainability, CC Mitigation
09	Strengthening Institutional Capacity, Technical Assistance & Training
10	Annual Review of SAARC FAEC(E) implementation and Annual status Report

CC: Climate Change
CBET: Cross Border Electricity Trade

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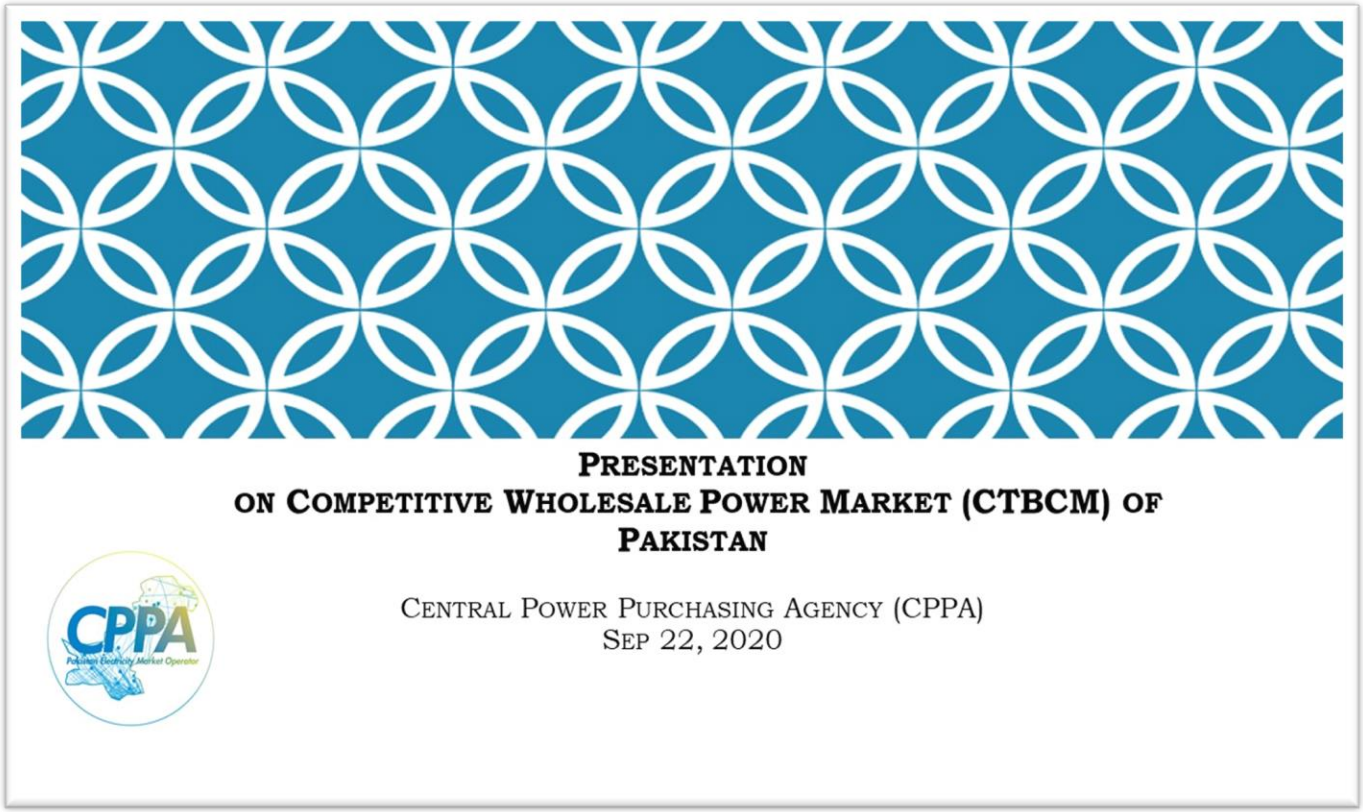
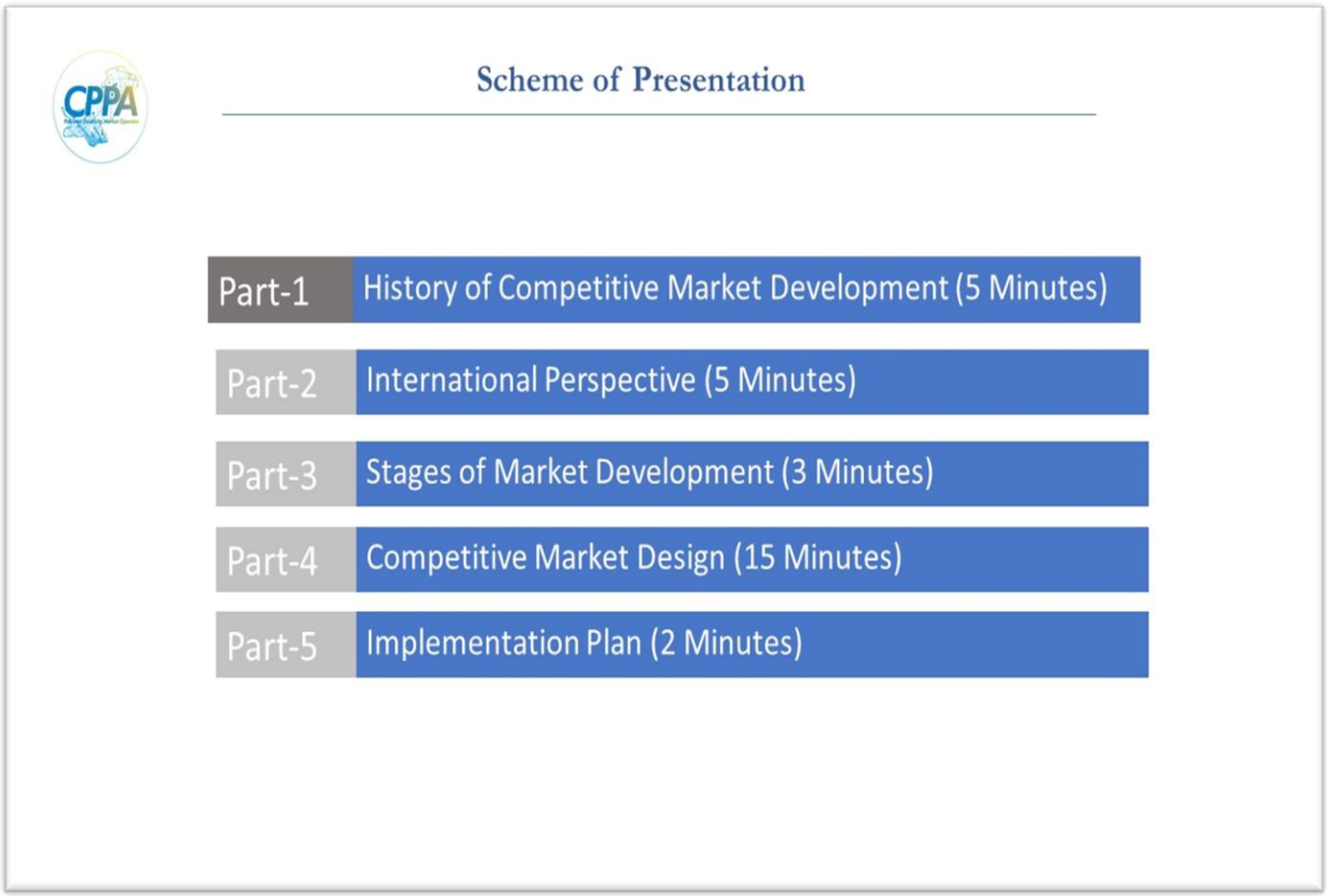
Thank You

Contact: rajivratnapanda@irade.org
rajivratnapanda@gmail.com
https://sari-energy.org/
https://www.irade.org/

3. "Competitive Wholesale Electricity Market in Pakistan" by Mr. Abrar Hussain

Team Lead Market Design & Development, Central Power Purchasing Agency (CPPA-G), Pakistan





Part-1

History of Competitive Market Development

Power Sector Reforms (Historical Perspective)

1992 — WAPDA Strategic Plan

- Enhance **capital formation**
- Improve **efficiency and rationalize prices**, and
- Move towards **full competition** by providing the greatest possible role for the **private sector** through **privatization**

1994 — First Power Policy

- Enabled Private Participation in Generation
- Offered generous incentives
- **Several deals and capacity additions**

1997 — NEPRA Act

- **Enactment of NEPRA Act**
- Formation of **Independent Regulator** (NEPRA) to oversee the restructuring process

1998 — Unbundling of WAPDA

PEPCO
- **Transition Management Company**
- Oversee the **corporatization & privatization**
- Formed **Business Plan for Restructuring process**

GENCOs (4) - Thermal Power Generation Companies

DISCOs (10)
- LESCO
- GEPCO
- FESCO
- IESCO
- MEPCO
- PESCO
- HESCO
- QESCO
- TESCO
- SEPCO

- **Perform Supply** Business
- **Perform distribution**, construction, expansion, maintenance operation of the distribution system

NTDC
- **Transmission Network Operator**
- **System Operator**
- **Planner**
- **Power Procurer**
- **Power Market Development**

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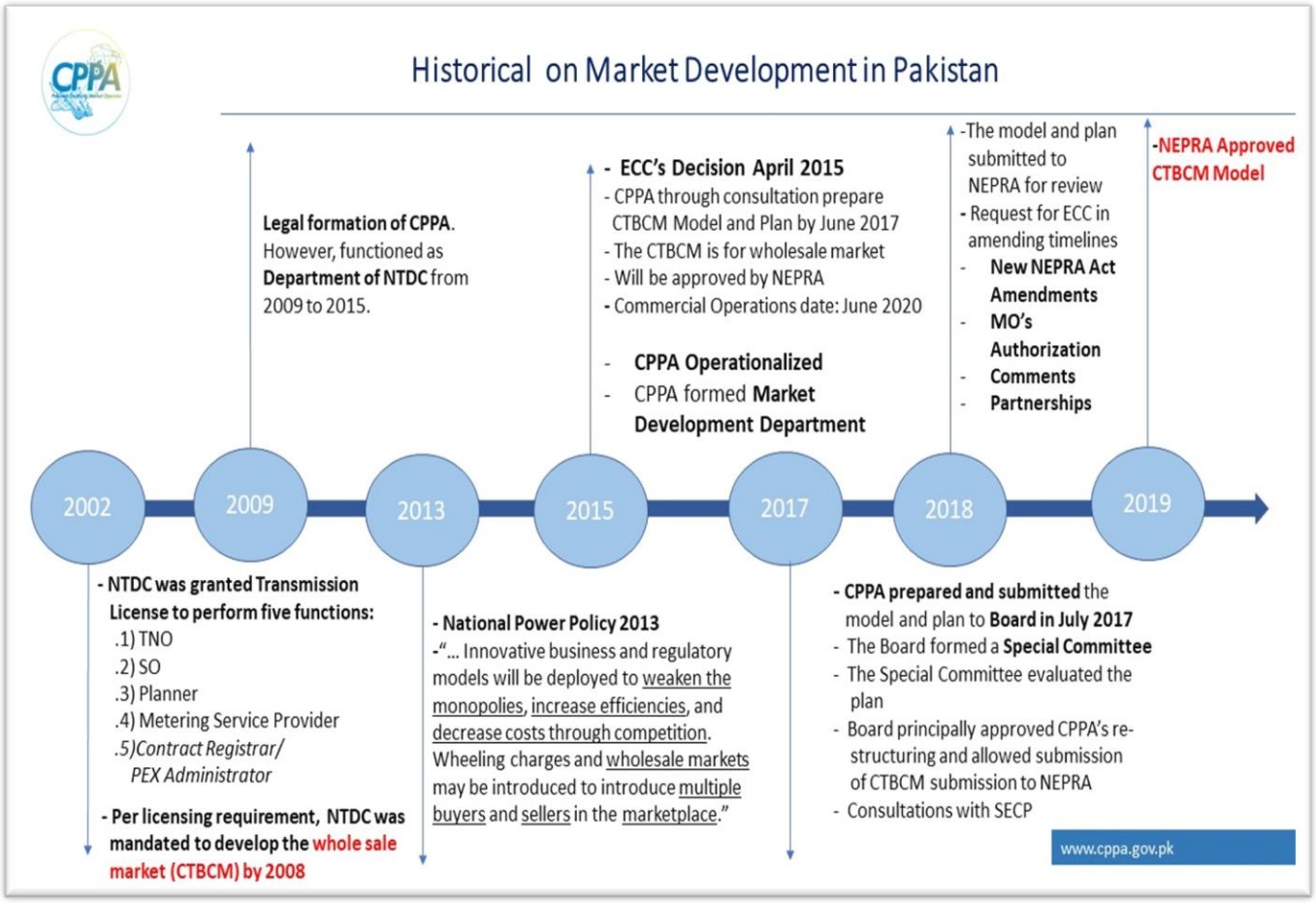
Historical on Market Development in Pakistan
2002
2009
2013
2015
2017
2018
2019
Legal formation of CPPA. However, functioned as Department of NTDC from 2009 to 2015.
- NTDC was granted Transmission License to perform five functions:
.1) TNO
.2) SO
.3) Planner
.4) Metering Service Provider
.5)Contract Registrar/ PEX Administrator
- Per licensing requirement, NTDC was mandated to develop the whole sale market (CTBCM) by 2008
- ECC's Decision April 2015
- CPPA through consultation prepare CTBCM Model and Plan by June 2017
- The CTBCM is for wholesale market
- Will be approved by NEPRA
- Commercial Operations date: June 2020
- CPPA Operationalized
- CPPA formed Market Development Department
- National Power Policy 2013
-"... Innovative business and regulatory models will be deployed to weaken the monopolies, increase efficiencies, and decrease costs through competition. Wheeling charges and wholesale markets may be introduced to introduce multiple buyers and sellers in the marketplace."
- CPPA prepared and submitted the model and plan to Board in July 2017
- The Board formed a Special Committee
- The Special Committee evaluated the plan
- Board principally approved CPPA's re-structuring and allowed submission of CTBCM submission to NEPRA
- Consultations with SECP
-The model and plan submitted to NEPRA for review
- Request for ECC in amending timelines
- New NEPRA Act Amendments
- MO's Authorization
- Comments
- Partnerships
-NEPRA Approved CTBCM Model
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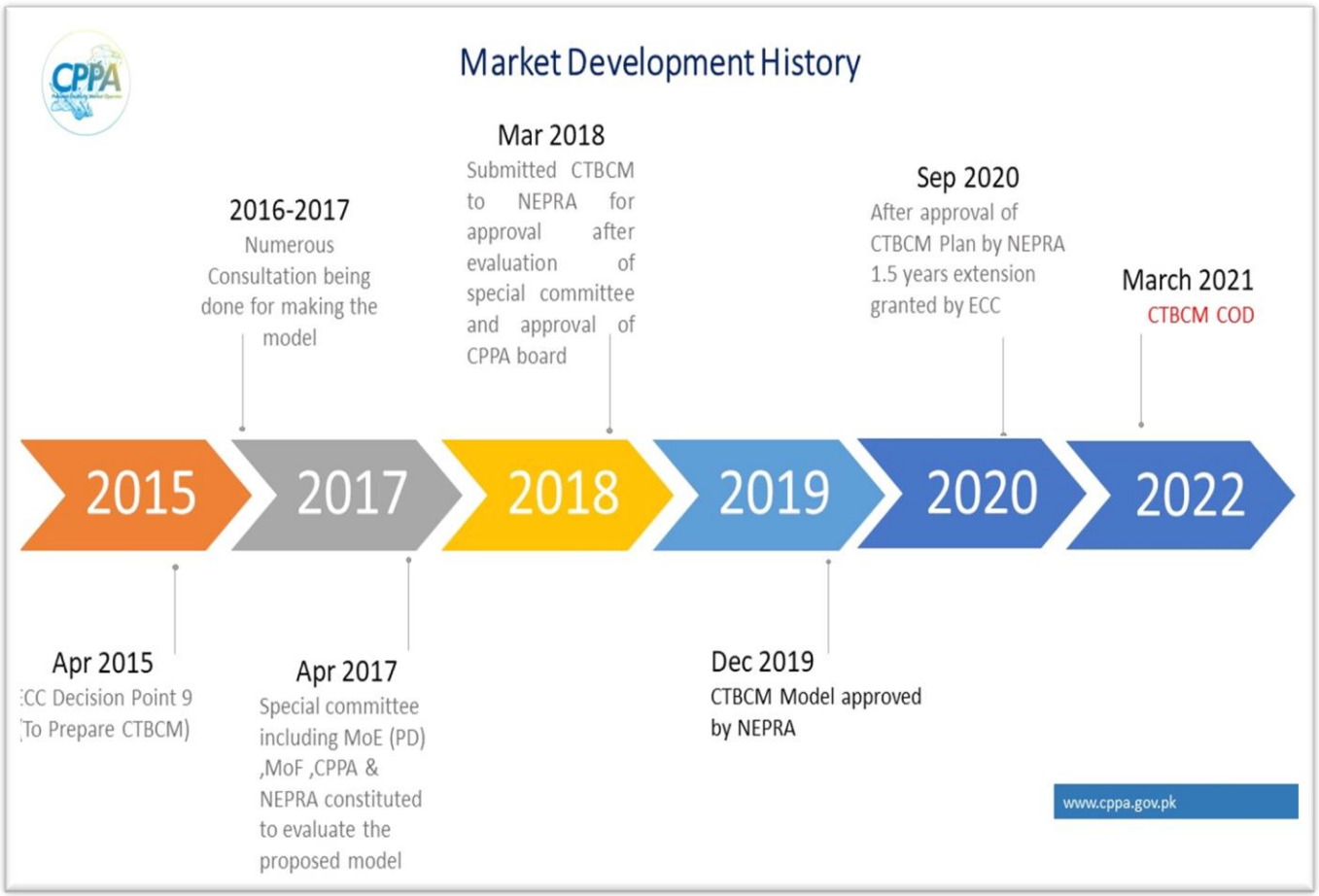
Market Development History
2015
2017
2018
2019
2020
2022
Apr 2015
CC Decision Point 9 To Prepare CTBCM)
2016-2017
Numerous Consultation being done for making the model
Apr 2017
Special committee including MoE (PD) ,MoF ,CPPA & NEPRA constituted to evaluate the proposed model
Mar 2018
Submitted CTBCM to NEPRA for approval after evaluation of special committee and approval of CPPA board
Dec 2019
CTBCM Model approved by NEPRA
Sep 2020
After approval of CTBCM Plan by NEPRA 1.5 years extension granted by ECC
March 2021
CTBCM COD
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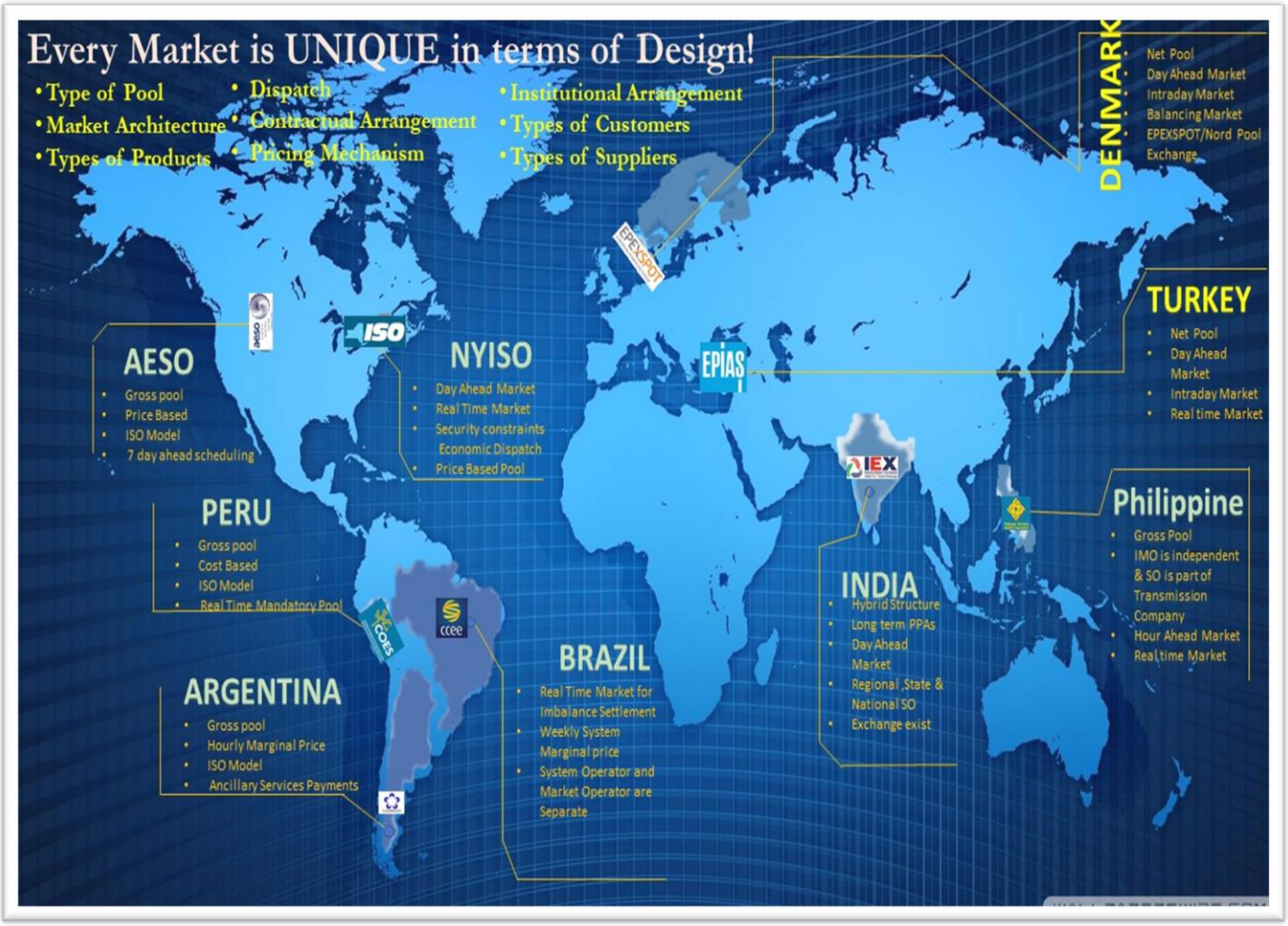
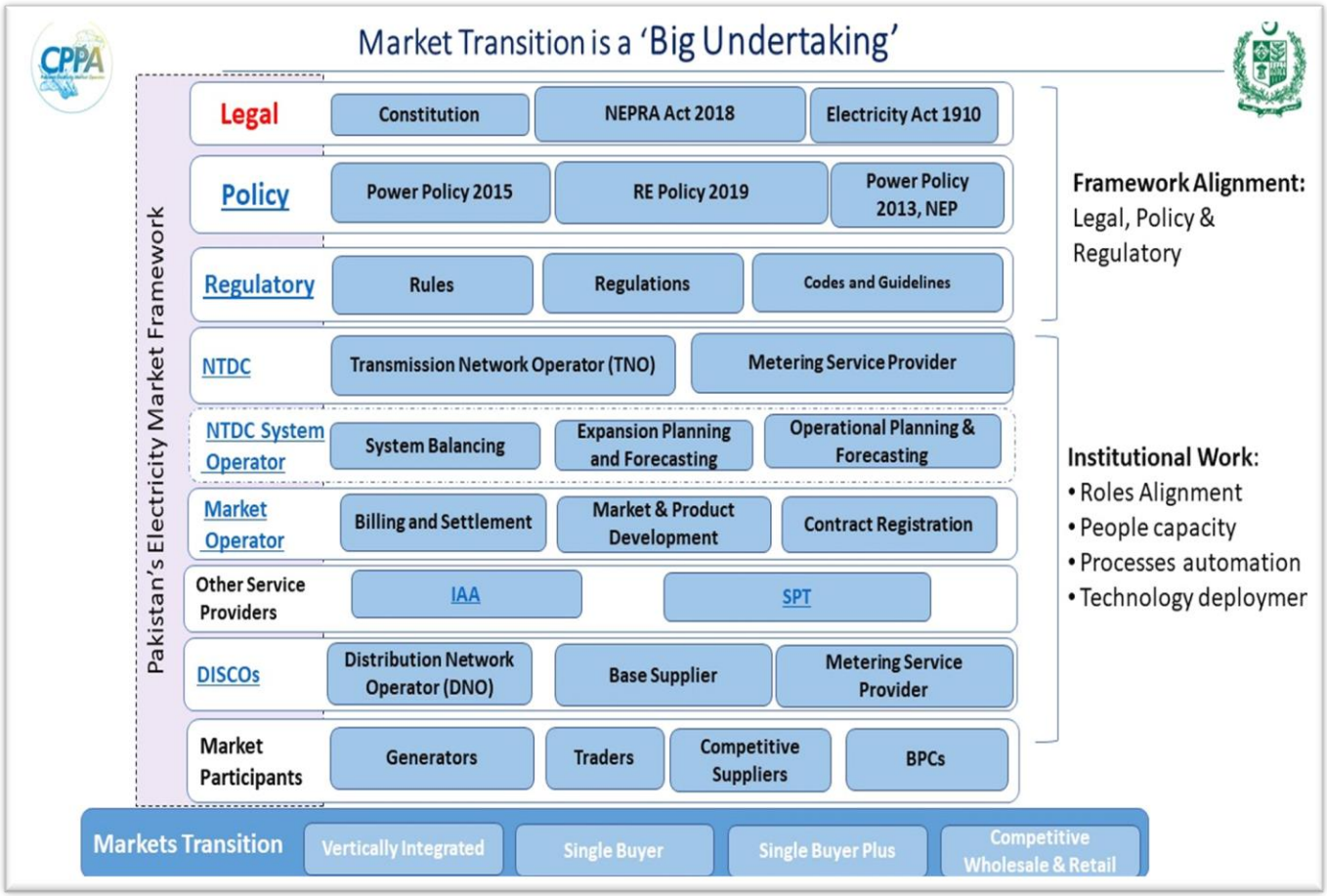
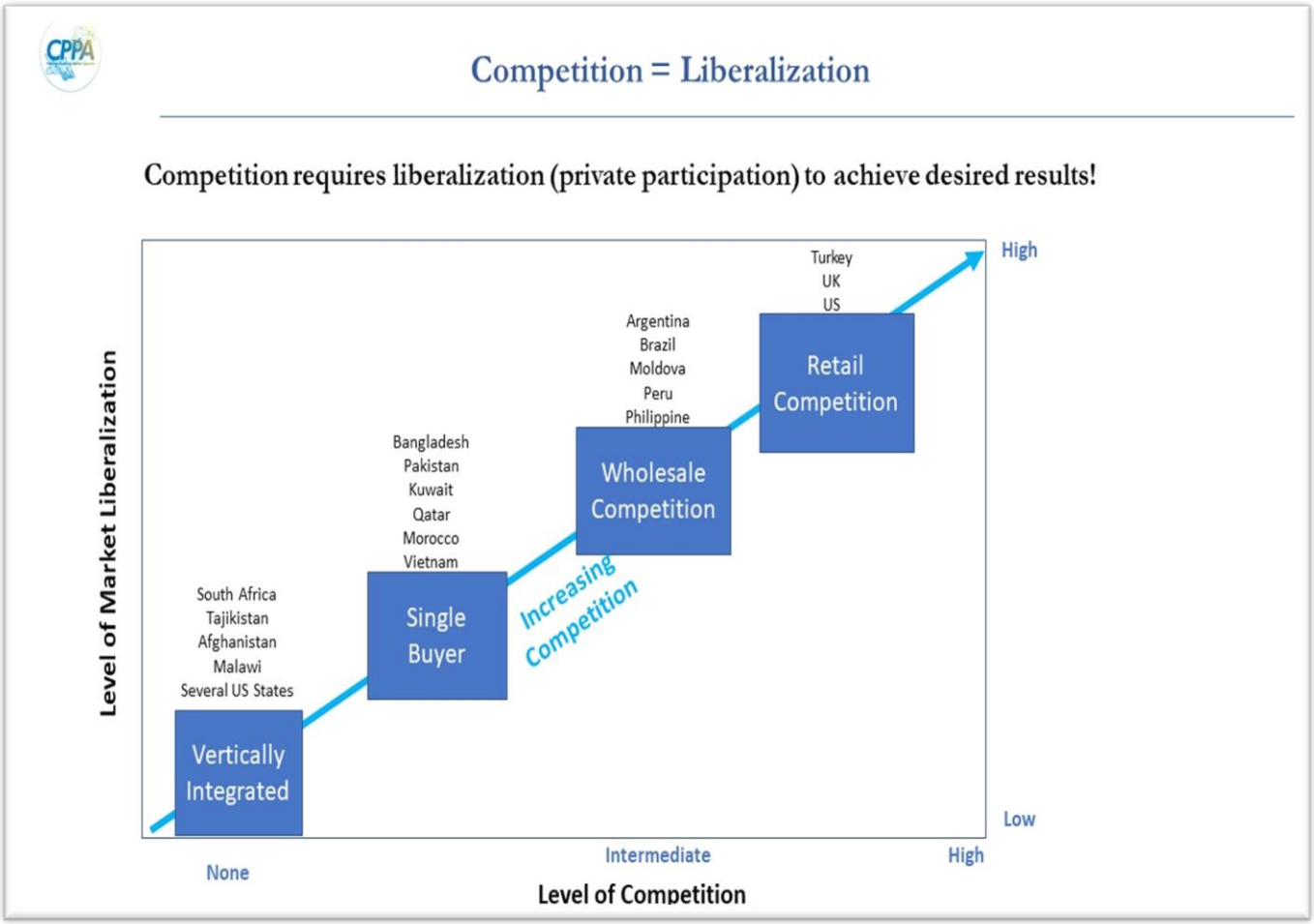
Part-2

International Perspective




Market Transition is a 'Big Undertaking'
Pakistan's Electricity Market Framework
Legal
Constitution
NEPRA Act 2018
Electricity Act 1910
Policy
Power Policy 2015
RE Policy 2019
Power Policy 2013, NEP
Regulatory
Rules
Regulations
Codes and Guidelines
NTDC
Transmission Network Operator (TNO)
Metering Service Provider
NTDC System Operator
System Balancing
Expansion Planning and Forecasting
Operational Planning & Forecasting
Market Operator
Billing and Settlement
Market & Product Development
Contract Registration
Other Service Providers
IAA
SPT
DISCOs
Distribution Network Operator (DNO)
Base Supplier
Metering Service Provider
Market Participants
Generators
Traders
Competitive Suppliers
BPCs
Framework Alignment: Legal, Policy & Regulatory
Institutional Work:
• Roles Alignment
• People capacity
• Processes automation
• Technology deploymer
Markets Transition
Vertically Integrated
Single Buyer
Single Buyer Plus
Competitive Wholesale & Retail


Competition = Liberalization
Competition requires liberalization (private participation) to achieve desired results!
Level of Market Liberalization
High
Low
None
Intermediate
High
Level of Competition
Vertically Integrated
South Africa
Tajikistan
Afghanistan
Malawi
Several US States
Single Buyer
Bangladesh
Pakistan
Kuwait
Qatar
Morocco
Vietnam
Wholesale Competition
Argentina
Brazil
Moldova
Peru
Philippine
Retail Competition
Turkey
UK
US
Increasing Competition

Part-3

Stages of Market Development

Players in the Market

Consumers

1. Regulated Tariff Consumers
(all consumers)

2. Eligible Consumers
(large consumers with choice)

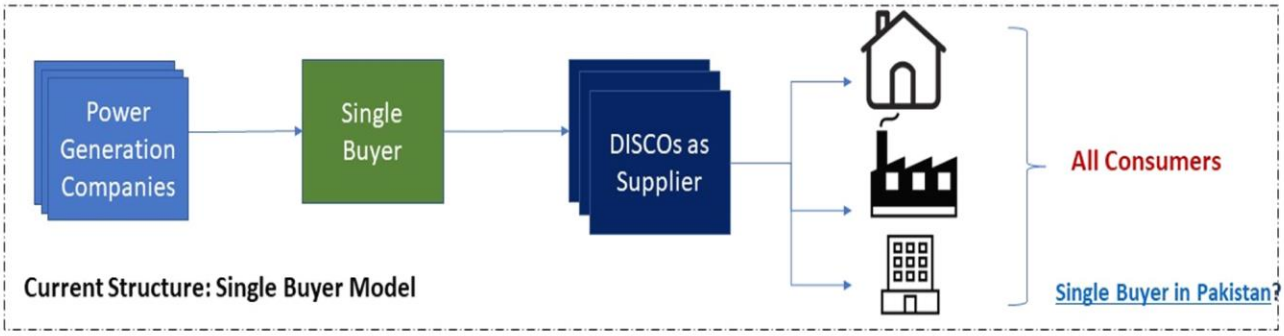
Suppliers

1. DISCOs as Supplier
(can sell at regulated tariff only*)

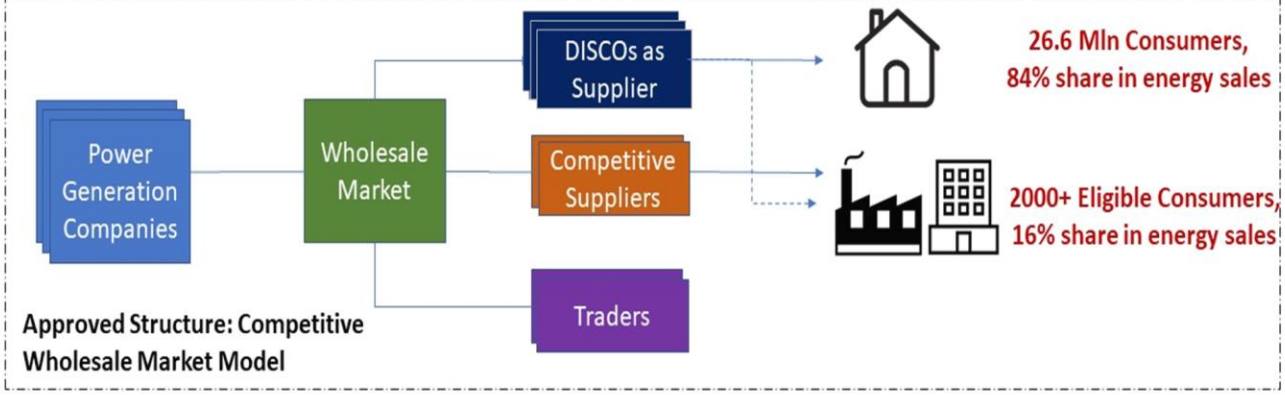
2. Competitive Supplier
(can sell to only eligible consumers at non-regulated prices)

*DISCOs are deemed last resort suppliers for a period of five years under NEPRA Act

Single-Buyer Model and Wholesale Competitive Market

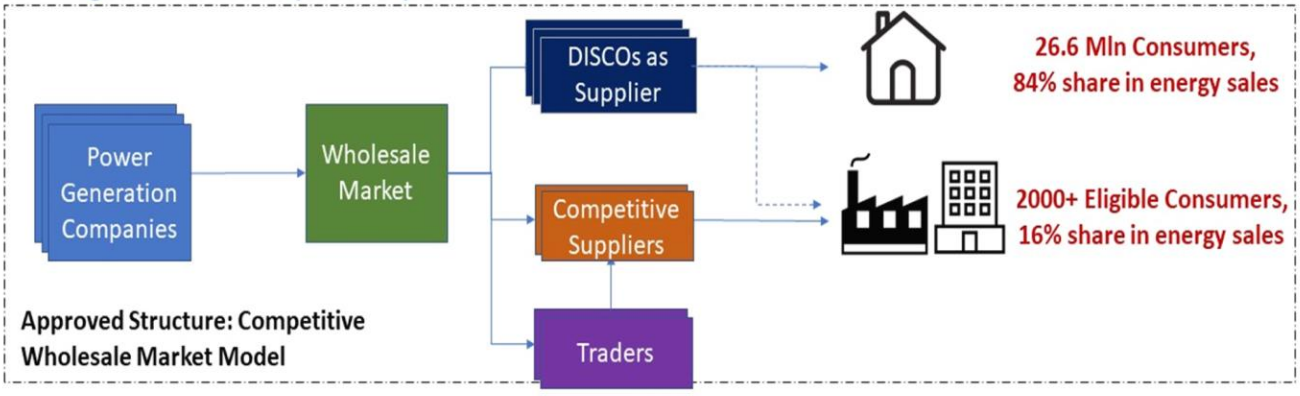


1st Stage: Wholesale (CTBCM) Mar 2022

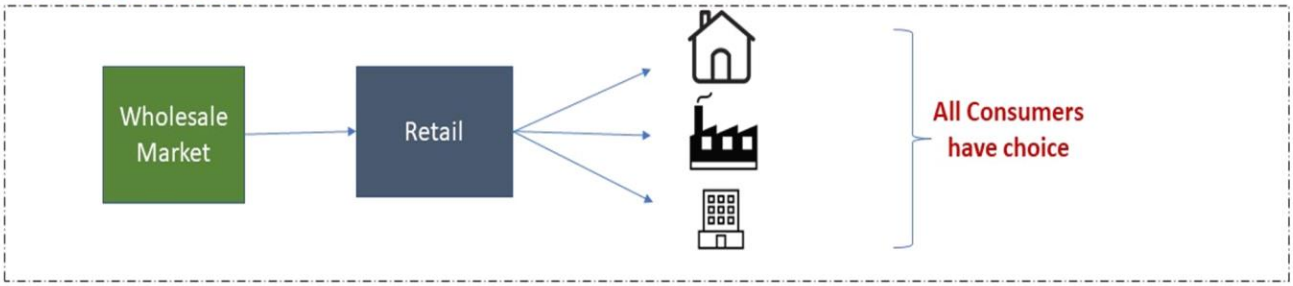


Competitive Wholesale and Retail Markets

1st Stage: Wholesale (CTBCM) Mar 2022



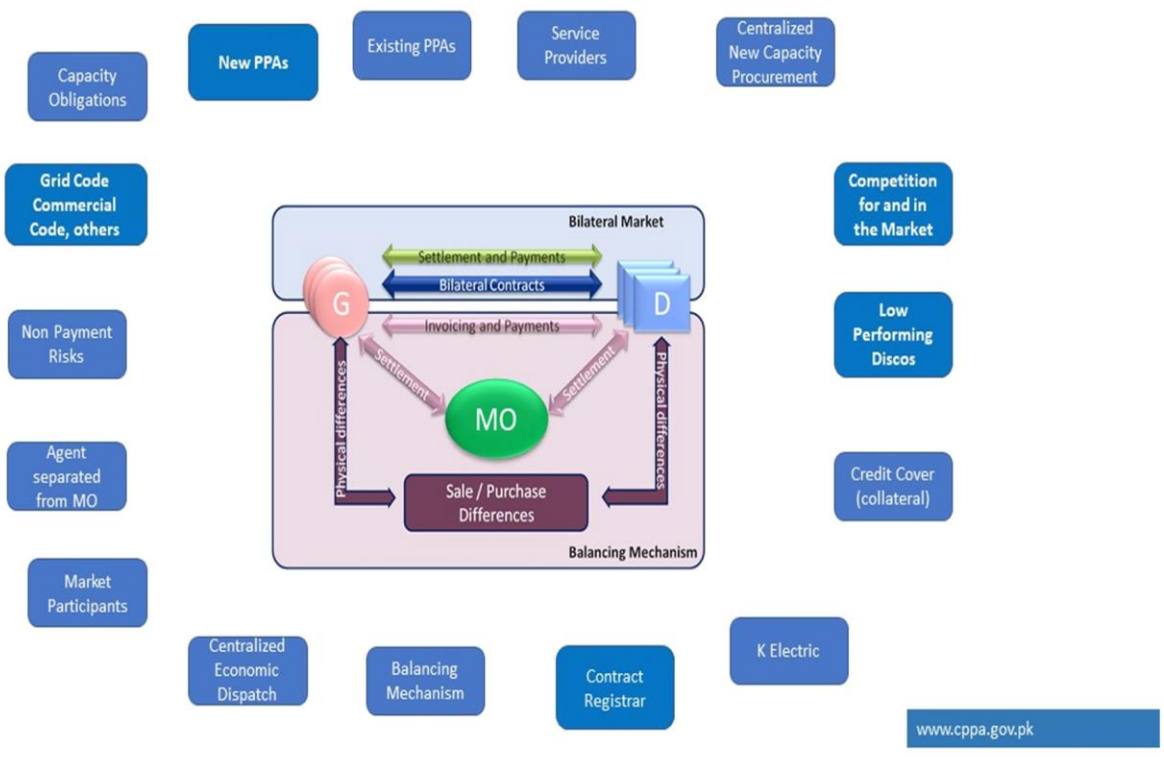
2nd Stage: Retail



Part-4

Competitive Market Design

CTBCM – Features



Trading in Competitive Wholesale Market

1. The CTBCM is constructed around bilateral contracts.
2. The System Operator will establish marginal prices for trading including settlement of imbalances.
3. DISCOs will procure power through competitive bidding organized by Independent Auctioneer (IAA) resulting in reduced purchase price for DISCOs.
4. Eligible Consumers will be free to procure power from Competitive Suppliers.

4 Major Design Parameters

- **Products Traded in the Market and System Reliability:** Two main products, Energy and Capacity, Energy traded to supply consumption and Firm Capacity Traded to ensure medium and long-term security of supply
- **Pricing Mechanism:** Cost-based pool model with single market clearing price based on marginal cost principle
- **Power Procurement:** 100% capacity obligations, procurement for regulated consumers is subject to IGCEP and Procurement Plan, Eligible Consumers free to contract bilaterally on their own terms and conditions
- **Market Architecture:** Bilateral Contracts complimented with balancing mechanisms for capacity and energy

CTBCM Main Features

CTBCM is **wholesale competitive electricity market** where electricity will be traded in **bulk quantities** on **competitive prices**

Main Features:

- Establishment of an **independent and impartial** Market Operator
- **Dispatch Operations** improved through strengthening of System Operator
- Tool based **Security Constrained Economic Dispatch**
- **Generation adequacy** ensured through **Capacity Obligations**
- **New Capacity** for DISCOs procured through **centralized auction by** Independent Auction Administrator (IAA)
- Introduction of **Credit Covers** to cover non-payment risks in the market
- Government Support for **low performing DISCOs**
- **Balancing Mechanisms** introduced to trade imbalances on **market prices**

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CTBCM Main Features

- Rules and Regulations established for **Market Participants** and **Service Providers**
- **Legacy PPAs/EPAs** will be **commercially allocated** to the DISCOs and will be legally administered by the Special Purpose Trader (SPT)
- Introduction of **flexibilities** in new contracts
- **Contract Registrar** to check **validity** of contracts and **verify capacity obligations** of the market participants
- **New Commercial Code** to govern the operations of MO
- **Existing Commercial Code amended** to govern the operations of SPT as per new market design
- **Amendments** in certain sub-codes of **Grid Code** to reflect the market design i.e. SDC, Metering, DRC and Planning
- **Strengthening of Institutions** i.e. MO, SO, IAA, DISCOs
- **Institutionalization** of data to enhance **transparency**

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Capacity Obligations

- **Capacity Obligations** are introduced to ensure **Security of Supply and Generation Adequacy** in the system
- Market **participants representing Demand** will have the obligation to **contract in advance** sufficient capacity (contribution to system peak and system reserves) to serve its load
- Each market participant will be **accountable** for its **demand projections**
- These capacity obligations is a contribution to ensure **medium and long term security** of supply
- Obligations for each demand participant will be **calculated in advance** by MO based on an approved criteria
- Capacity Obligations will be **verified** by the **Contract Registrar** function of the MO

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Future Procurement Price Discovery through Competitive Auction

- **All future procurements for regulated customers will be subject to competitive procurements (to the extent feasible)**
- **The competitive process will be subject to NEPRA's regulations and oversight**
- The IAA will consolidate requirements from all DISCOs and will run competitive auctions as per process approved by NEPRA
- After successful completion of the bidding process, the IAA will nominate successful bidders which will then be required to approve their tariffs from NEPRA
- After approval of such tariffs, NEPRA will be bound to pass through these costs to end-customer tariffs of the DISCOs.

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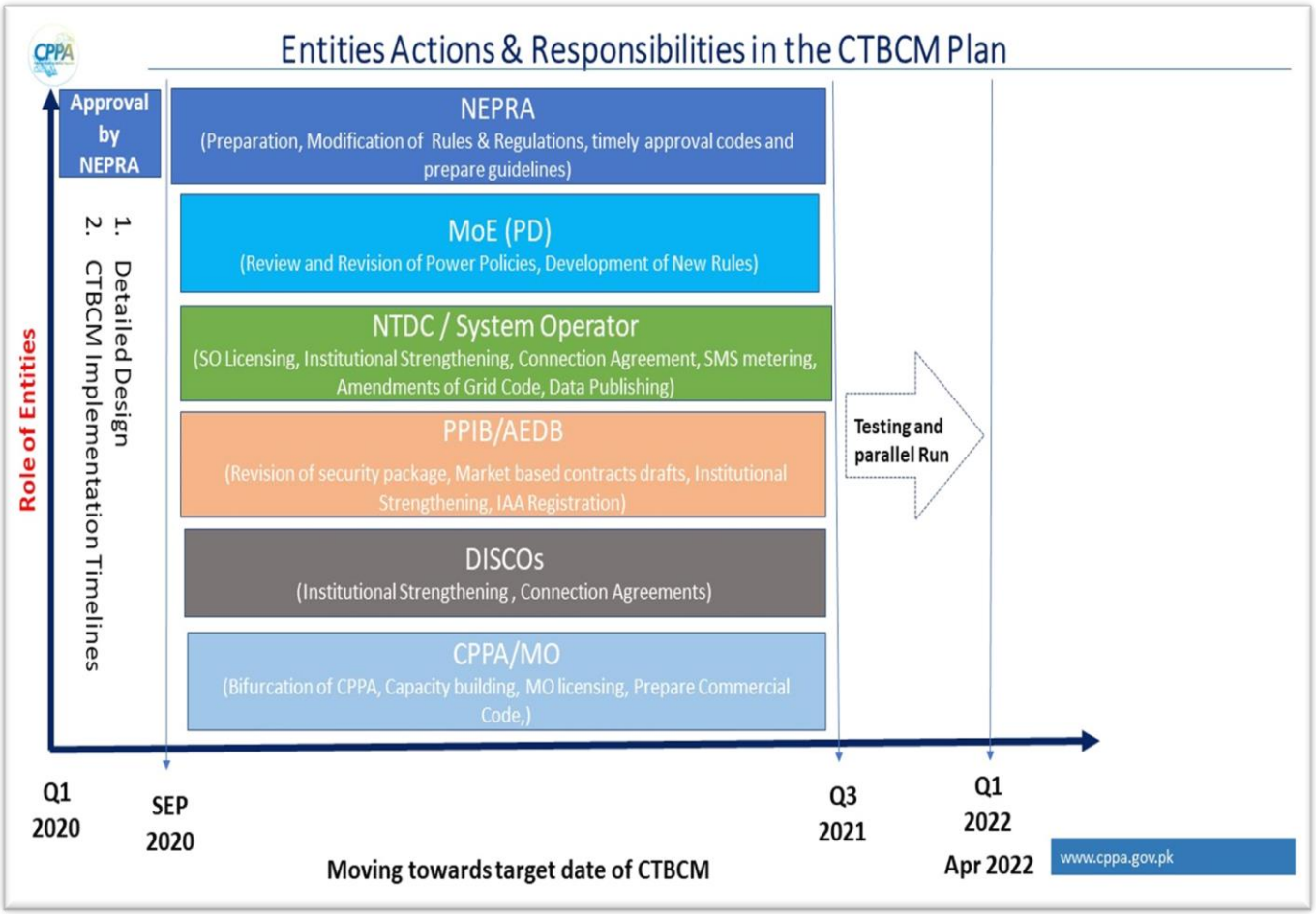
Part-5

CTBCM Implementation Plan and Monitoring



Implementation & Monitoring

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Thanks

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