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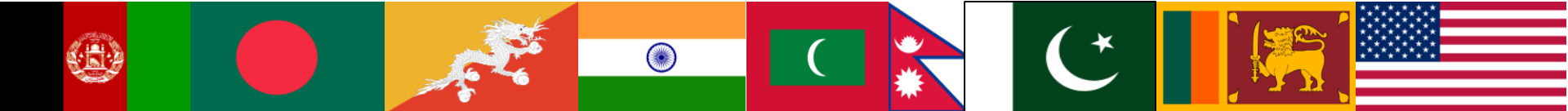
South Asia Regional Initiative for Energy Integration (SARI/EI)

South Asian Power Sector : Overview of South Asia Power Sector, Key Policies/Regulations, Investment challenges & Drivers for Investment

Opportunities through facilitating bi-lateral or multi-lateral cooperation



DEVELOPMENT THROUGH
LOW EMISSION DEVELOPMENT STRATEGIES
AND GREEN GROWTH



Overview SARI/EI Program: South Asia Regional Initiative for Energy Integration (SARI/EI)

● SARI/E is a long standing program of USAID started in the year 2000.

● Program has consistently strived to address energy security in South Asia by focusing

- 1) Cross Border Energy Trade
- 2) Energy Market Formation and
- 3) Regional Clean Energy Development.

● SARI/EI–Phase IV (2012-2017): Key Outcomes.

Three Key Development Outcomes:

1. *Coordinate policy, legal and regulatory issues.*
2. *Advance transmission interconnections.*
3. *Establish South Asia Regional Electricity Markets.*

● First Three Year of the Program is Completed.

● Demand Driven ‘Bottom Up’ Approach

● IRADe, a regional organization, is implementing partner

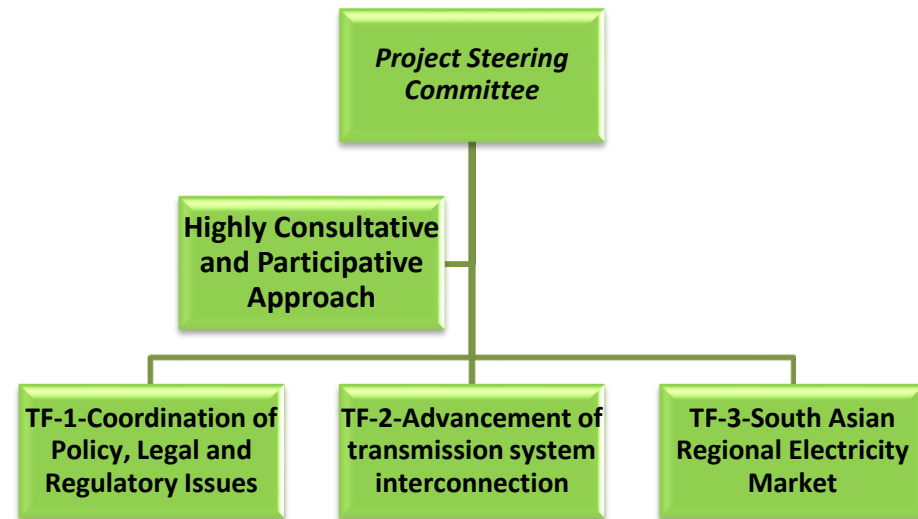


SARI/EI Framework

Project Steering Committee (PSC) is the apex body of the program and provides overall strategic directions.

PSC members consist of **Senior level officials from the country governments, SAARC, ADB, Independent Energy Experts/Diplomats.**

Task Forces are **represented by Government Nominated members of level of Directors/Chief Engineers/Members etc. from Utilities, Regulators, planners, Power Exchanges of SA countries.**



➤ **TF1: Coordination of Policy, Legal and Regulatory issues**



➤ **TF-2: Advancement of transmission system interconnection**



➤ **TF 3: South Asian Regional Electricity Market**




Demand Driven Studies /Exercises to Achieve the Deliverables of Task Forces as Defined in the Terms of Reference of Task Forces



TF-1 :

Study -1: Study on Review of policies, regulations and laws, preparation regulations etc. (Report has been finalized, Proposed Changes, amendments in electricity laws, regulations and policies Regional Regulatory Guidelines) -Completed

Study-2: Study on Investment policies/guidelines for SA countries (On going)



TF-2 :

Study 1: Study to find out the Trading Potential of South Asian Countries (Draft Final Report -Ongoing)

Study 2: Harmonization of Grid Codes (Draft final Report-Ongoing)

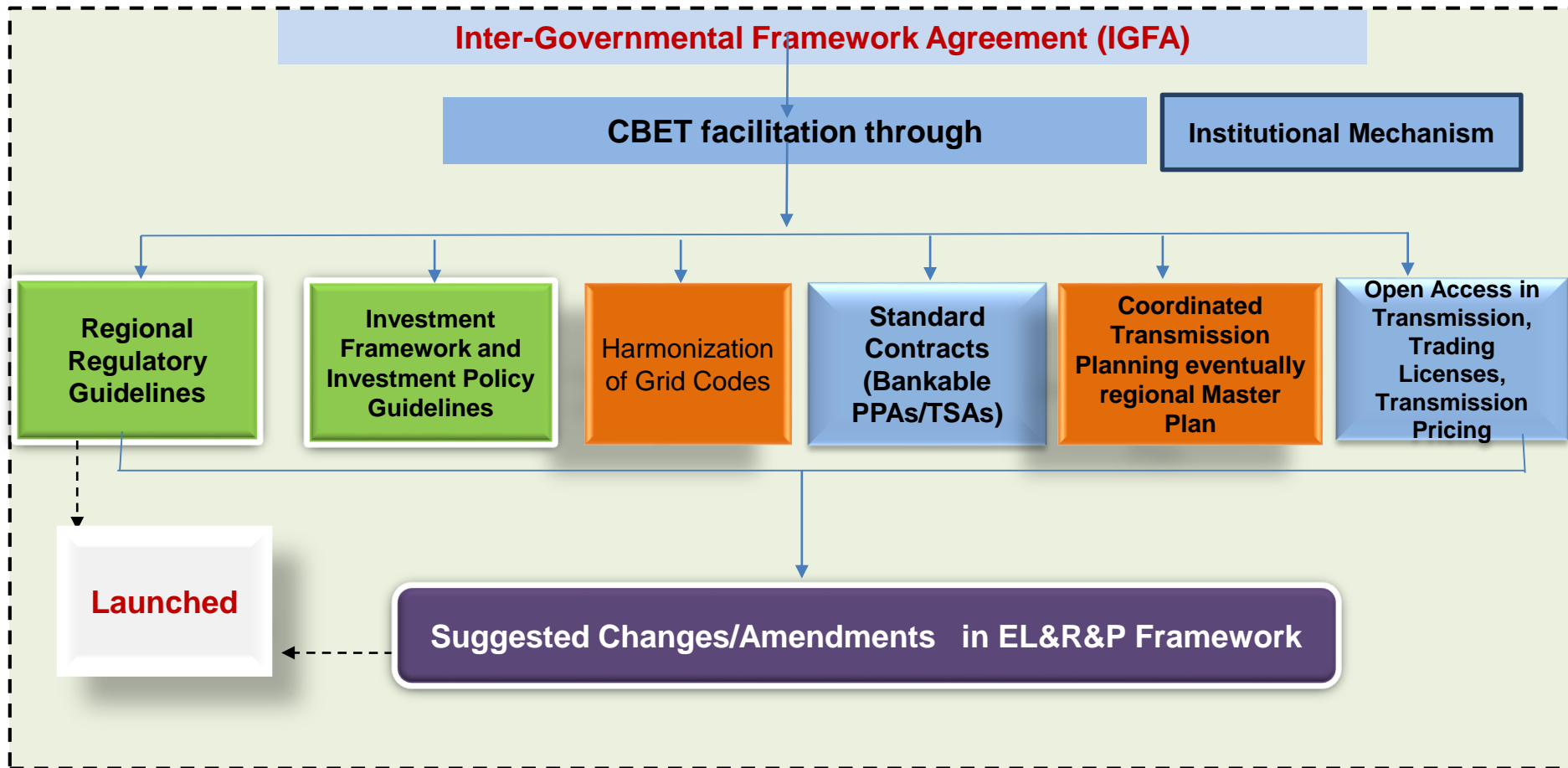


TF-3 :

Study 1: "Assessment and recommendation of commercial terms & conditions for Cross Border Electricity Trade (CBET) and suggesting the model Of Power Exchange in South Asian region" (Draft Final Report– Ongoing)

Study 2: Implementation of Pilot Market & Market rules (RFP Issued)

Overall Framework for development of CBET in South Asia



Overview of South Asian Power Sector

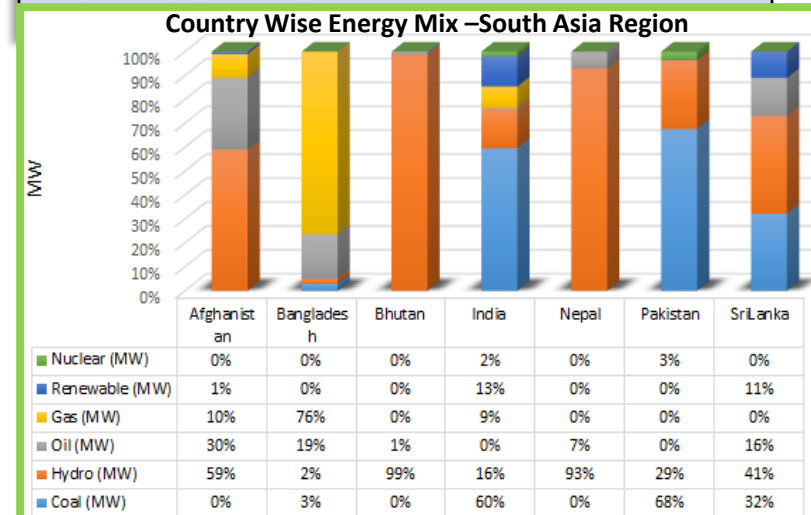
South Asian Power Sector. Total Installed capacity of around 3,47,593 MW

- ✓ **Afghanistan** : Small Power system(1341 MW), Electricity Imports high, Hydro Dominated.
- ✓ **Bhutan**: Small Power system (1614 mw) Hydro dominated, Surplus Hydro , Exporting to India
- ✓ **Bangladesh** : Gas Dominated, Resource Constraints , Imports Electricity from India and in future will remain as a Importing Country.
- ✓ **India**: Very Large Power System, Coal Dominated, reducing deficits, long terms electricity demand are huge and potential large market, Electricity importing and exporting nation.
- ✓ **Nepal** : very Small Power system (765 MW), Hydro based, very high deficits, Importing Electricity from India , Potential exporter and importer of electricity.
- ✓ **Sri Lanka**: hydro dominated but the fuel mix is changing, no trading at present, High peak demand.

Overall SA region is a power hungry region and per capita consumption is very low. Large part of population remains without access to electricity.

Country	Installed Capacity (MW)
Afghanistan	1341
Bhutan	1,614
Bangladesh	12,071
India	302833
Nepal	765
Sri Lanka	4050
Pakistan	24,829
Total	347593

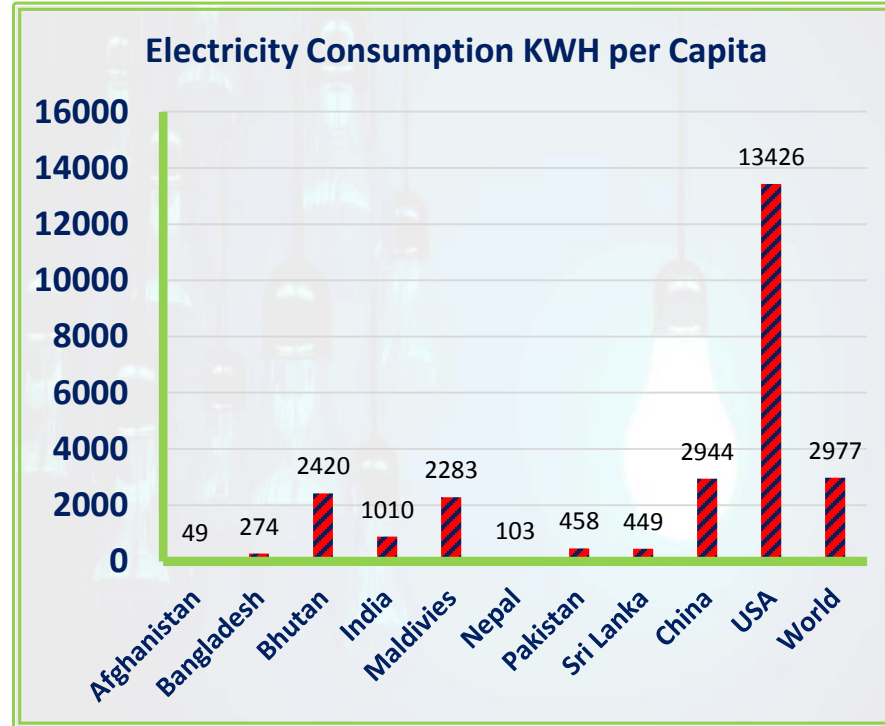
Source : Compiled from various sources PGCB, DGPC,CEA,Annual Report NEA, Status of Industry Report NEPRA, Task Force 1 Report IRADe Report on CBET in



PER CAPITA ELECTRICITY CONSUMPTION

Country/ Region	Electricity Use kWh/capita/yr
SAARC	517
USA	12,914
EU	6,592
BRAZIL	2,206
MALAYASIA	3,614
CHINA	2,631
WORLD	2,803

Source: SAARC Energy Centre



- ✓ Low per capita electricity consumptions.
- ✓ Maldives and Bhutan have high per capita electricity consumption among SA countries.
- ✓ Developed countries are at much higher level of consumption.
- ✓ Need to increase the level of consumption for a decent standard of living.

Resource Potential: Hydro Potential :350 GW !

- ✓ Vast potential of hydro power:350 GW
- ✓ Bhutan, Nepal, Pakistan, India: 30,83, 59, 150 GW respectively.
- ✓ Nepal and Bhutan can build export oriented hydro power plants
- ✓ Significant Coal deposits in India and Pakistan.
- ✓ Coal deposits in Bangladesh yet to be exploited.
- ✓ In addition to the conventional energy resources, there is huge renewable energy resources like solar and wind.

Country	Coal (million tons)	Oil (million barrels)	Natural Gas (trillion cubic feet)	Biomass (million tons)	Hydro (GW)
Afghanistan	440	NA	15	18-27	25
Bhutan	2	0	0	26.6	30
Bangladesh	884	12	8	0.08	0.33
India	90,085	5,700	39	139	150
Maldives	0	0	0	0.06	0
Nepal	NA	0	0	27.04	83
Pakistan	17,550	324	33	NA	59
Sri Lanka	NA	150	0	12	2
Total	108,961	5,906	95	223	349.33

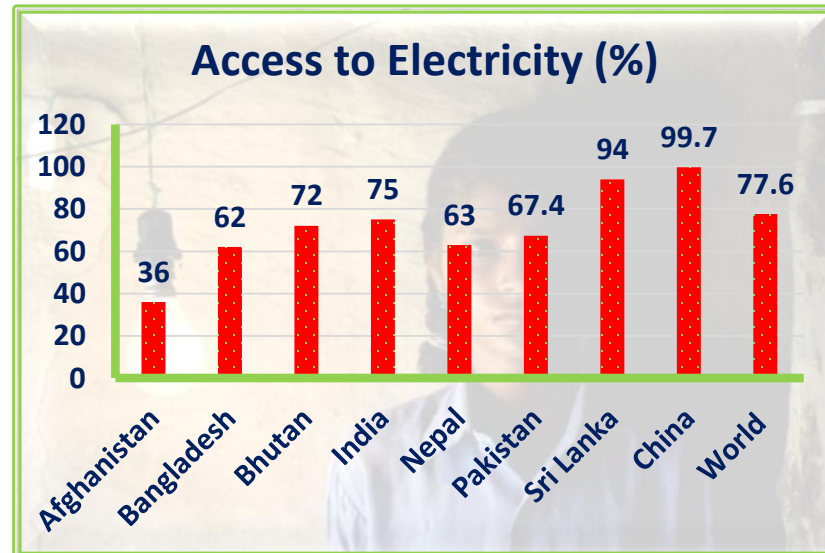
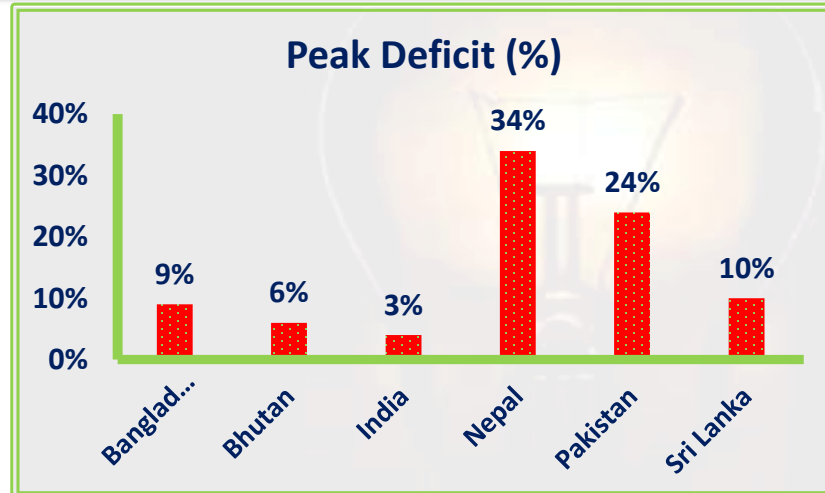
Source: SAARC Secretariat (2010) for Bangladesh, Bhutan, India, Nepal, Sri Lanka; CWC (2005) for Indian States and WAPDA (2011) for Pakistan

Renewables	Bangladesh	India	Nepal	Bhutan	Pakistan	Sri Lanka
Solar Power (Kwh/sq. m per day)	3.8 - 6.5	4 - 7	3.6 - 6.2	2.5 - 5	5.3	NA
Wind (MW)	Very limited potential	151,918	3,000	4,825	24,000	25,000 MW



Key Drivers for Investment in South Asian Power Sector, CBET and Regional Exploitation of Energy Resources

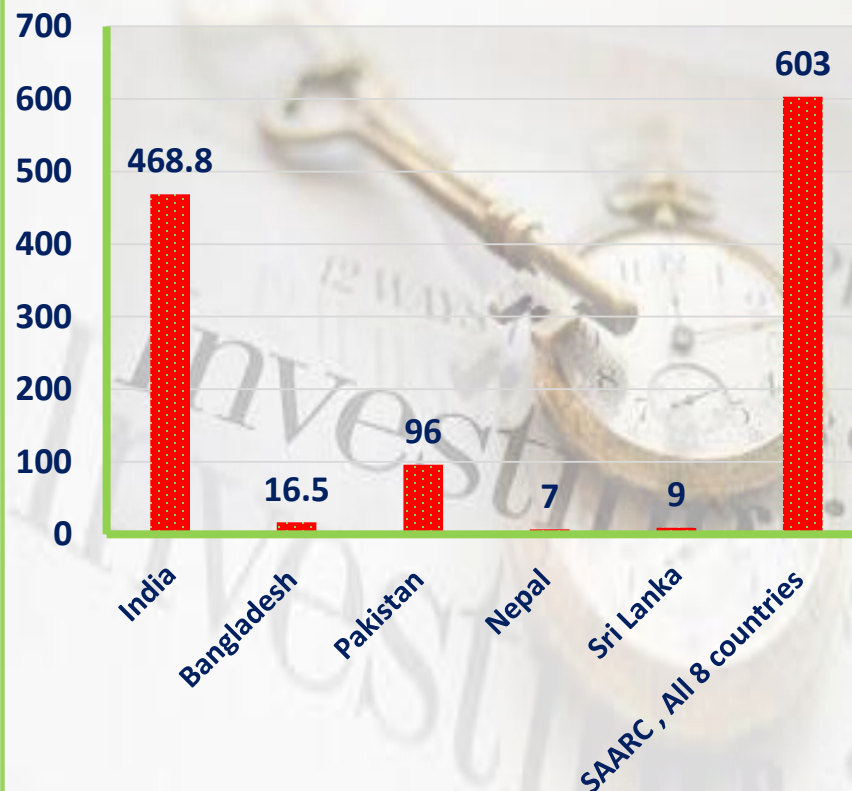
- ✓ Energy and Peak Shortages.
- ✓ Low per Capita electricity consumptions
- ✓ Poor access to electricity.
- ✓ Resource Crunch (In Bangladesh)
- ✓ Optimal utilization of energy resources.
- ✓ Economic benefits.



Investment Requirement in Electricity in South Asia 2020

- ✓ South Asia is one of the fastest growing regions in the world.
- ✓ As per world bank estimates, SA countries needs to invest in the range of **USD 1.7 trillion to USD 2.5 trillion(2011-2020)** to bring its power grids, roads, water supplies up to the stranded needed to serve the population.
- ✓ Total investment of **USD 603 billion** is required for SAARC countries for Electricity Infrastructure development.
- ✓ Bangladesh, India, Nepal , Pakistan and Sri Lanka are expected to invest around **US\$ 16.5 Billion, US\$ 468.8 Billion, US\$ 7billion, US\$ 96 Billion and US \$ 9 Billion** respectively by 2020.

Investment Requirement (Billion USD) in Electricity Infrastructure Development 2011-2020





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 **IRADe** Integrated Research and
Action for Development

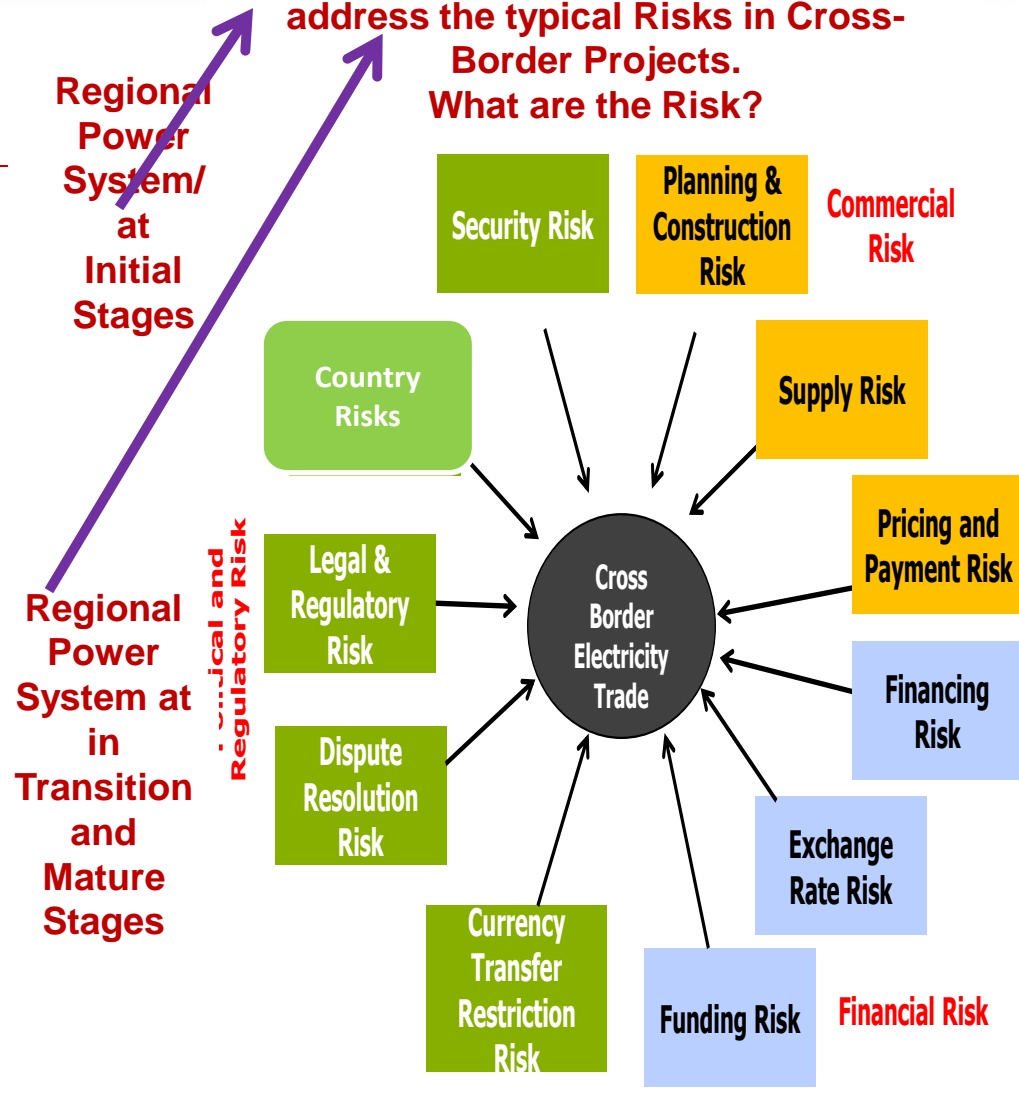
Key Issues related to Policy, Regulatory Investment and Financing of Power Projects, CBET infrastructures

Key Policy, Regulatory Issues/Challenges and risk for CBET

Key Policy, Regulatory Issues/Challenges

1. Political Conesus : Regional Cooperation and Recognition of CBET/Trade in the National Policy, Law
2. Government Commitment & Policy Coordination
3. Financial Challenges, Investment , Financial Viability
4. Mechanism of Inter-connection
5. Market form of Trade
6. Regional Cooperation on Regulatory and Contractual Aspects
7. Open Access in Transmission
8. Transmission Charges/Pricing
9. Transmission Plan
10. Commercial Mechanisms to Settle Imbalances
11. Dispute Resolution

Motivation behind these challenge is to address the typical Risks in Cross-Border Projects. What are the Risk?



Key Regional Policy/Regulatory Instruments for Facilitating Investment

Key Policy/Regulatory Instruments



1 **Licensing Instruments 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 instruments in transmission :** (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 mechanisms/instruments :** (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 **Regional 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**

Key Regional Policy/Regulatory Instruments for Facilitating Investment



5 Instruments for 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 Mechanisms for 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 Instruments: (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**

Institutionalizing the Process: Need for Regional Institutional Mechanism

ACER

Agency for the Cooperation of Energy Regulators

ACER in European Union

Issues non-binding opinions and recommendations to national energy regulators, transmission system operators

- Fosters cooperation among European energy regulators,
- Ensures market integration and harmonisation of regulatory frameworks.
- Formulates Framework Guidelines related to regulation on System operation, connection and capacity allocation etc. leads to network codes.
- Harmonization of Transmission tariff

RPTCC

(Regional Power Trade Coordination Committee)

RPTCC in Greater Mekong Subregion

High level body responsible for coordinating and guiding the market development

- Specifying basic rules and guidelines for power trading among Parties
- Providing recommendation for the overall policy and day-to-day management of regional power trade;



RERA in Southern Africa (SAAP)

Responsible for Cooperation on regulatory & contractual aspects through common set of regulatory guidelines

- Regional Guidelines for regulating cross-border power trading.
- Making Compatible regulatory decisions
- Approving cross-border agreements in transit countries
- Promoting transparency in the regulation of cross-border trading

ECOWAS Regional Electricity Regulatory Authority (ERERA) in West Africa.

Ensure the regulation of interstate electricity exchanges and to give appropriate support to national regulatory bodies or entities of the Member States.

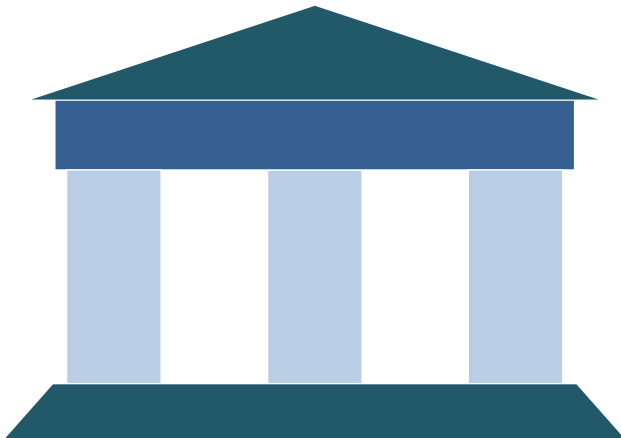
- Framework for cross Border Electricity trade.
- Regulatory coordination and harmonization of regulations.
- Various regulation and guidelines related to the system operation, transmission tariff etc.

Institutionalizing the Process: Need for Regional Institutional Mechanism

Constitution of South Asia Forum of Regulators

“To work towards a consistent and harmonized regulatory framework for facilitation of regional energy integration issues in South Asia

SAFER



To act as a **neutral, apolitical platform for experts to assemble, brainstorm, strategize and recommend specific steps** to address the multiple barriers to CBET

- ❖ **To act as a platform for cross-cutting deliberations across the set of policy, regulatory and legal issues** that advance CBET in South Asia;
- ❖ To facilitate coordination and harmonization of regulatory issues that have a bearing on CBET. This would involve the **preparation of guidelines, regulatory opinions, monitoring of implementation and provision of technical assistance**
- ❖ **To facilitate regulatory capacity building among members at both national and regional levels** through information sharing and skills training
- ❖ **White Paper on SAFER-** Role, Function, Rationale, Structure- Draft Paper Prepared.

In the 2nd SAARC Regulator Meeting held at Sri-Lanka on 8th and 9th Feb'2016, it is decided to create SAARC Council of Experts of Energy Regulators (Electricity) for supervision and implementation of SAARC frame work Agreement on Energy(Electricity) cooperation and also proposed Regional Regulatory Forum.

Lenders Concerns

Risk Profile & Project Viability

- ✓ Hydrological uncertainty
- ✓ Geological uncertainty
- ✓ Statutory and environment clearances
- ✓ Land Acquisitions , R & R Policies
- ✓ Backward Linkages: Fuel Risk
- ✓ Forward linkages :Sale of power

Developers/Promoters Creditability:

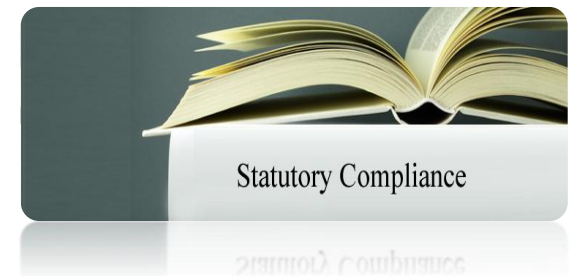
Promoters financial strength

- ✓ Should not be a defaulter
- ✓ Capability to bring equity
- ✓ Sound DSCR
- ✓ Business History & experience of promoter
- ✓ Credit rating



Lender Concern:

- ✓ Hydrological uncertainty
- ✓ Geological uncertainty
- ✓ Statutory and environment clearances
- ✓ Land Acquisitions , R & R Policies
- ✓ Backward Linkages: Fuel Risk
- ✓ Forward linkages :Sale of power



Source of funding

- a) **Government Budget**
- b) **Foreign Direct Investments.**
- c) **Multilateral and bilateral funding**
- d) **Equity financing (Sponsor Capital ,International Stock Markets ,Investment Funds / Multilateral)**
- e) **Debt financing**





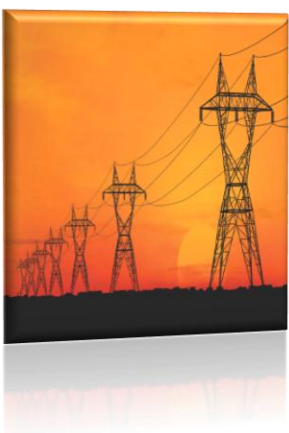
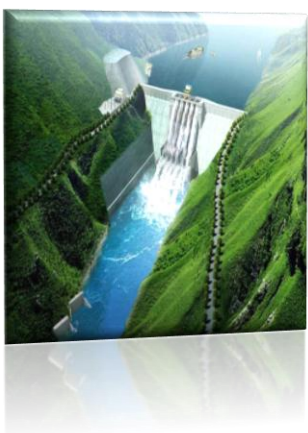
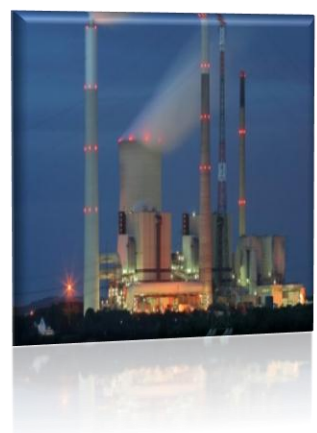
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Thank You

THANK YOU



Questions

- In your opinion, What are the four key Drivers for CBET, Key Challenges and Risk associated with CBET projects and regional energy cooperation?
- How do you see the Role of various key stakeholders such as Policy makers, Regulators, Lenders, Investor/developers for mobilization of investment in CBET projects?
- How do you see the various models of Investment viz. Public-Public, Public Private Partnership, Private?
- How do you see current state of policy/regulations supporting bilateral/multilateral CBET ?
- Do we need Harmonization/coordination of Policies/regulations and enabling regional institutional mechanism for CBET?
- What should be market design for advancing South Asia for Cross Border Electricity Trade and Development of Hydro Power?