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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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- 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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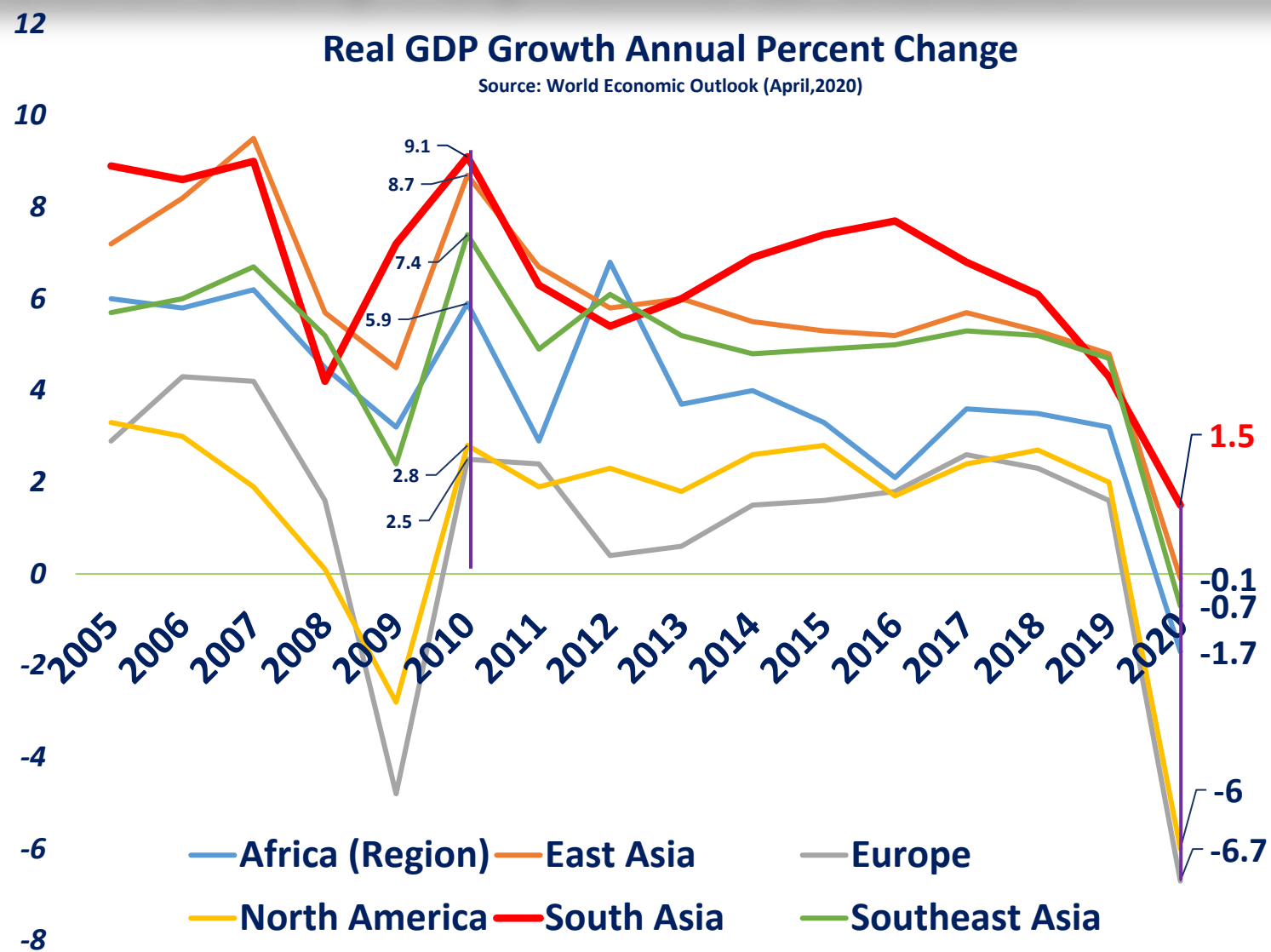
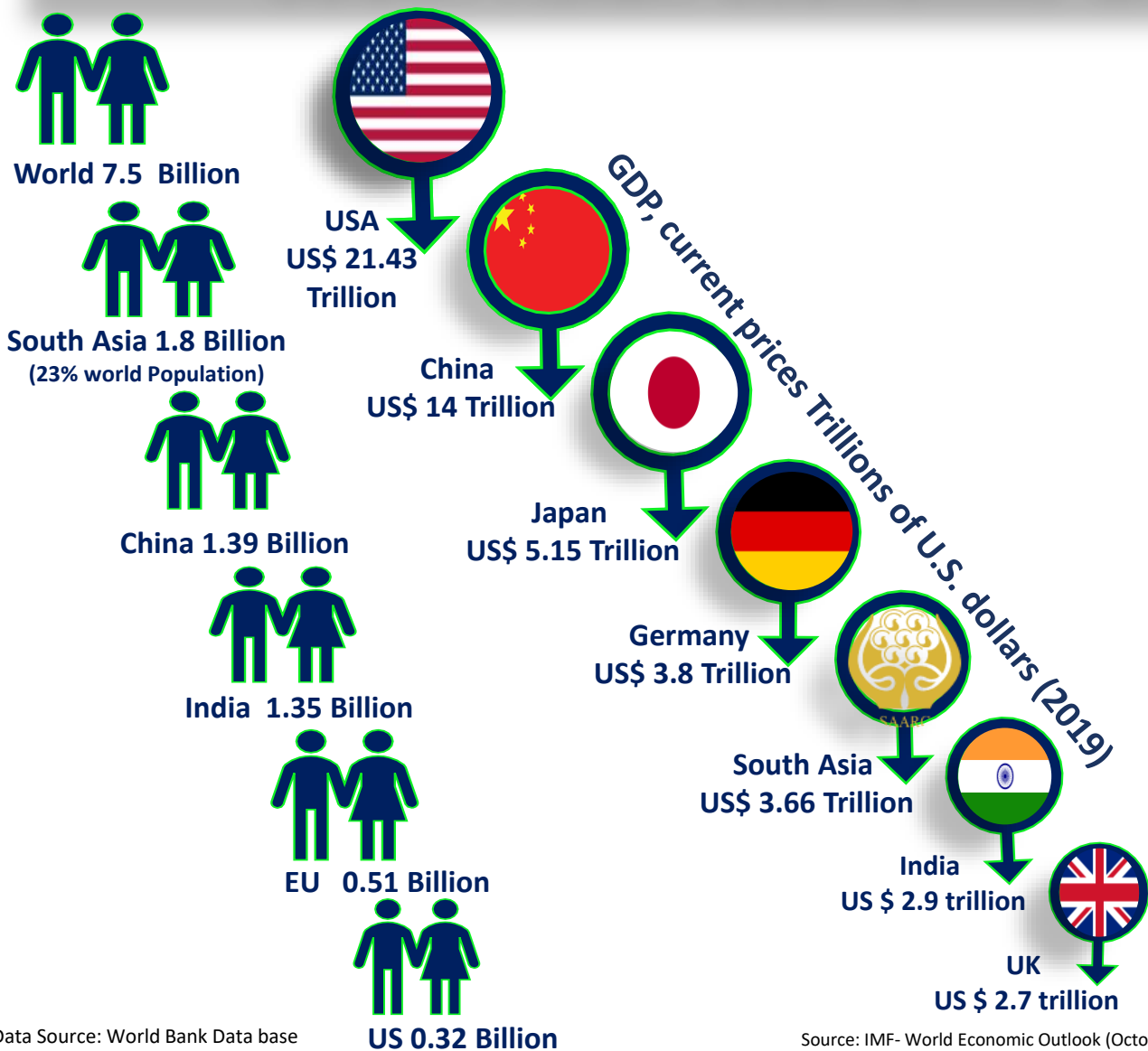
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# **Marco-Economic Growth & Economic Integration of South Asia**





# South Asian Economic Growth Story : Dynamic & Vibrant



Data Source: World Bank Data base

Source: IMF- World Economic Outlook (October 2019)

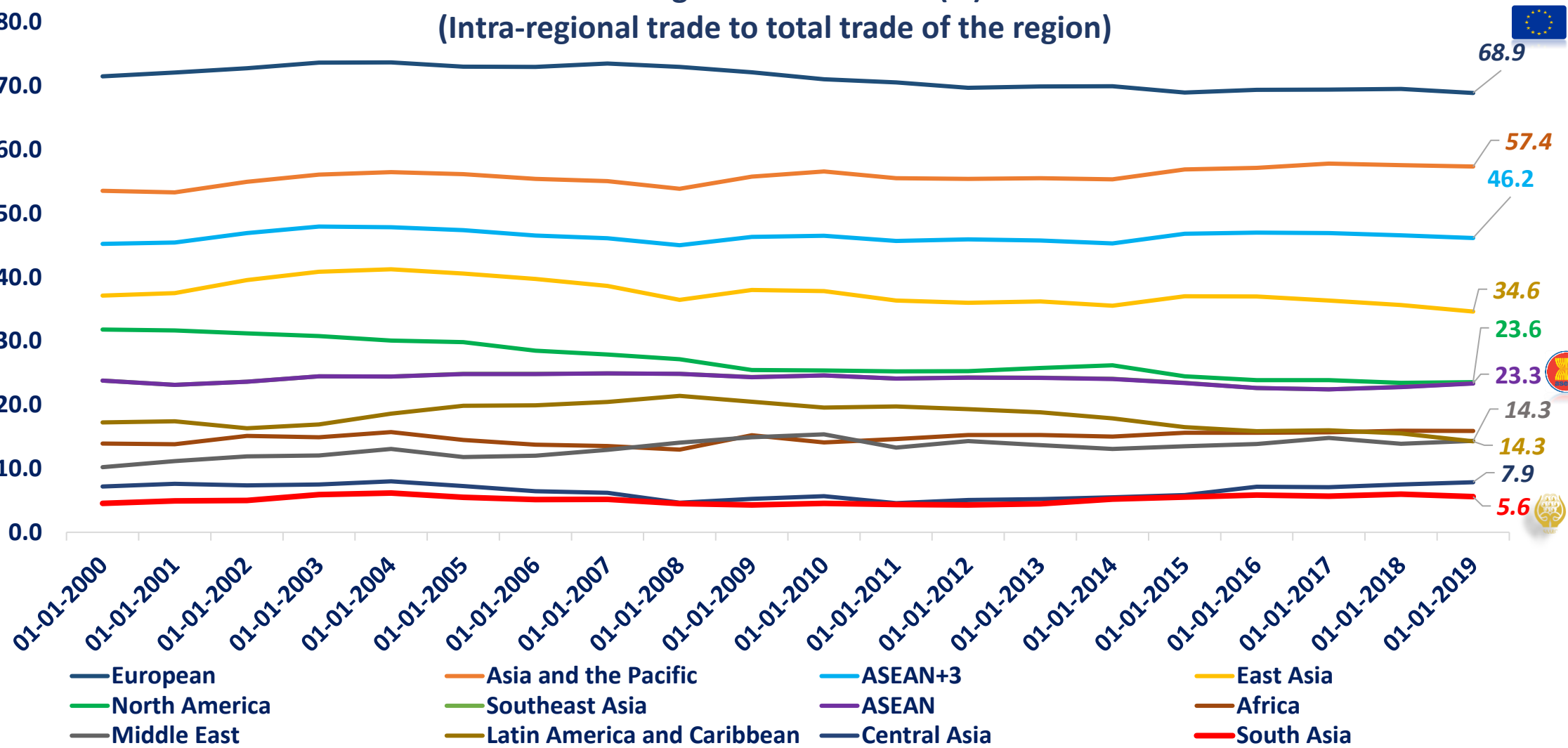
Source: IMF- World Economic Outlook (April, 2020), [https://www.imf.org/external/datamapper/NGDP\\_RPCH@WEO/AFQ/EAQ/SAQ/SEQ/EUQ/NMQ](https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/AFQ/EAQ/SAQ/SEQ/EUQ/NMQ)

**South Asia : Fastest growing region in the world in recent past & expected to remain so in future**



# South Asia : Yet Least Integrated

**Intra-regional Trade Share (%)**  
(Intra-regional trade to total trade of the region)



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.



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# Overview of South Asian Power System

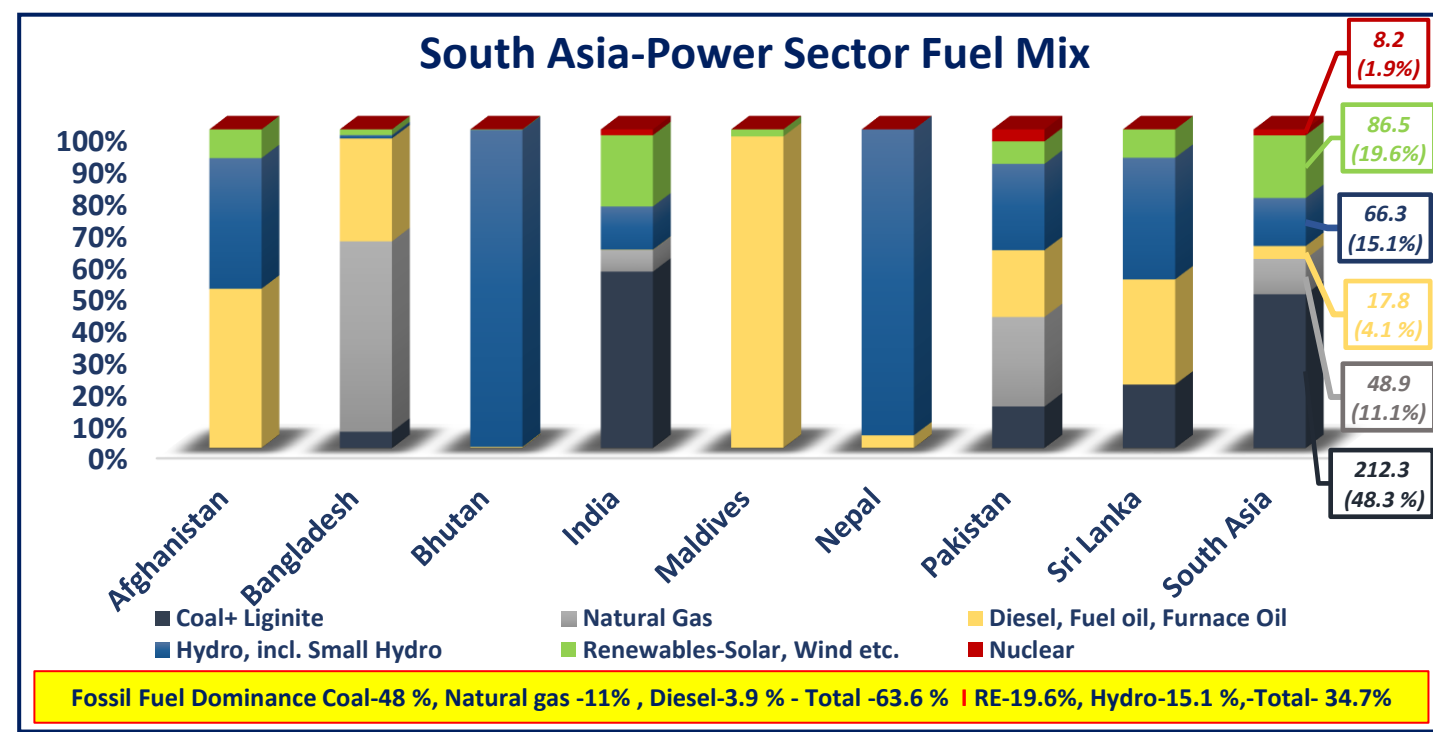
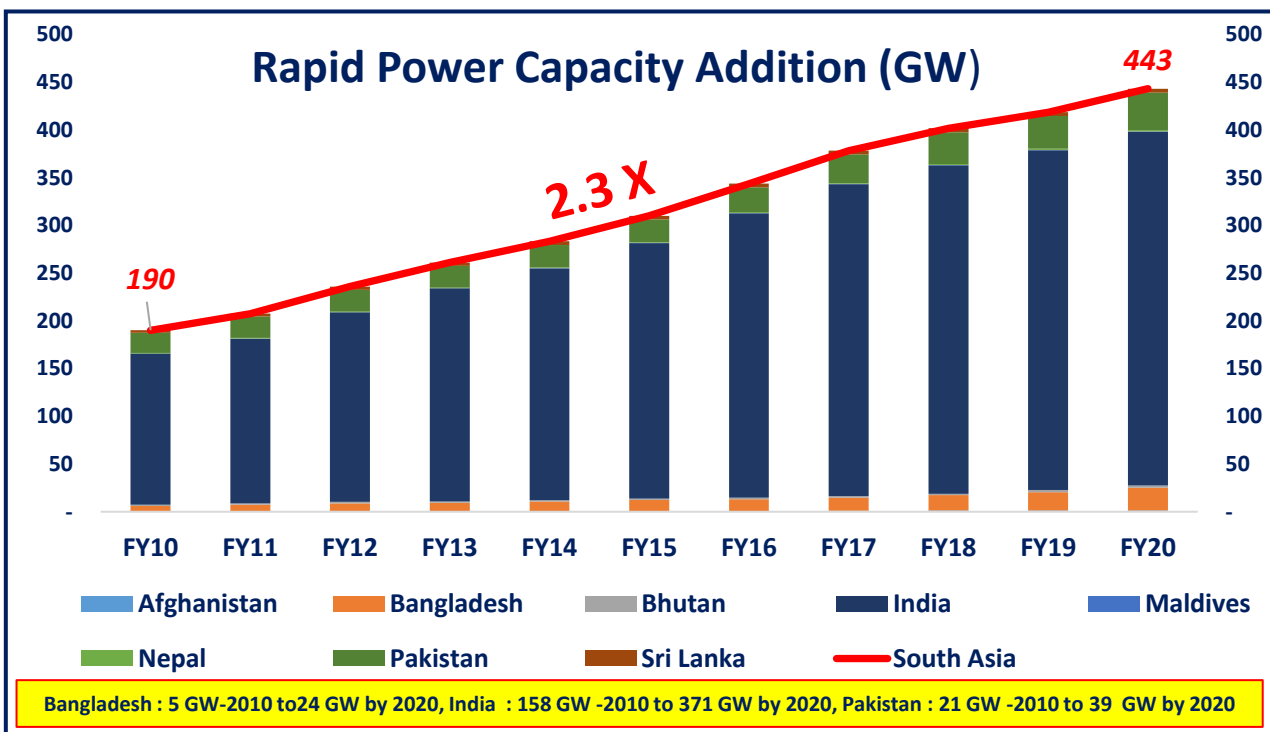
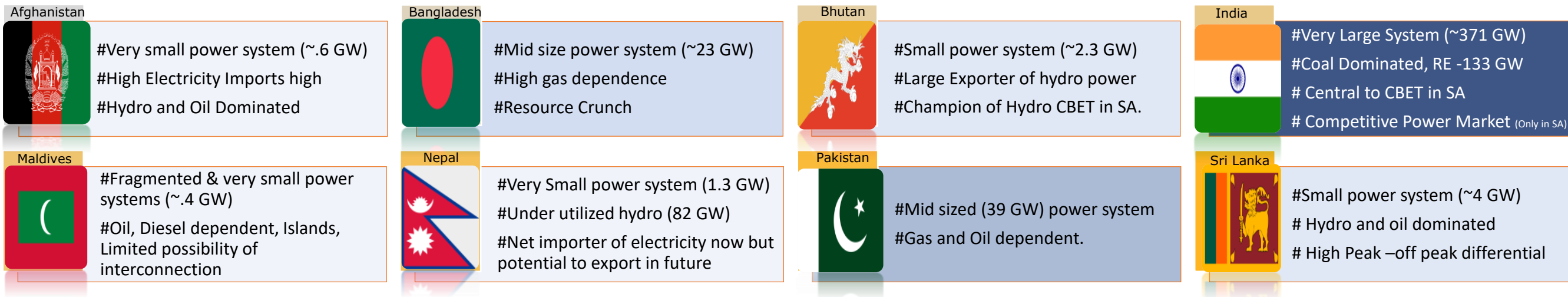




# South Asia Power System-Snapshot



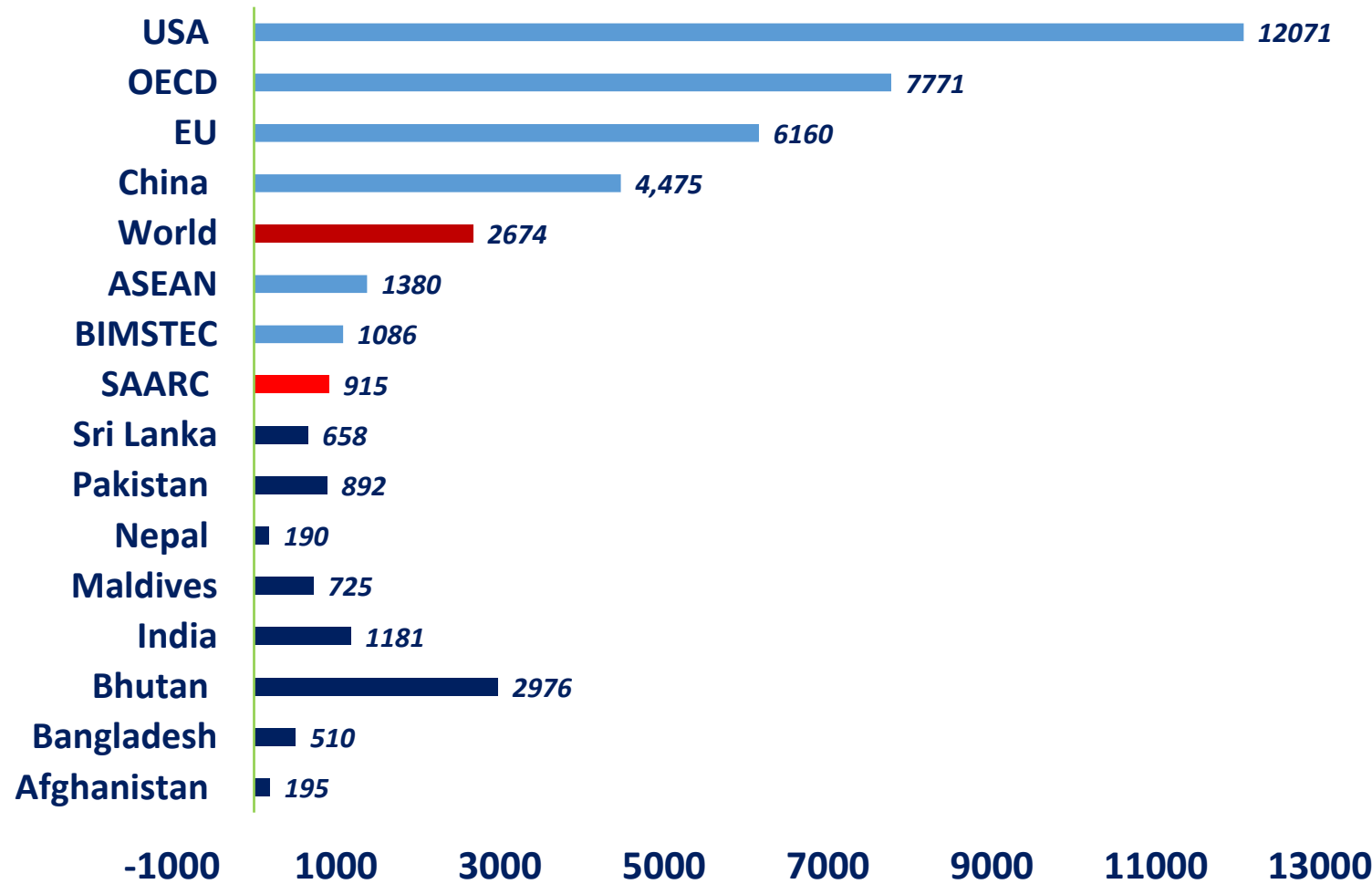
size, < 200 GW-Large, < 500 GW-Very Large





# Yet Challenges Remain

## Electricity Consumption (kWh per capita)\*



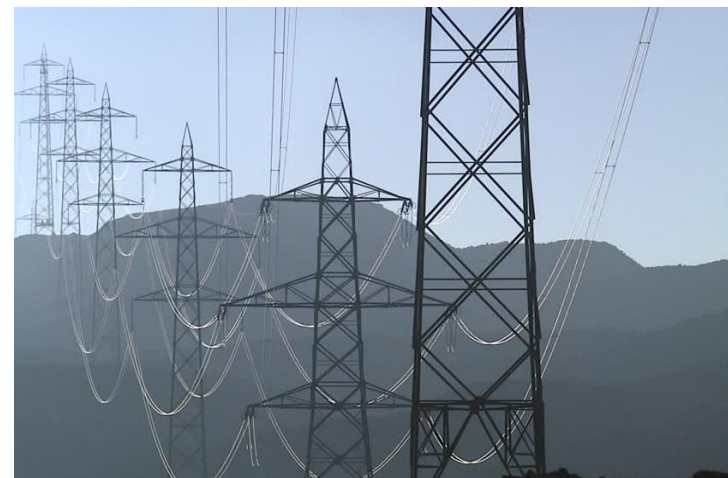
\* Compiled from various Sources, For Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan data is for year 2019, ASEAN-2017, World-2014, China (2017), EU-2014, OECD-2014, USA-2016, For Bangladesh, Per Capita Power generation is considered as per data available from Power Cell, ASEAN, per capita demand is considered as per data available

## 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

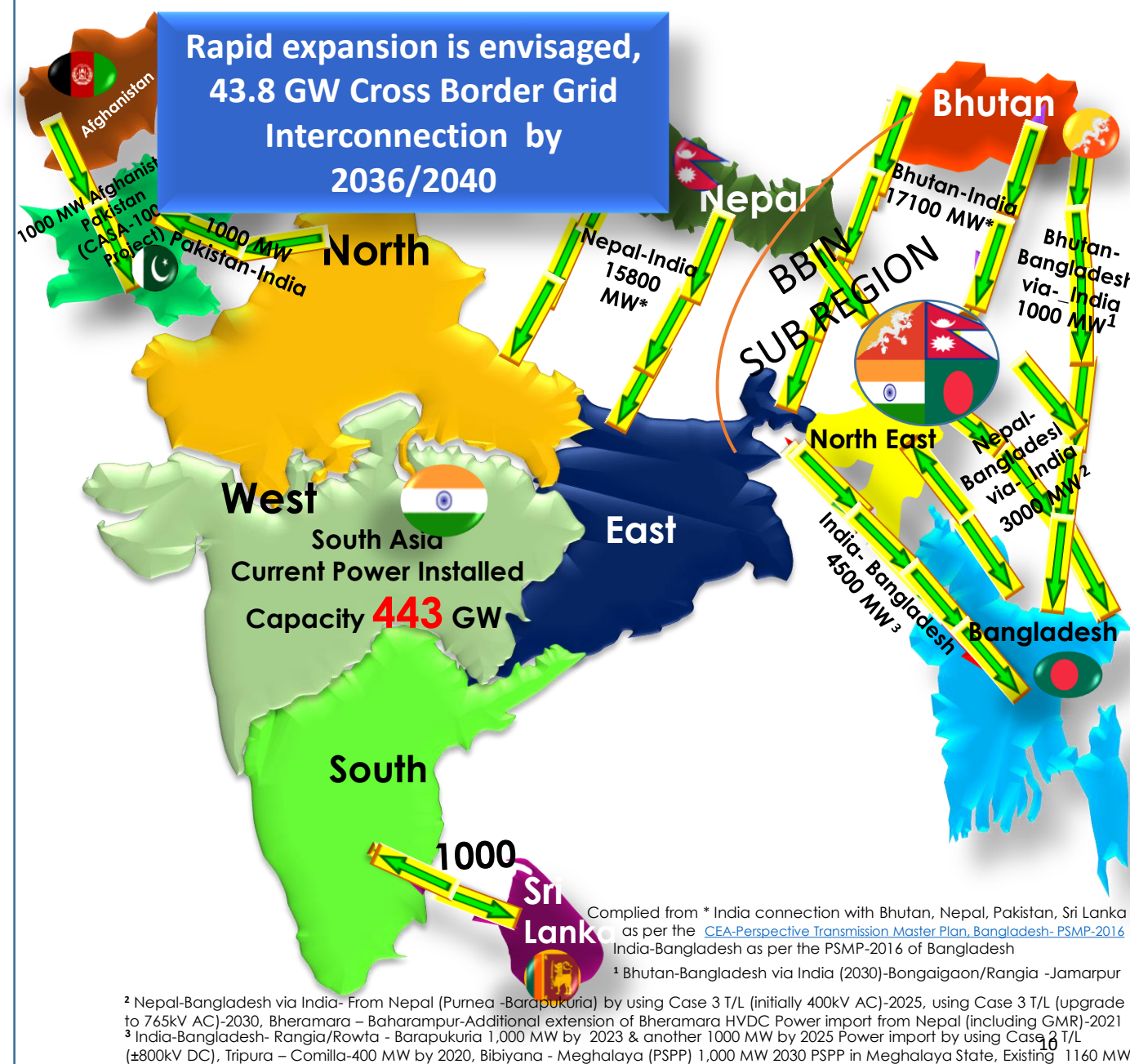
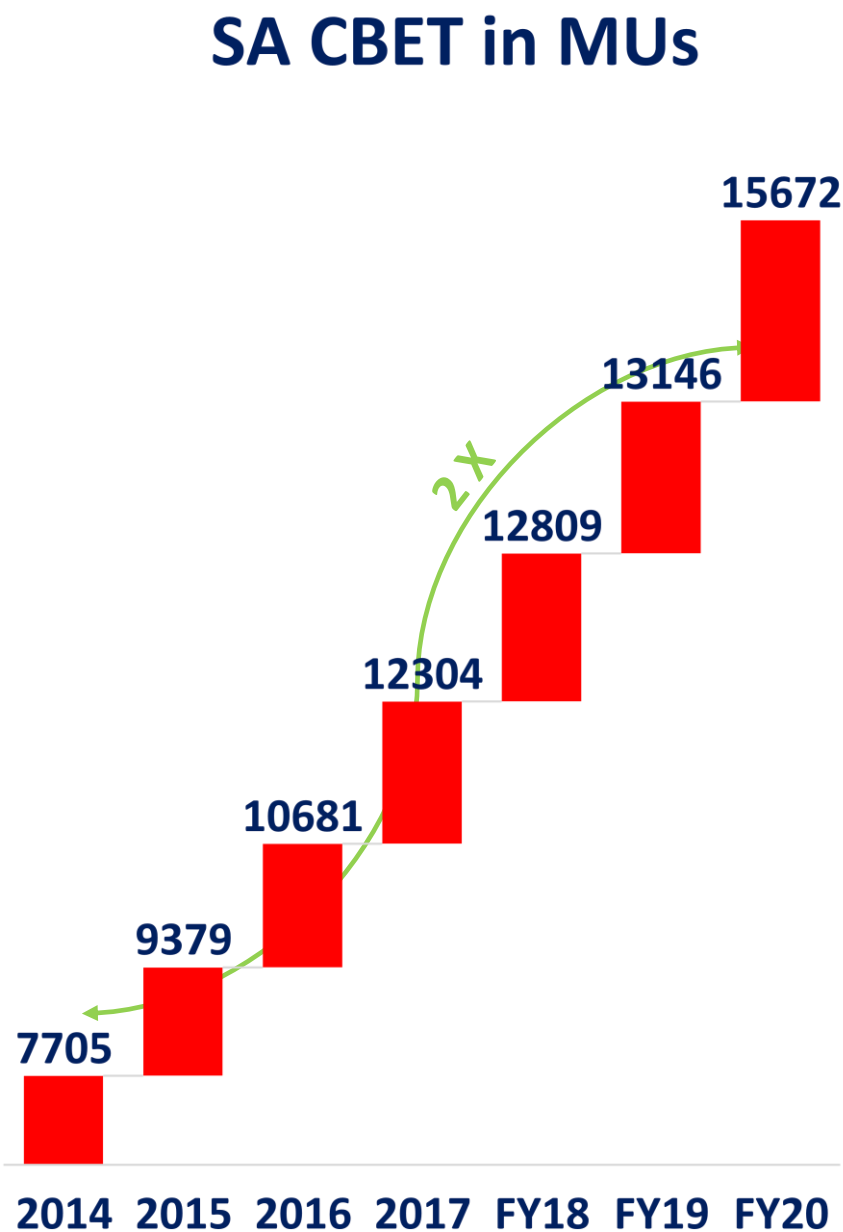
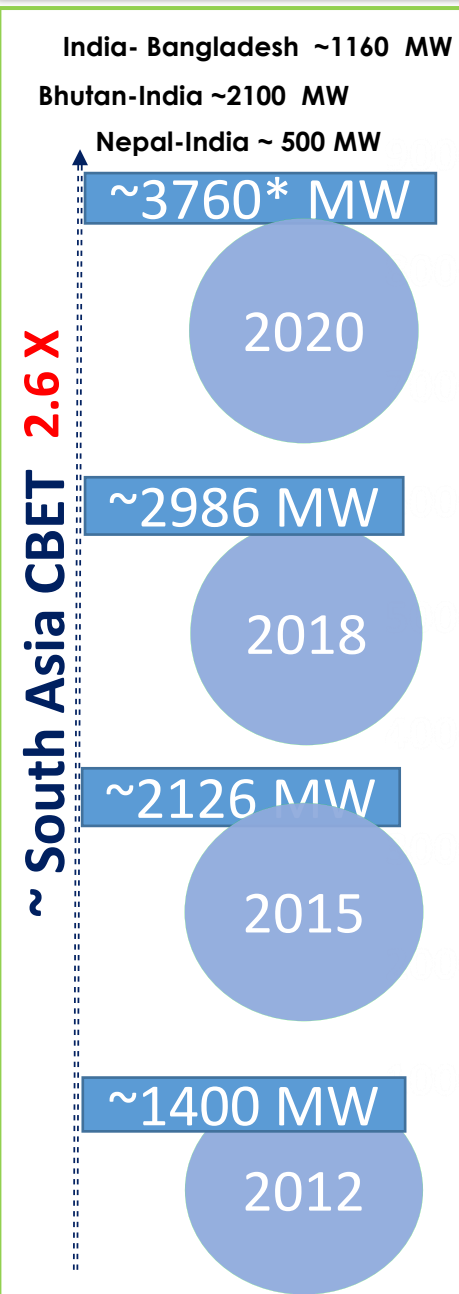


# Cross Border Electricity Trade in South Asia: *Current Status* and *Future Scenario*

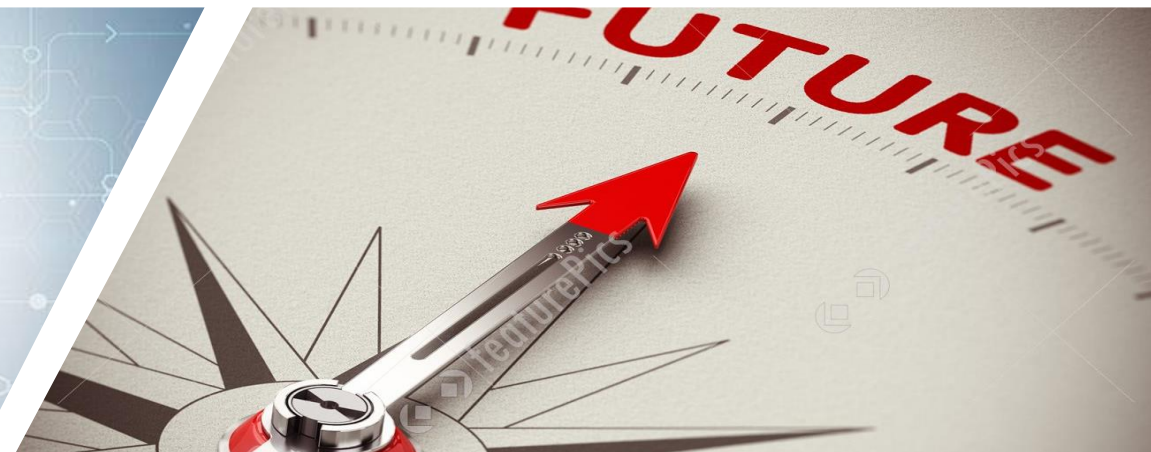




# South Asia (SA) - Cross Border Electricity Trade (MW) : Current Status & Future Scenario







# Cross Border Electricity Trade in South Asia:

## *Future Outlook*





# 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**



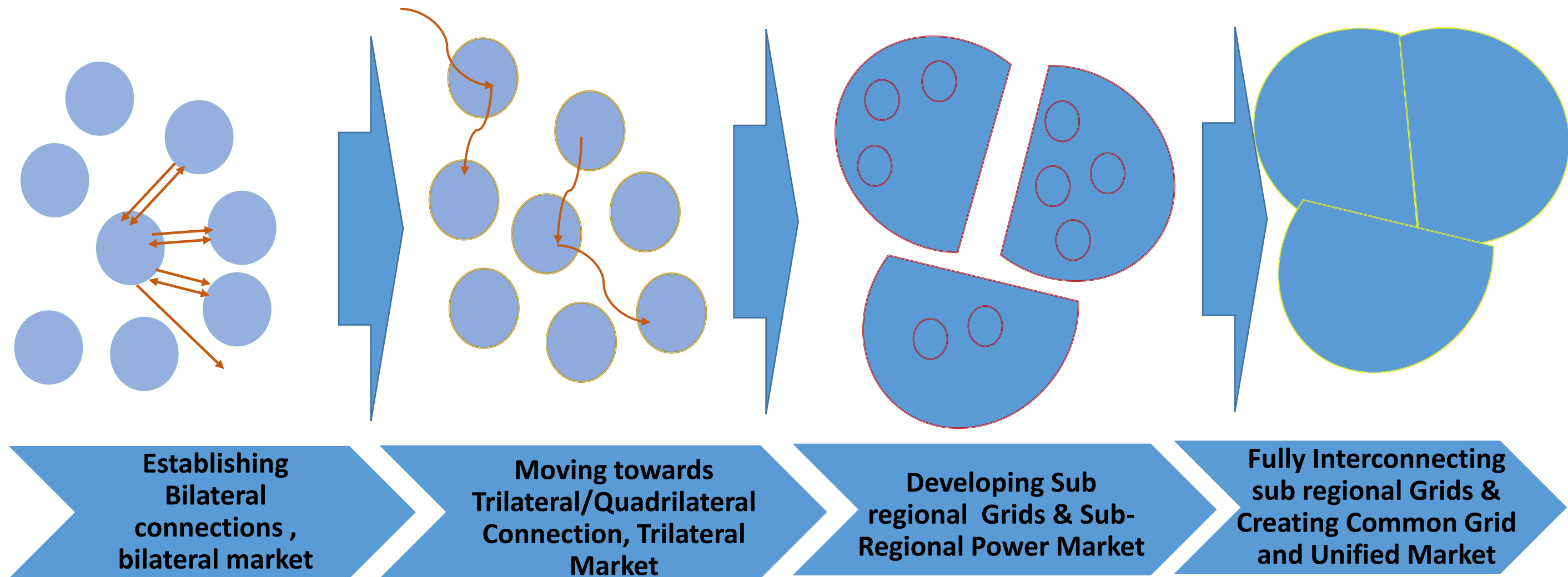


# **CBET Outlook -1**

## **Transitioning from Bilateral to Trilateral CBET**



# Power system Integration evolution across the Globe



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

# Gradual Transition to Trilateral Cross Border Power Trade



**Bangladesh Master Plan<sup>#</sup>** envisaged to import from **Bhutan (1 GW) & Nepal (3 GW)** through India



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

*(DPR under preparation)*

**\$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<sup>##</sup>

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



<sup>#</sup> Power System Master plan 2016 (Final)-<https://powerdivision.gov.bd/site/page/f68eb32d-cc0b-483e-b047-13eb81da6820/Power-System-Master-Plan-2016>

<sup>##</sup> <https://kathmandupost.com/money/2020/02/09/bangladesh-issues-letter-of-intent-to-purchase-500-mw-from-upper-karnali-hydro-project>





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# CBET Outlook-2

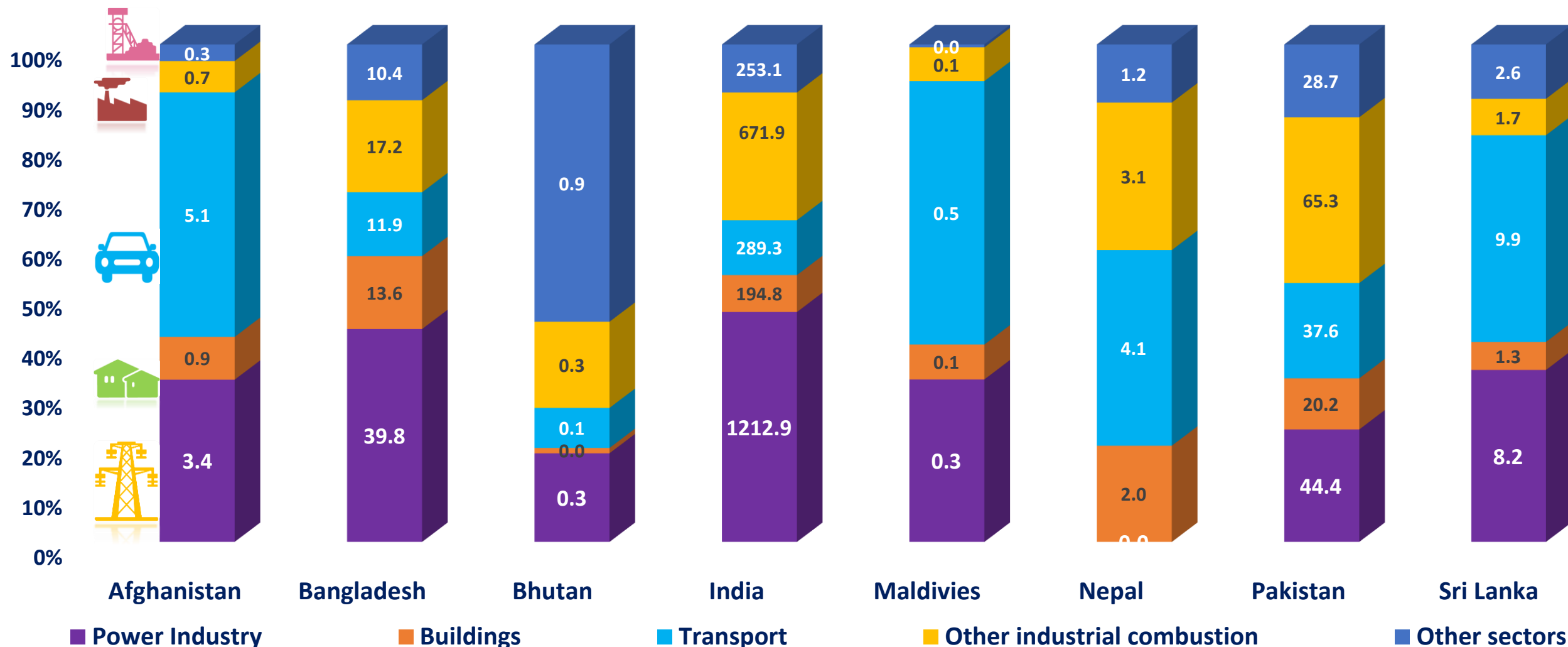
## Renewable Energy based CBET





# South Asia-Significant Environment/Climate Change Challenge

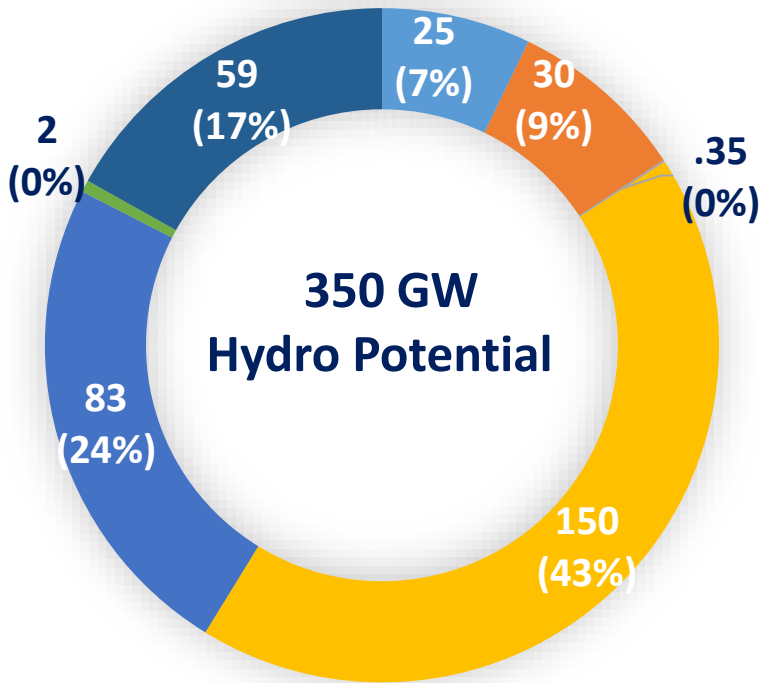
SAARC Countries-fossil\_CO2\_by\_sector\_ in Mt CO2/yr (2018)



**South Asia : Vulnerable to adverse impacts of climate change, De-Carbonising the Power Sector is crucial.**

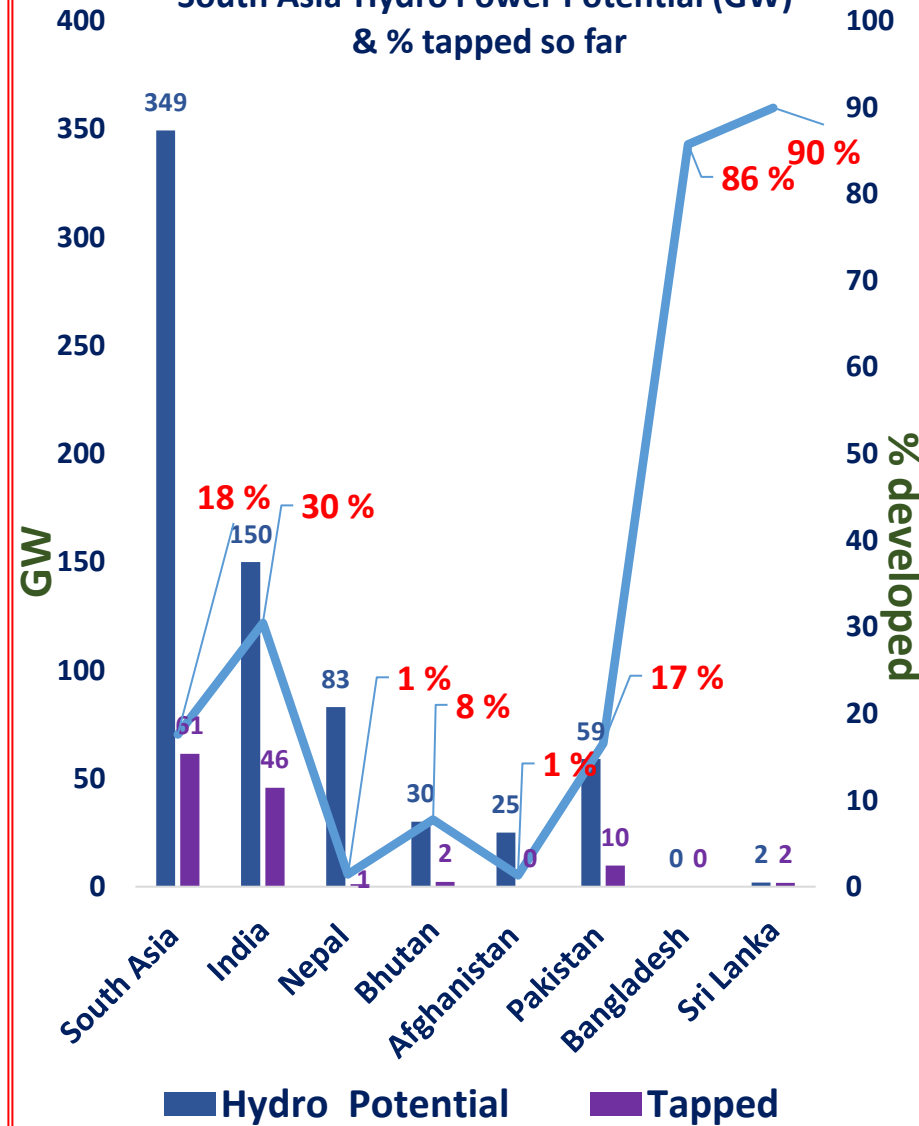
# South Asia-Large Renewable Energy Potential

**South Asia Hydro Power Potential in GW (%)**

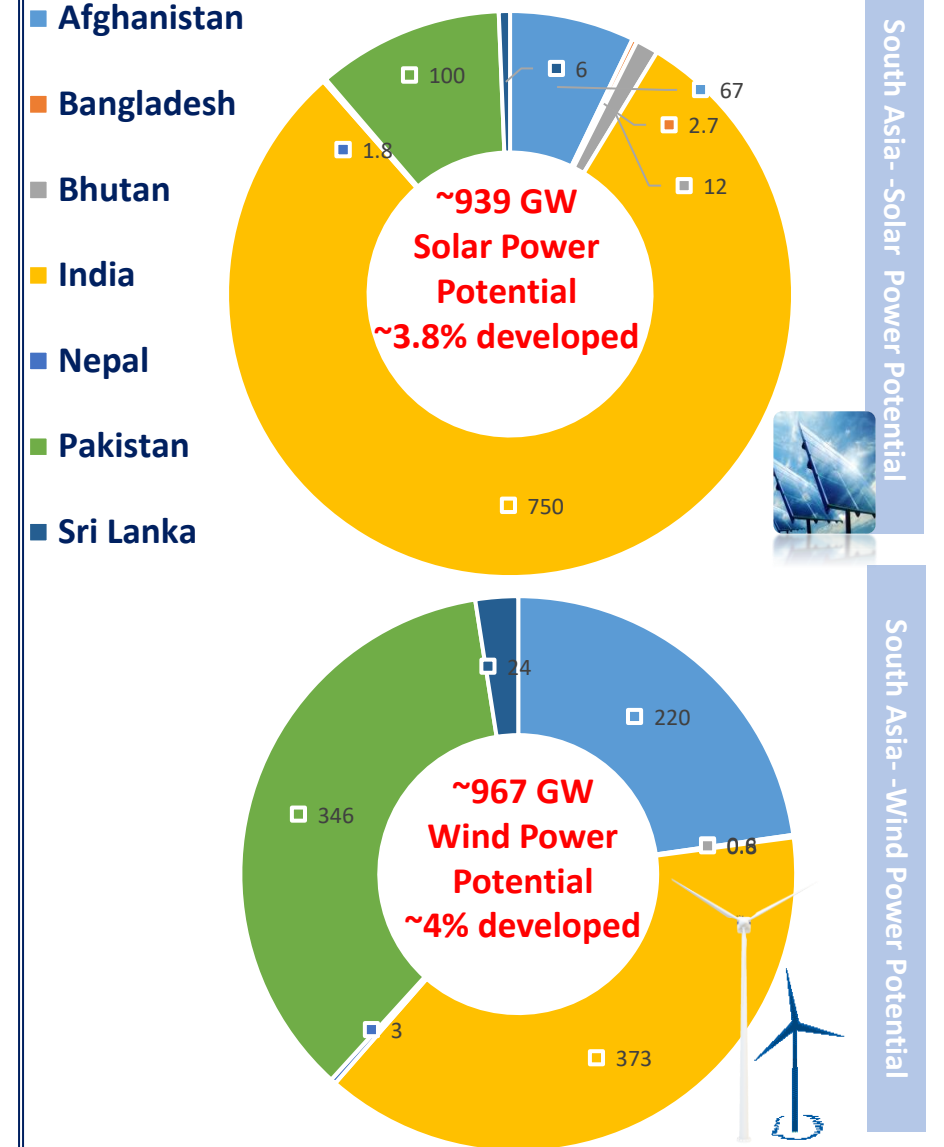


- Afghanistan
- Bhutan
- Bangladesh
- India
- Nepal
- Sri Lanka
- Pakistan

**South Asia-Hydro Power Potential (GW) & % tapped so far**



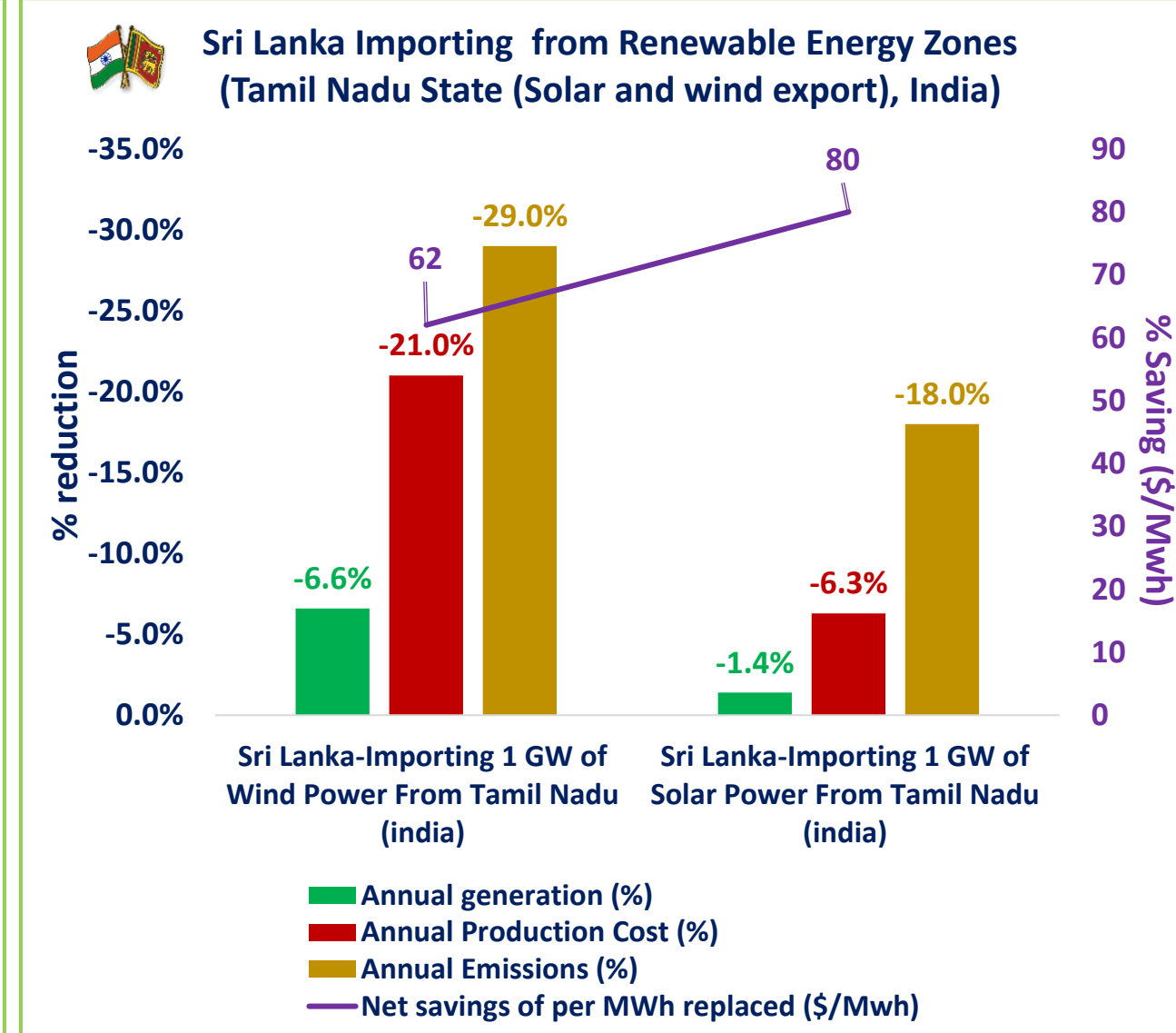
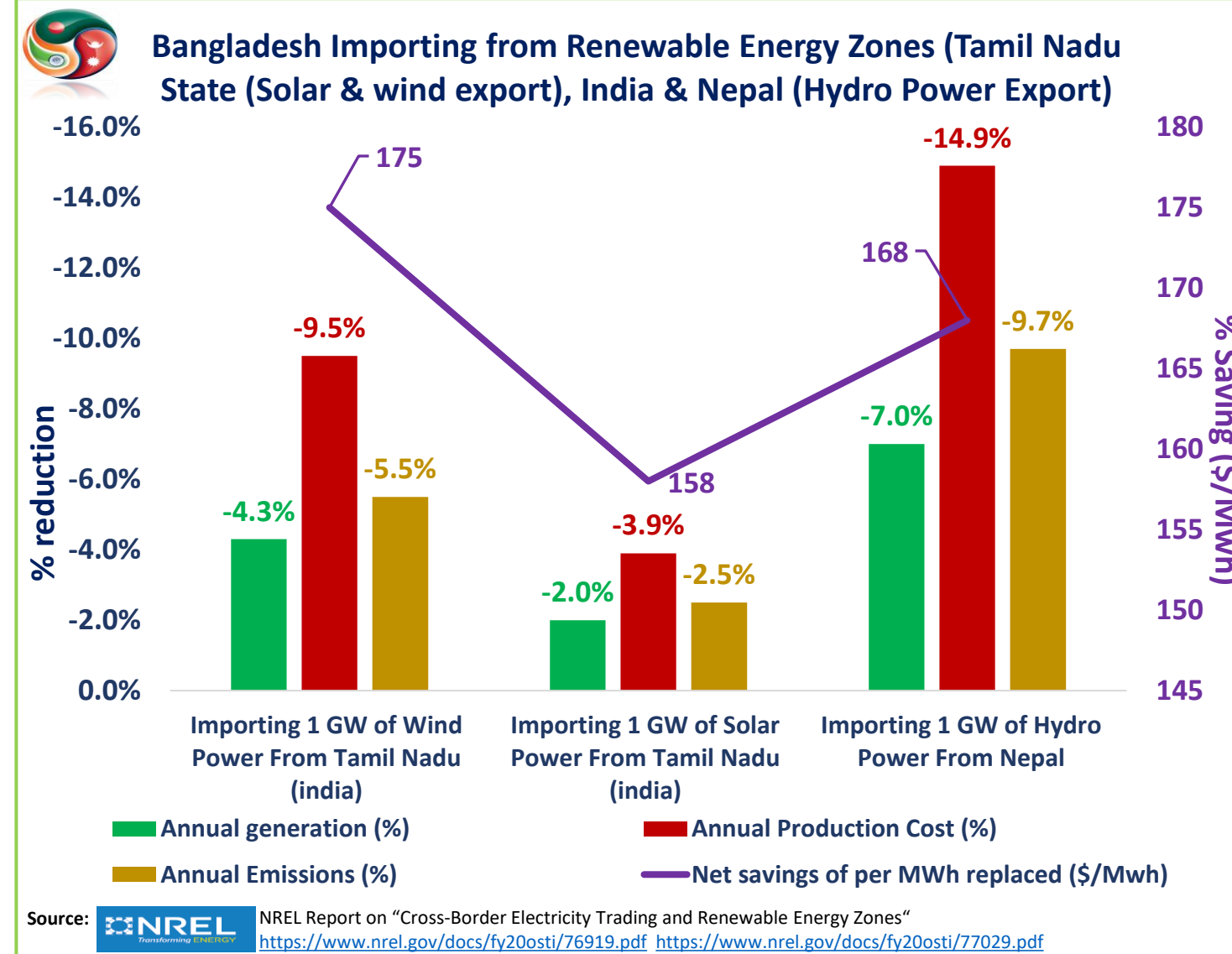
**Large Solar & Wind Potential**



**South Asia : Large Renewable Energy Resource within the Region-Potential for clean energy transition, sustainability & energy security**



# South Asia : Cross Border Electricity Trade From Renewable Energy Zones

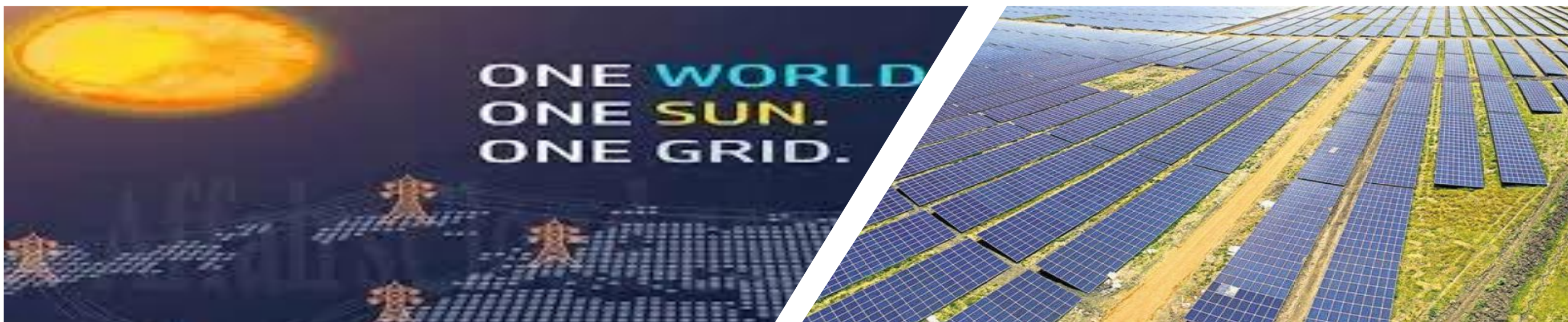


**South Asia : GW scale RE based trilateral CBET offers cost saving, clean energy transition:-leads to enhance energy affordability & sustainability**





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





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



**India-Idea Announced  
in October 2018**

Ministry of New and Renewable Energy  
Government of India



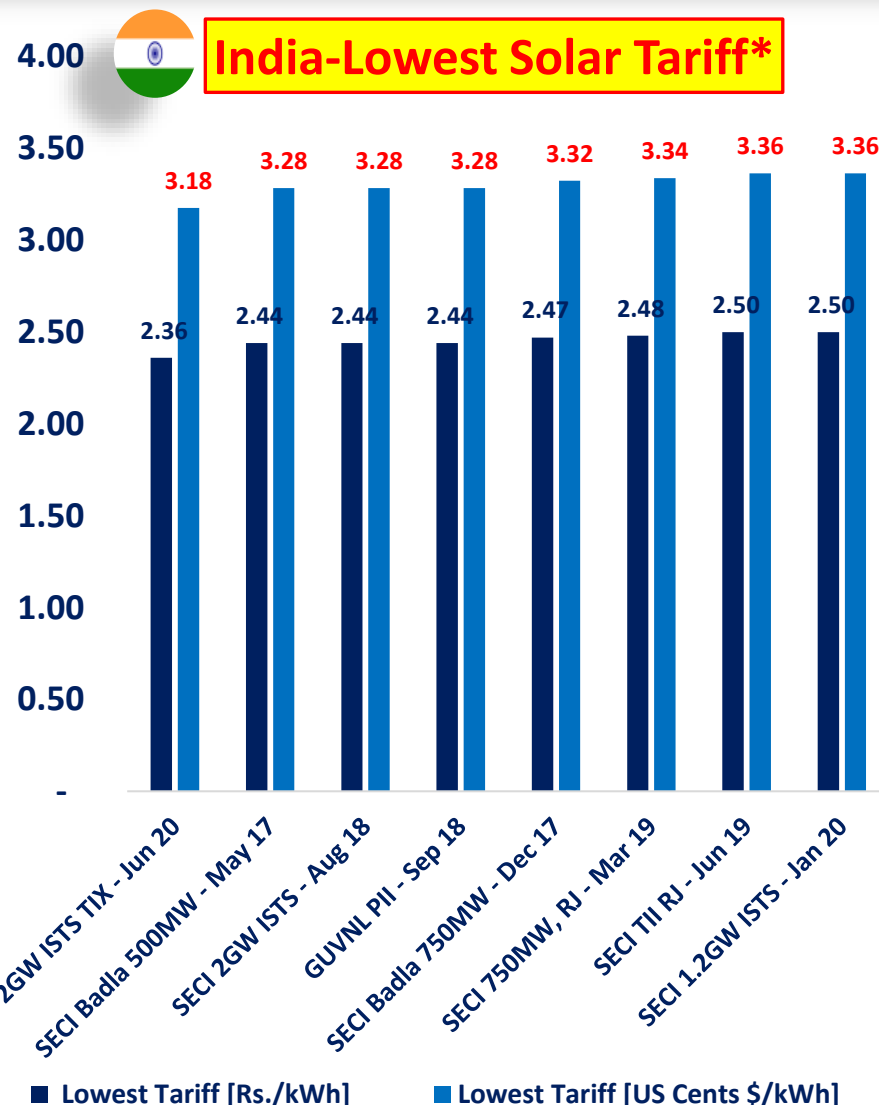
The **"Sun Never Sets"**,  
globally, at any given point of  
time.



Building a **global ecosystem of  
interconnected RE**, seamlessly  
shared for **mutual benefits &  
global sustainability**



Large Scale **regional & trans-  
region** cross border  
transmission interconnection



\* 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**

# CBET Outlook -3

## Commercial form of CBET





# 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) <b>G-G-2136</b> <b>Comml-126</b> 	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) <b>G-G-410</b> <b>Comml-790</b> 	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) <b>G-G-237</b> <b>Comml-350</b> 	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 business case, help in fostering private sector engagement & investment**



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## CBET Outlook -4

# Regional Power Market Development & Market Integration





# 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**)



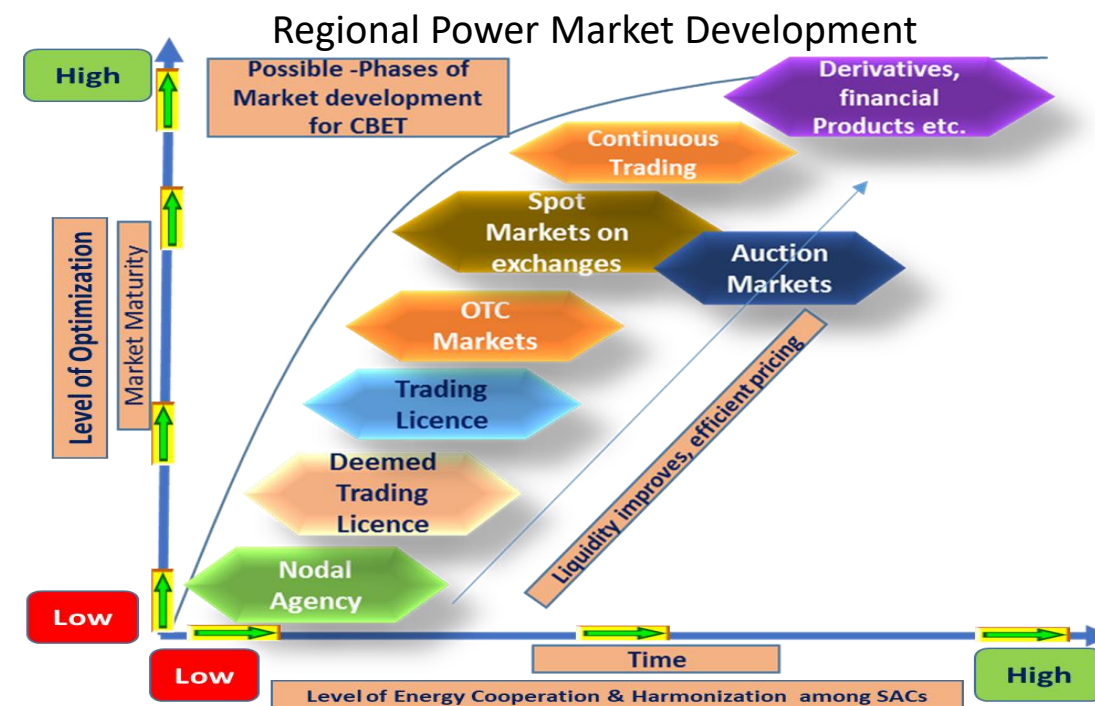
SARI/EI-Study-**SARPEX- Pilot Market Exercise-** DAM in  
PX Platform. Bangladesh, Nepal, Bhutan in PXs, the  
quantum of MCV increased in the range of 5-7% (2015-  
16).

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 <sup>2</sup>

	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						



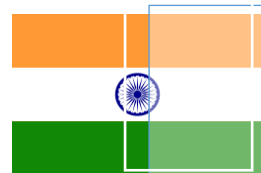
<sup>2</sup> Source: [World Bank Study](#)

<sup>1</sup> Government of India (GoI), Ministry of Power (MoP) guidelines- Import/Export Cross Border Electricity

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

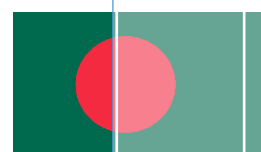


**Rapid Renewable  
Energy Expansion in  
the horizon in SA**



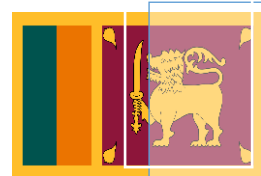
**175 GW by 2022**

**450 Gw<sup>1</sup> 2030**



**Bangladesh**

**7.9 Gw<sup>2</sup> by 2041**



**Sri Lanka**

**50% Generation<sup>4</sup> from  
RE by 2030**



**Pakistan**

**16 Gw<sup>3</sup> by 2040**



**Hydro Power through CBET for  
optimised grid balancing**



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



**Successful 9 PM, 9 Minute-A  
generation flexibility of ~ 400  
MW was achieved from  
hydropower plants in Bhutan<sup>5</sup>**



**CBET as a tool for flexibility,  
managing RE Intermittency**



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



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

**In 2016, 80% of Denmark's wind generation<sup>6</sup> 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**



# 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)





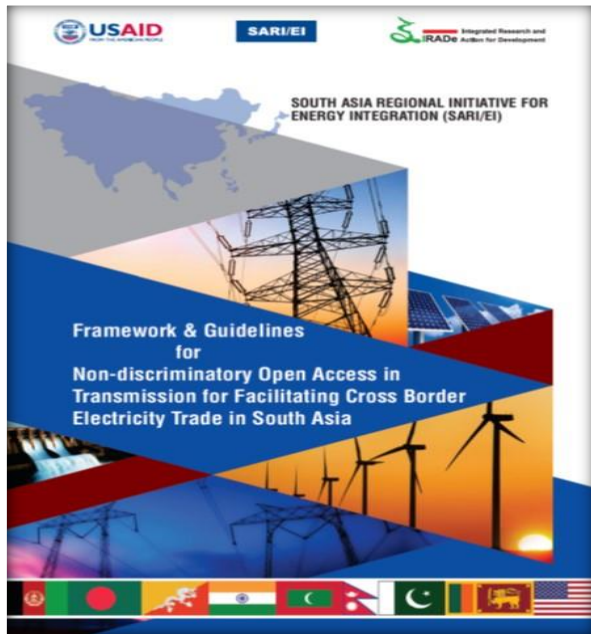
# SARI/EI Published Studies: An effort to Provide Actionability to articles of SAARC FAEC(E)

## 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

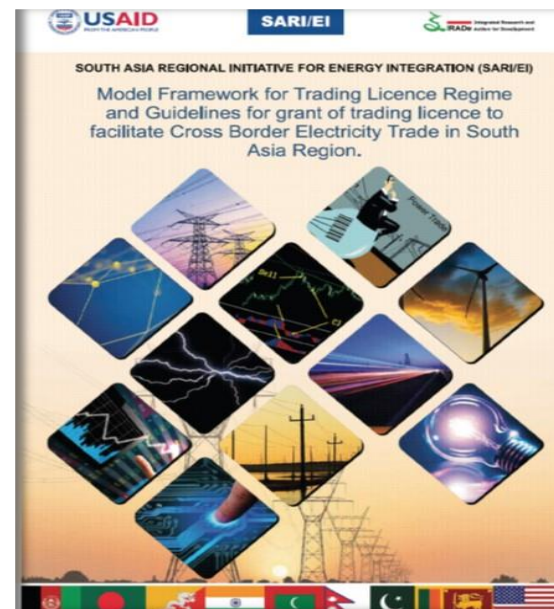
SA-South Asia

## 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

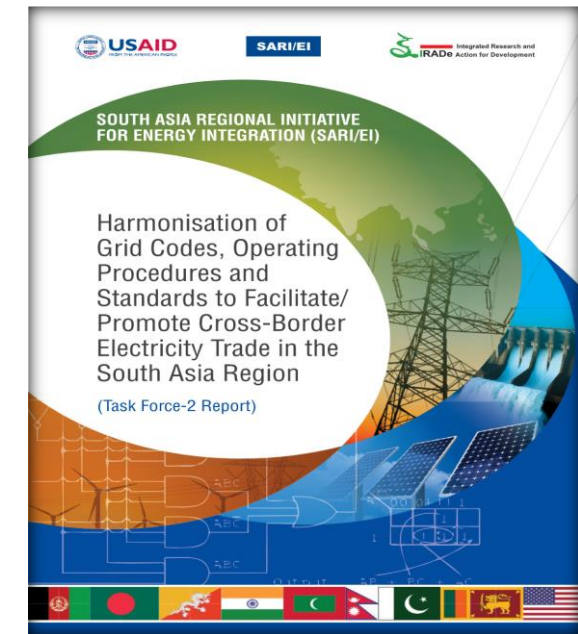


- ❑ Report Suggested detailed Model Framework & Guidelines (on 7 key areas) for trading license regime in South Asia
- ❑ Implementation Roadmap- Regional Level Action & Country specific Action Plan

## 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



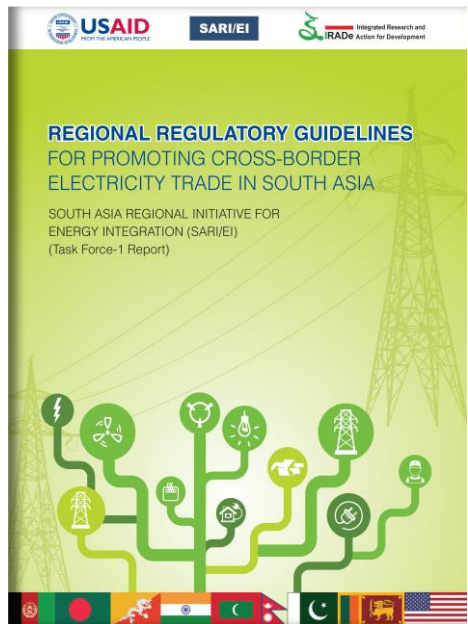
- ❑ Report Suggested a very detailed set of Framework Grid Code Guidelines on Planning, Connection, Operation and Scheduling & Dispatch Guidelines.
- ❑ Suggested Regional Technical Institutional Mechanism.



# 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.

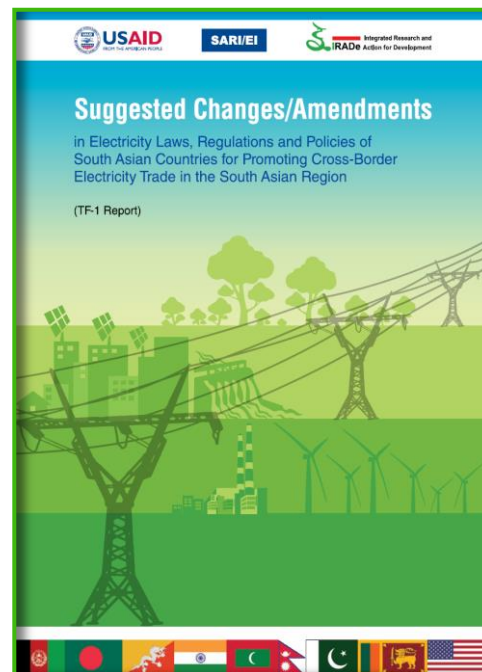
## Regional Regulatory Guidelines (RRGs) for Promoting CBET in SA Region



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

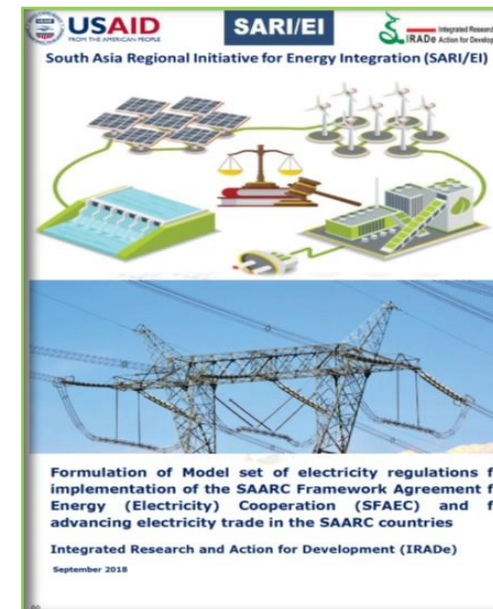
SA-South Asia

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



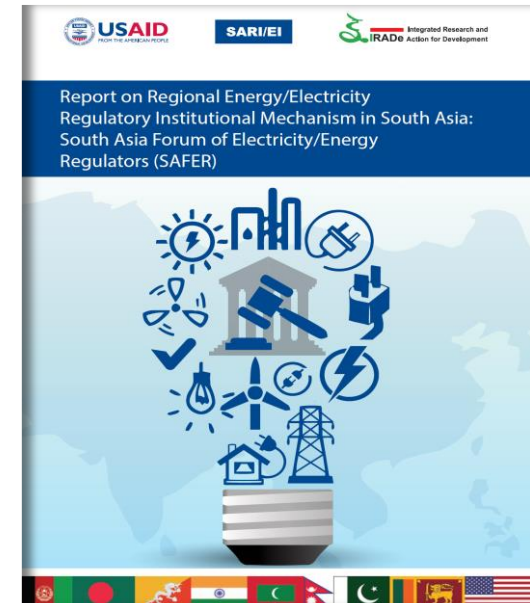
- ❑ Key ingredients for CBET
- ❑ Clause/section wise suggested changes/amendments in EL&R&P framework-Country Wise

## 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

# 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.}*



## *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)**

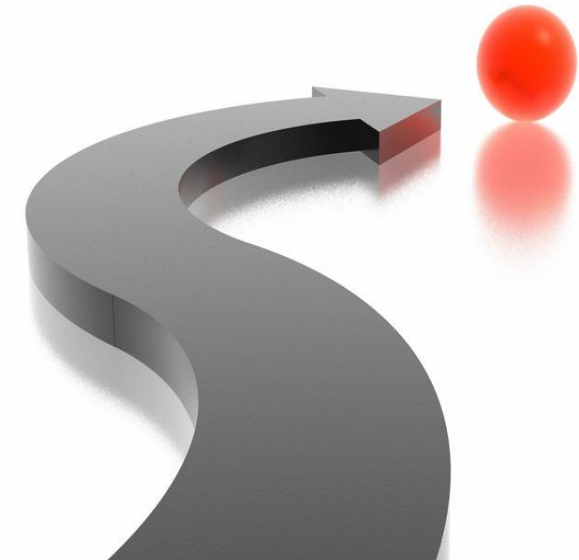
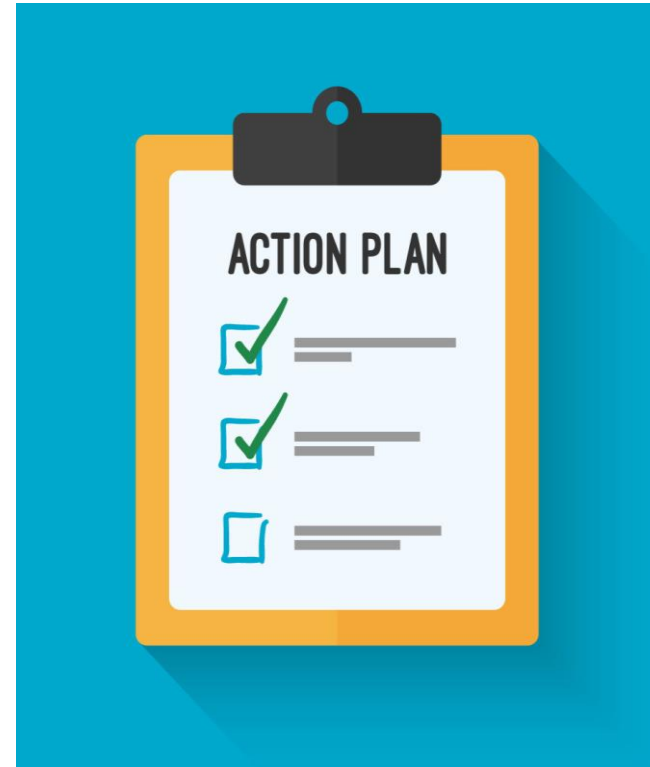


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# *Road Map and Action Plan*





# 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**



























































































**It always seems  
impossible until it's done.**

Nelson Mandela

# Thank You










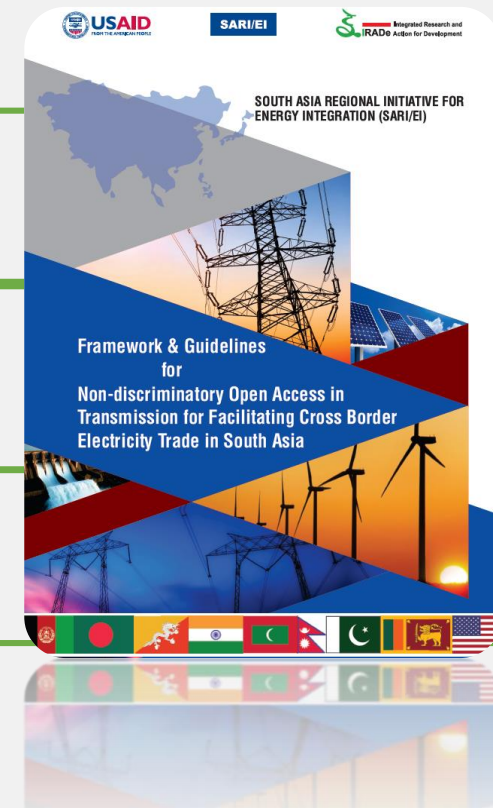
# SARI-EI Study: Open Access Desirable pre-requisites availability in South Asia power sector

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

 Very low
  Low
  Moderate
  High
  Very High

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

	<b>Introduce enabling provisions for open access</b>	<ul style="list-style-type: none"> <li>• Introduction of <b>open access in the legislative framework</b> for electricity where it does not exist</li> <li>• Treatment of open access for cross border trade</li> <li>• Introducing <b>changes in the power market structure</b> to aid and enable open access</li> <li>• <b>Enable system operators</b> to co-ordinate cross border power flows</li> </ul>
	<b>Define features and eligibility criteria for connectivity and open access</b>	<ul style="list-style-type: none"> <li>• <b>Types</b> of open access</li> <li>• <b>Tenure and priority</b> of various types of open access</li> <li>• Eligibility <b>criteria for connectivity and open access</b></li> </ul>
	<b>Fixation of open access charges</b>	<ul style="list-style-type: none"> <li>• <b>Segregation and fixation</b> of transmission &amp; system operation charges</li> <li>• Application <b>fees</b></li> <li>• <b>Relinquishment</b> charges for open access</li> </ul>
	<b>Terms and conditions, and information system for open access</b>	<ul style="list-style-type: none"> <li>• <b>Terms and conditions</b> for open access</li> <li>• Open access register and other information systems</li> </ul>
	<b>Procedure for grant of connectivity and open access</b>	<ul style="list-style-type: none"> <li>• <b>Procedure</b> for connectivity</li> <li>• Procedure for STOA, MTOA and LTOA</li> <li>• <b>Nodal agencies</b>, processing time lines, required documents etc.</li> </ul>
	<b>Establishing the operational and commercial mechanisms</b>	<ul style="list-style-type: none"> <li>• Approval of <b>detailed procedures</b> for open access</li> <li>• Committee to prepare <b>monthly energy accounts</b></li> <li>• <b>Standard agreements</b>.</li> </ul>
	<b>Encouraging regional mechanisms for co-ordination in CBET</b>	<ul style="list-style-type: none"> <li>• Ensuring co-operation and support in the operationalization of <b>regional forums</b> for collaboration in CBET</li> </ul>





# SARI-EI Study: Trading License - Desirable pre-requisites availability in South Asia power sector

- ☐ Trader are **important market intermediaries**.
- ☐ In SA , **CBET** is transacted **through** Trading Licenses.
- ☐ CBET through PXs through Traders of India in future.
- ☐ Act as **counter party** in the transactions.
- ☐ Transparency, reduce **information asymmetry**.
- ☐ Increase **liquidity** market, facilitate **competitive discovery of price**, Offer risk mitigation options.
- ☐ **Aiding in wholesale competition & power market development.**

## Trading license framework in South Asian countries

Country	Legal Framework	Regulatory Framework	Operational Framework	Institutional Framework
Afghanistan	✗	✗	✗	✗
Bangladesh	✗	✗	✗	✗
Bhutan	✓	✗	✗	✗
India	✓	✓	✓	✓
Maldives	✗	✗	✗	✗
Nepal	●	●	✗	✗
Pakistan	✗	✗	✗	✗
Sri Lanka	✗	✗	✗	✗

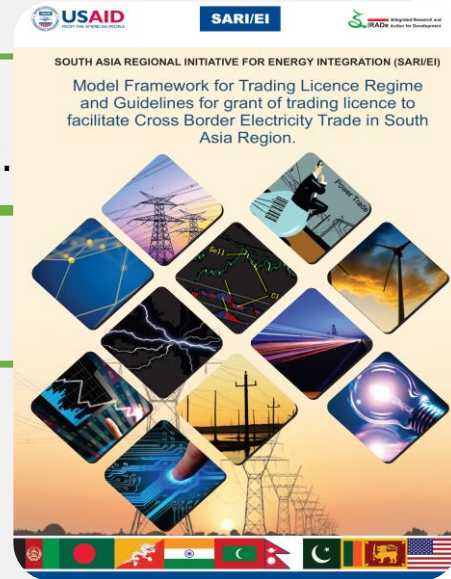
✓ - Yes

✗ - No

● - Partial

# SARI-EI Study: Summary of model Framework & guidelines Trading License

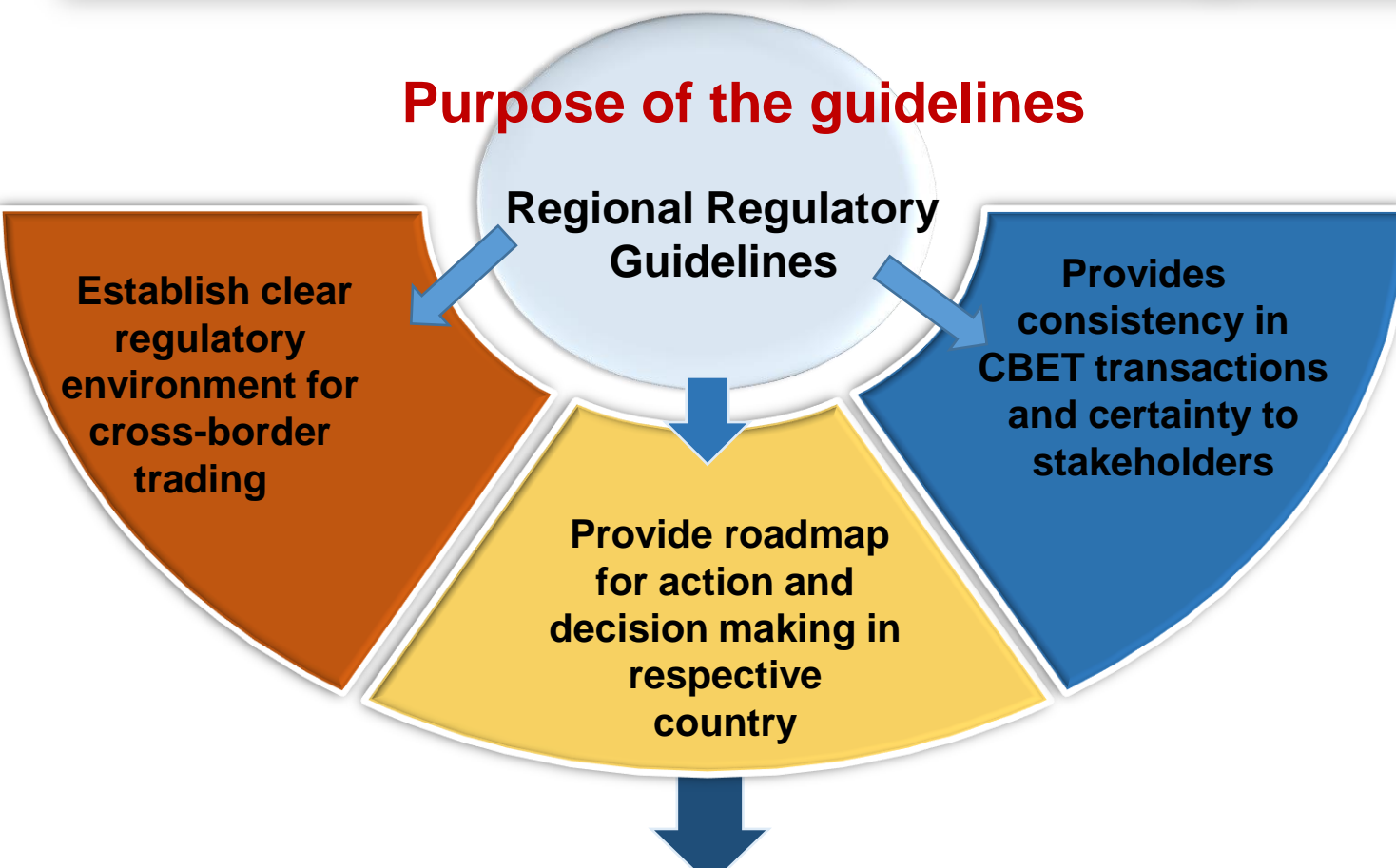
	<b>Operationalization of legal and regulatory framework for trading licensees</b>	<ul style="list-style-type: none"> <li>• <b>Introduce trading</b> as a defined &amp; allowed activity under statutory legislation.</li> <li>• <b>Empower national electricity regulators</b> to exercise market oversight &amp; price control through measures such as trading margin cap and emergency provisions.</li> </ul>
	<b>Extending the trading license framework in the context of cross border trade</b>	<ul style="list-style-type: none"> <li>• Introduce the concept of <b>"authorization for cross border trade"</b>, so that domestic trading license regime can be extended to cover cross border trade.</li> </ul>
	<b>Categories of trading licensees and qualification criteria</b>	<ul style="list-style-type: none"> <li>• <b>Categorization</b> of trading licensees; based on annual trading volume.</li> <li>• <b>Authorization for CBET</b> initially, only traders falling in <b>highest category</b>.</li> </ul>
	<b>Grant and revocation of trading licence</b>	<ul style="list-style-type: none"> <li>• Clearly define the <b>procedures for issue, renewal, amendment and revocation of trading licenses</b>.</li> </ul>
	<b>Terms, conditions and obligations of trading licensees</b>	<ul style="list-style-type: none"> <li>• Trading licensees to be made responsible for <b>fair, transparent and competitive market operations</b> and safe grid operation through <b>terms &amp; conditions &amp; obligations</b> specified in legal/regulatory framework.</li> </ul>
	<b>Market development</b>	<ul style="list-style-type: none"> <li>• Hurdles against the introduction and participation of power traders in the power market may be <b>removed through legal/regulatory changes</b>.</li> </ul>
	<b>Regional forum for coordination of trading license</b>	<ul style="list-style-type: none"> <li>• All efforts to <b>operationalize the proposed regional electricity regulatory forum</b>. SAFER can issue non-binding recommendations on regulatory harmonization for CBET trading licensees.</li> </ul>





# Regional Regulatory Guidelines

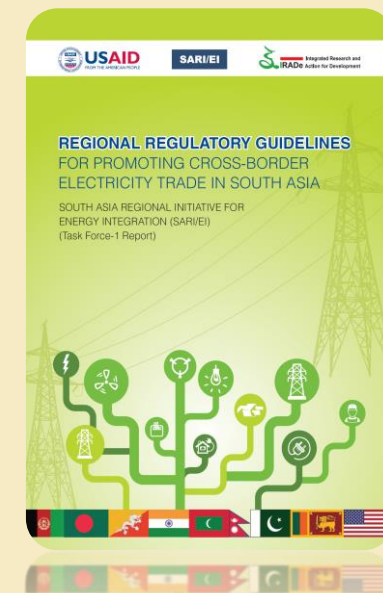
## Purpose of the guidelines



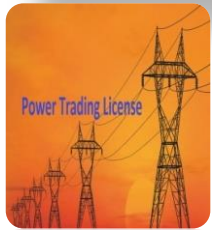
The flexible nature of the guidelines and focus on specific aspects of CBET, would **permit both the guidelines and the national regulatory framework to co-exist for a reasonable period of time.**

## Specific aspects requiring consensus through common operating principles

1. **Licensing for cross border trading**
2. **Open access to Tx network**
3. **Transmission pricing regime**
4. **Transmission planning**
5. **Imbalance settlement mechanism**
6. **Harmonization of Codes**
7. **Dispute Resolution**
8. **Duties and tax regimes**



# Brief Summary of Regional Regulatory Guidelines



## 1 **Licensing for CBET:** (Important Regulatory Tool for Trading)

- Recognition of Trading as a **separate licensed business activity**
- Grant of license for CBET **through a well defined process**
- **License requirements** and the underlying rules/limitations

## 2 **Open access to transmission system:** (Competitive Market)

- **Setting of fair rules and procedures** for non-discriminatory open access
- **Modification/amendment of applicable regulations and gradually legally binding provisions**
- Defining **application process, eligibility criteria, priority order** and nodal agency for OA

3

## **Transmission Pricing:** (cost reflective & efficient)

- Transmission pricing mechanism based on a **country's requirement and acceptability**
- Setting up **principles and mechanism for determination of economically efficient transmission pricing regime** and gradually adopting methods based on the concept of location specific pricing
- Adoption of **tariff framework in respective country power system through enabling regulations**

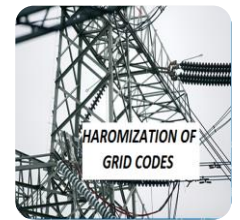
4

## **Transmission Planning:** (coordinated Regional Planning)

- **Development of a regional coordination forum of National Transmission Utilities** to coordinate between Member Countries on transmission planning aspects
- **Development of a database of information that enables coordination** and cooperation towards transmission planning
- **National Transmission Plans** to also **include details of cross border transmission lines** (specifically for CBET) & associated infrastructure
- **Sharing of the national transmission plan at the regional level and progress towards developing a regional level master plan**



# Brief Summary of Regional Regulatory Guidelines



5

## **Imbalance Settlement:** *(transparent common procedure)*

- Member Countries to **develop a common set of procedures for Imbalance Settlement for CBET transactions**
- This will include **preparation of scheduling, dispatch, energy accounting and settlement procedures** for both AC-AC & AC-DC interconnections in the region

6

## **Harmonization of codes:** *(safe and reliable regional integrated system operation)*

- **Harmonization through formulation of guidelines on technical standards for interconnection of power systems** on aspects related to voltage standards, frequency tolerance, thermal limits etc.
- **Sharing of technical characteristics and system specific data** among the member countries
- **Rules on metering standards, communication technologies, Protection Schemes** etc.

7

## **Dispute Resolution:** *(transparent and fair legal framework)*

- Dispute Resolution process should primarily be in accordance with the **agreements or through amicable settlement**
- **Referring the disputes to the SAARC Arbitration Council in case the member countries are unable to resolve disputes through amicable settlement.**

8

## **Taxes & Duties:** *(for fostering investment and removing trade barriers)*

- Countries to **gradually move towards a zero tax regime**

# Framework Grid Code Guidelines (FGCG)

## Purpose of the guidelines

Framework  
Grid Code  
Guidelines  
(FGCG)

Establish a clear  
technical framework  
and Grid code &  
related regulatory  
environment for  
smooth, reliable,  
secure Electricity  
trading

Provide roadmap  
for action &  
decision making for  
Relevant  
Authorities/Regulators  
through FGCG

Provides  
consistency  
across technical  
parameters, grid  
codes, standards,  
operating  
procedures in  
CBET transactions

The flexible nature of **Framework Grid Code Guidelines** and focus on specific aspects of CBET only, would **permit both the Framework Grid Code Guidelines and the national regulatory framework and Grid codes to co-exist.**

Framework Grid Code  
Guidelines (FGCG)

Planning Guidelines

Connection Guidelines  
(including metering &  
protection guidelines)

Operational Guidelines

Scheduling & Dispatch  
Guidelines

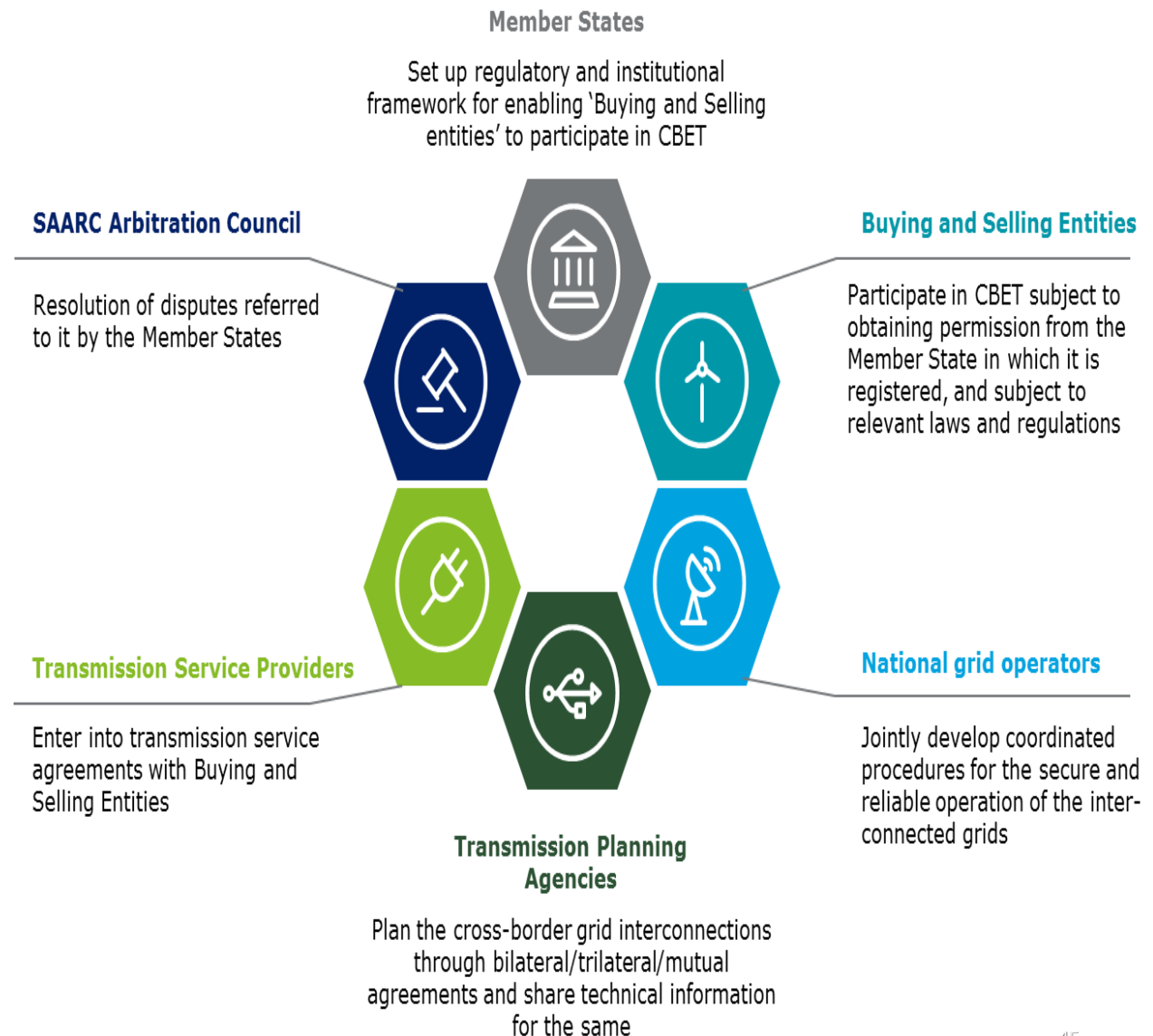
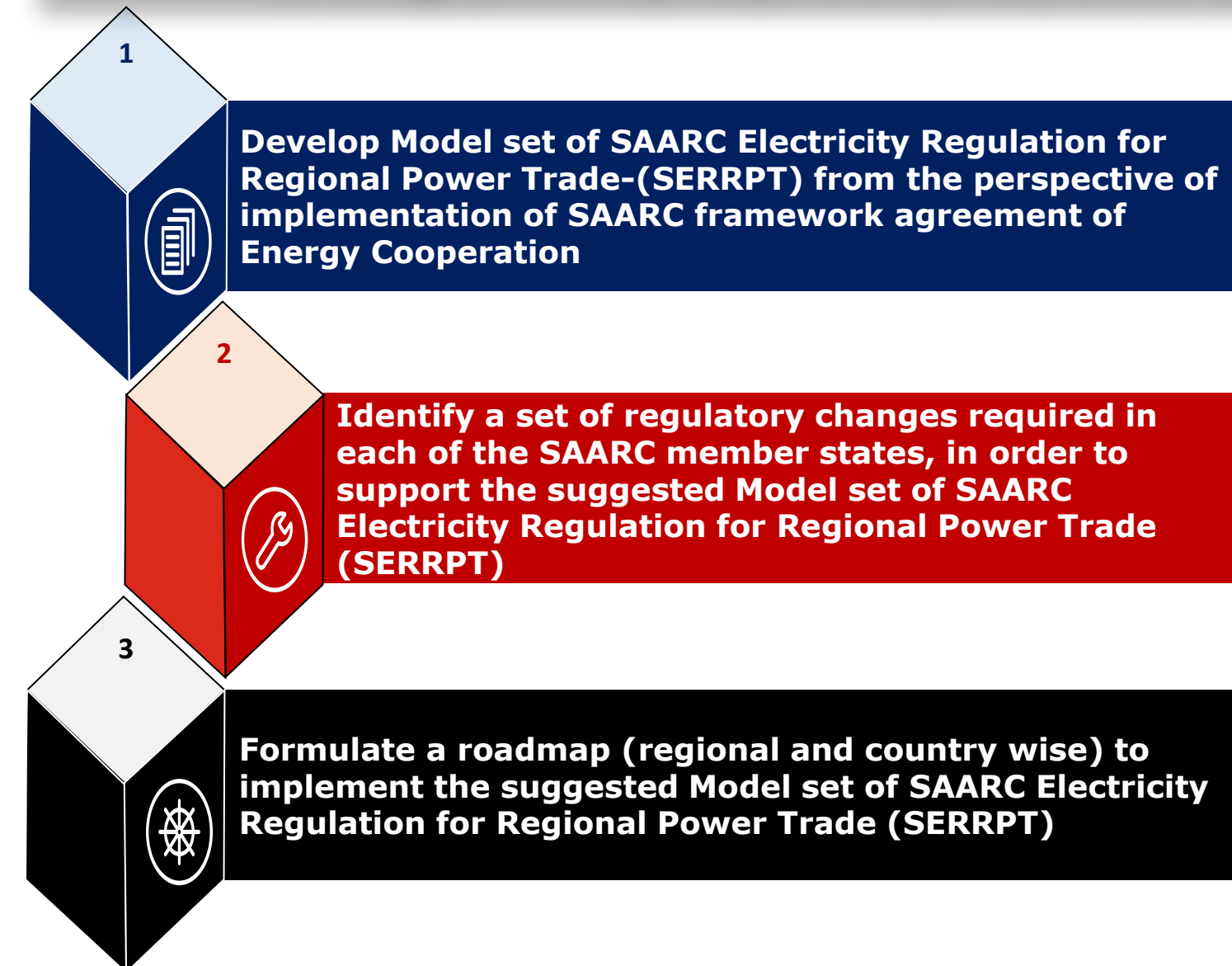
*FGCG in the form draft Codes are in line with various article of SAARC Inter-Governmental Framework Agreement (IGFA) for Energy Cooperation with a view to provide actionability to these articles*

- ✓ Article 7 (Planning of Cross-border interconnections) , Article 11 (System Operation and Settlement Mechanism)
- ✓ Article 10 (Electricity Grid Protection System) , Article 8 (Build, Operate and Maintain)
- ✓ Article 9 (Transmission Service Agreements), Article 12 (Transmission Access)

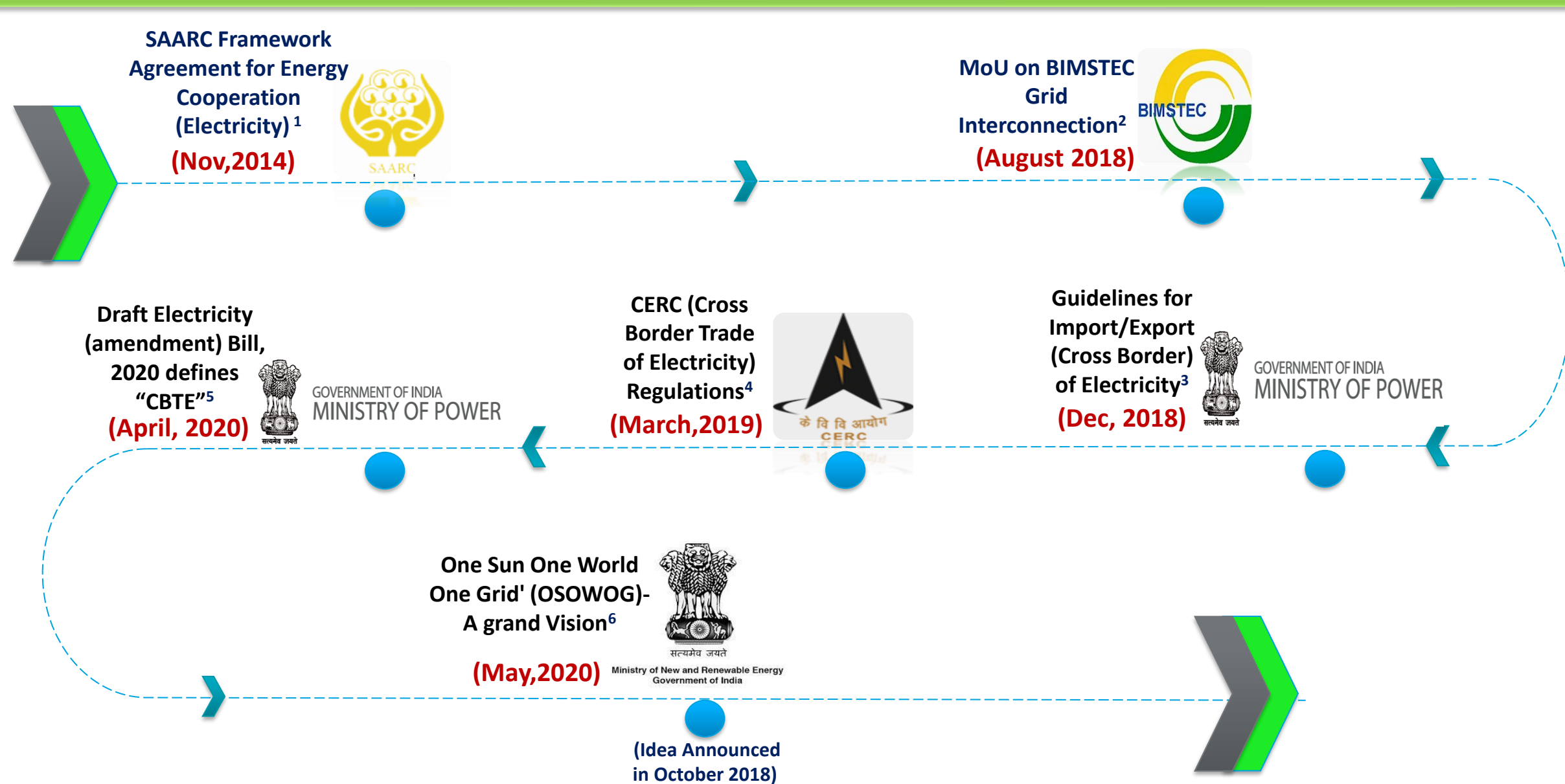


# SARI-EI Study: Formulation of Model set of electricity regulations for implementation of the SAARC Framework Agreement for Energy (Electricity) Cooperation (SFAEC) and for advancing electricity trade in the SAARC countries

## Key entities and their responsibilities as per Framework Agreement



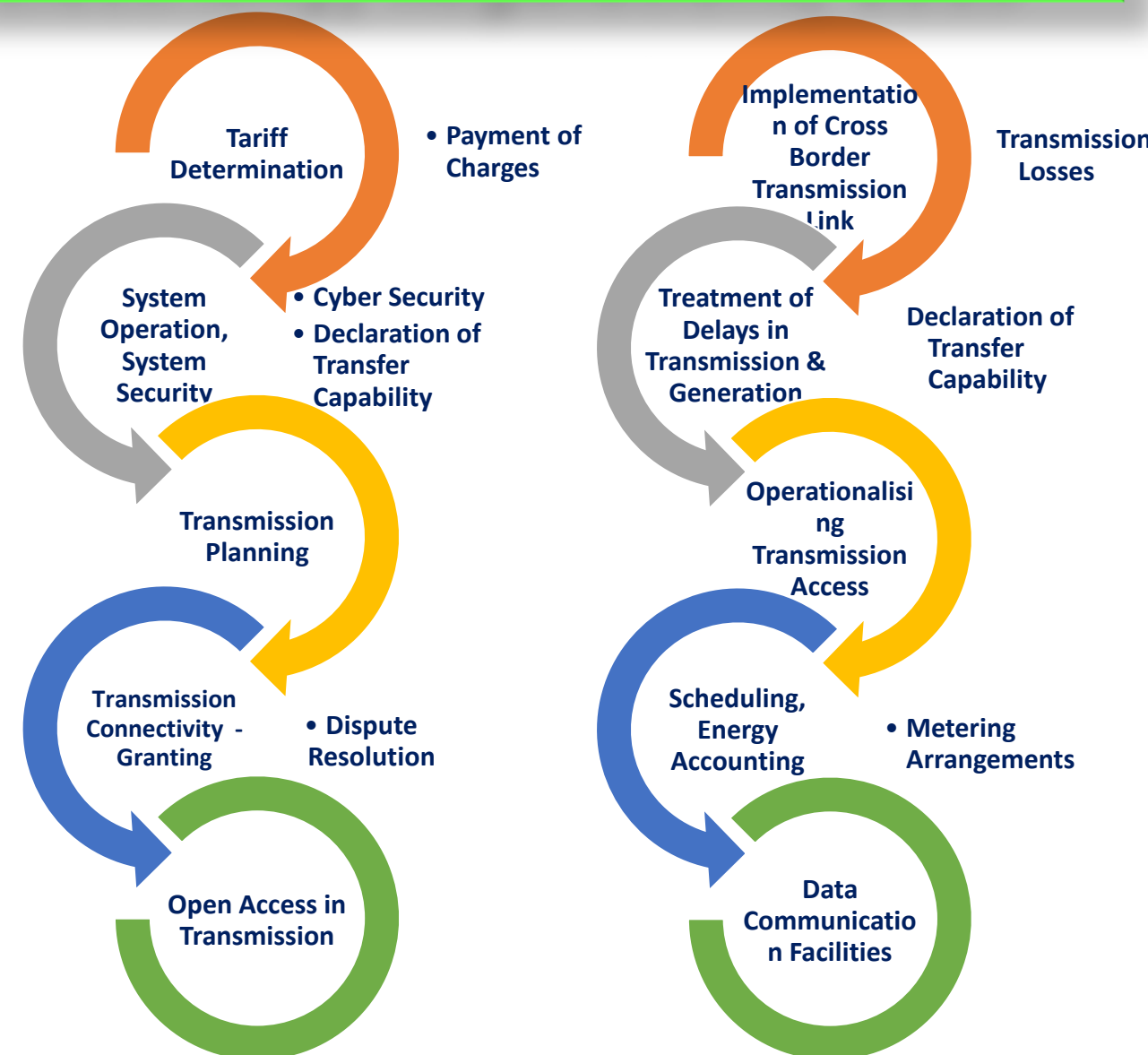
# Key Policy & Regulatory Enablers in SA





# India-CERC (Cross Border Trade of Electricity) Regulations, 2019

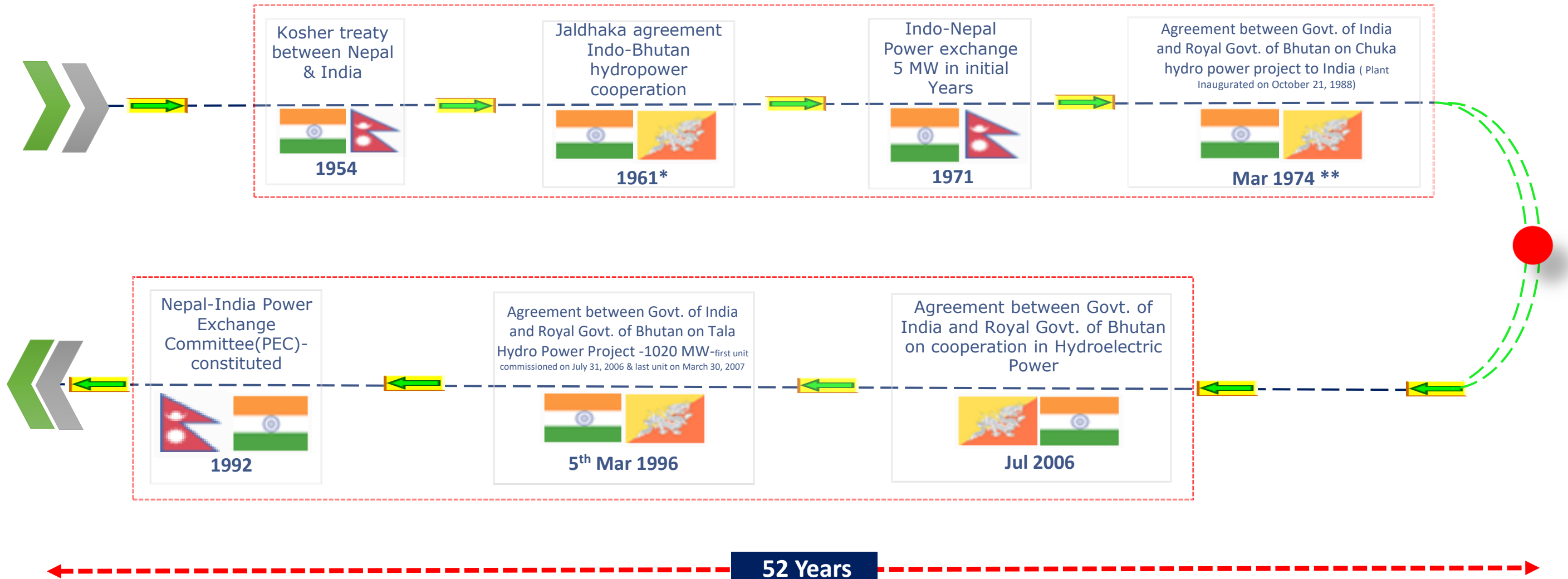
- ❑ First of its Kind **dedicated Regulations** on CBET in the Region.
- ❑ Comprehensively address various aspects of **Cross Border Trade of Electricity**
- ❑ Provides **clarity, transparency, consistency** and **predictability** in regulatory mechanism
- ❑ Can be learning process & starting point towards development of **Regional Regulatory Framework**



Designated Authority : facilitating the process of approval and laying down the procedure for import and export of electricity

**A comprehensive and detailed regulation, covers all possible regulatory aspects of CBET**

# History of evolution of Energy Cooperation, CBET- Key Policy & Regulatory Development

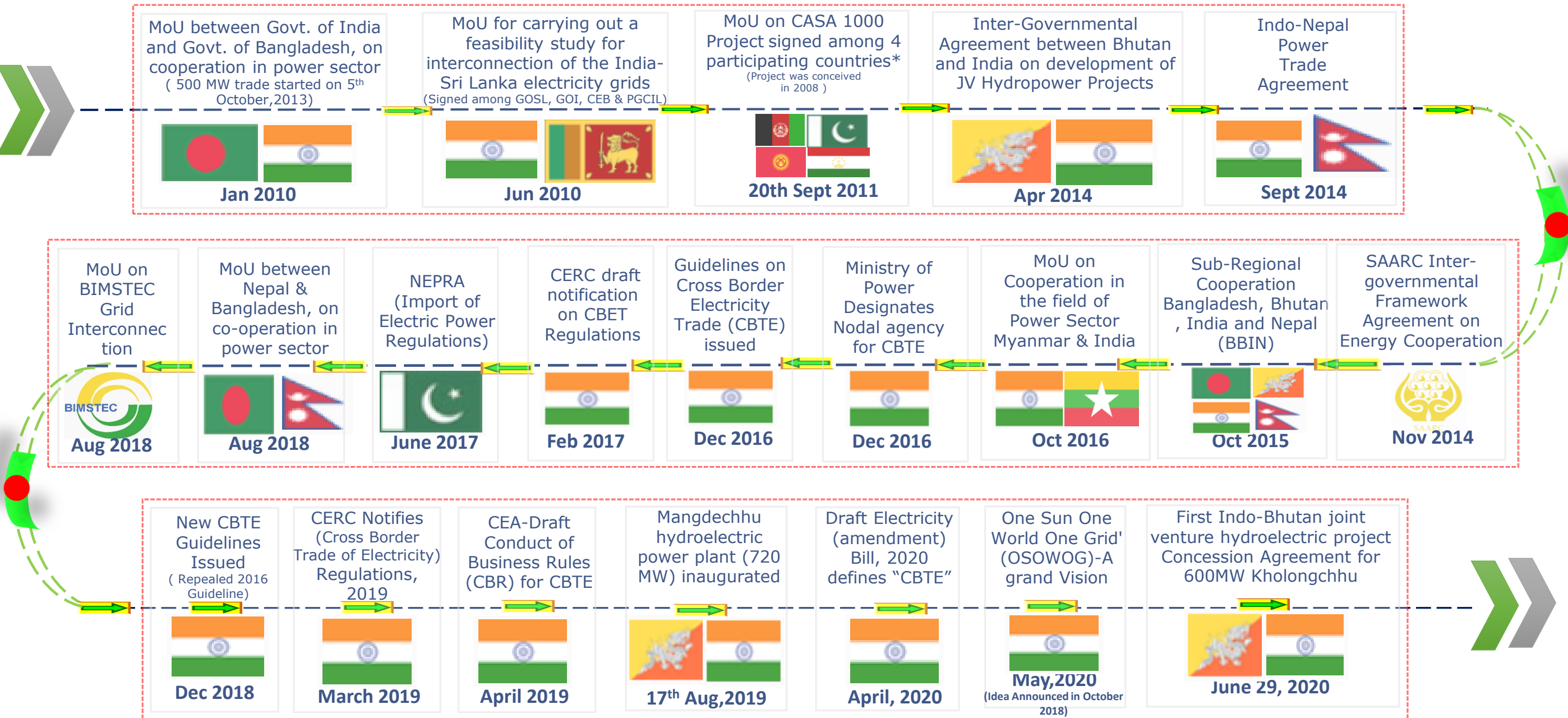


\* [http://www.mfa.gov.bt/rbedelhi/?page\\_id=28](http://www.mfa.gov.bt/rbedelhi/?page_id=28)

\*\* <http://www.mea.gov.in/bilateral-documents.htm?dtl/6349/agreement>



# Significant Developments in Energy Cooperation, CBET- Key Policy & Regulatory Development



10 Years

# Regional Hydro Power can help in Renewable Integration and Grid Balancing

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

● India RE Target -175 GW by 2022

● India: 450 GW of renewable energy by 2030 \*

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

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

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

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



**BIDS**

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



**BUSINESS MODEL**

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



**Result**

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

\* WIND-SOLAR HYBRID POWER PROJECT" means the wind-solar hybrid power project where the rated power capacity of one resource is at least 25% of the rated power capacity of the other resource I PEAK HOURS" shall mean the energy scheduling hours between (& including) 06:00 hrs up to 09:00 hrs, and between (& including) 18:01 hrs to 24:00 hrs of the same day. For the purpose of scheduling, a 'day' shall commence from 00:00 hrs and end at 24:00 hrs.; minimum 6-hour Peak Power supply, on daily basis, during the Peak Hours,



## De-Risking of Energy Projects: Risk mitigation instruments

Regional energy projects will benefit from access to low cost finance from development partners. However, support is required for regional energy projects, not just for financing, but also for risk mitigation.

### Typical providers of risk mitigation instruments



#### Political risk insurance

Risk insurance against events such as nationalization by the Government, breach of contract by the Government, currency transfer restrictions, war, terrorism and civil unrest.

Multilateral  
Investment  
Guarantee Agency



#### Partial risk guarantee

Partial risk sharing between the insurer and the Government, typically through a dedicated fund. This lowers the moral hazard associated with 100% insurance.

The World Bank,  
Asian Development  
Bank



#### Partial credit guarantee

Covers part of the debt service default by the borrower regardless of the cause of default.

Asian Development  
Bank



### Examples:

- Bangladesh - Sirajganj 220MW CCPP – MIGA guarantee of \$70 million against risk of non-honoring of sovereign financial obligations.
- Bangladesh – Sembcorp 414 MW CCPP – MIGA guarantee for equity, against risk of breach of contract.
- Sri Lanka – ADB's Partial Risk Guarantee for \$31 million and Partial Risk Insurance for \$21 million for 163 MW diesel plant of AES. The Guarantees provided protection to the local commercial lenders of the project.
- Maldives - \$16 million of IDA (World Bank Group) guarantees for solar projects under ASPIRE program. The guarantee provides backstopping for payment delays under PPA and ensures compensation in case of contract termination by Government.