

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

Over view of South Asian Power Sector & SARI/EI Program



**Regional Conference on Energy cooperation & Integration in South Asia
30th-31st August'2018, Hotel Le Meridien, New Delhi**



Overview of South Asia Power Sector

South Asia Installed Capacity : 3,94,140 MW (approx.)

 **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.

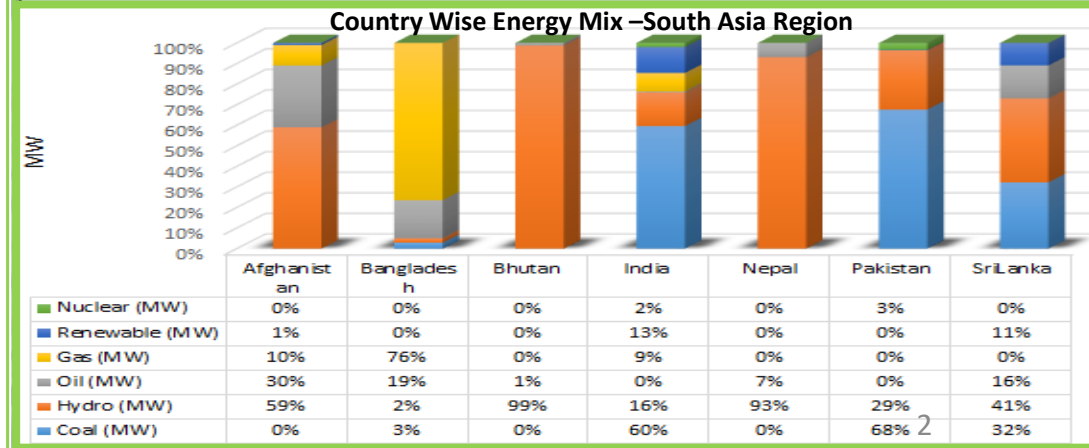
 **India**: Very Large Power System, Coal Dominated, reducing deficits, long terms electricity demand are huge and potential large market, Electricity importing and exporting nation.

 **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.

Country	Installed Capacity (MW)
Afghanistan	1341
Bhutan	1,614
Bangladesh	16,046
India	345495
Nepal	765
Sri Lanka	4050
Pakistan	24,829
Total	394140

Source : Compiled form various sources PGCB, DGPC,CEA,Annual Report NEA, Status of Industry Report NEPRA, Task Force 1 Report IRADe Report on CBET in South Asia: Challenges and investment oppoutinuties, etc.



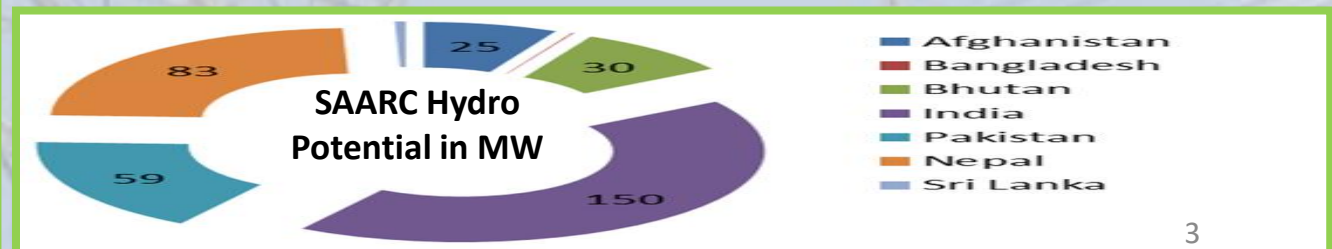
Resource Potential: Hydro Potential :350 GW !

- ✓ 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

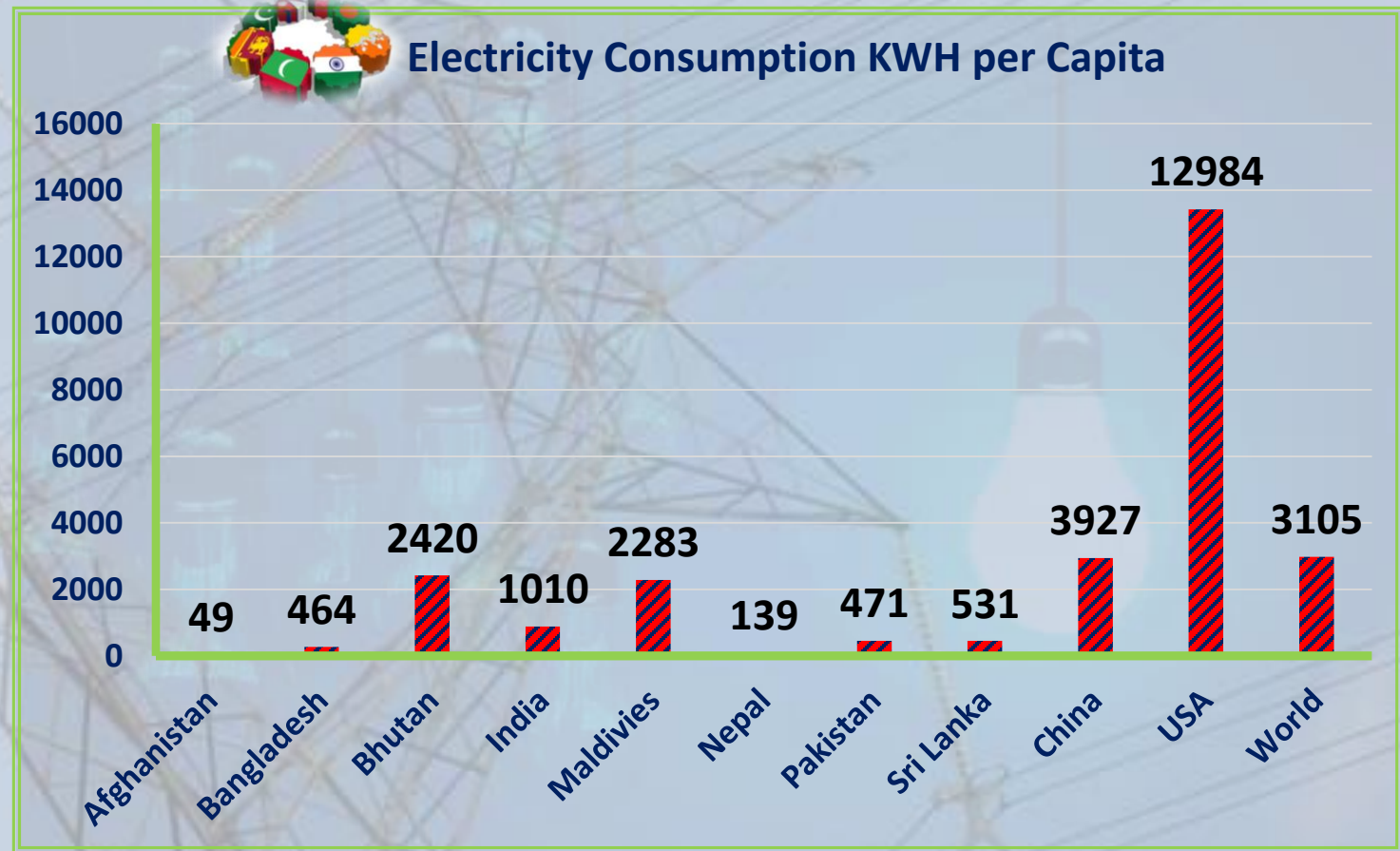
Source: SAARC Secretariat (2010) for Bangladesh, Bhutan, India, Nepal, Sri Lanka; CWC (2005) for Indian States and WAPDA (2011) for Pakistan

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	25,000MW



Per Capita Electricity Consumption

Country/ Region	Electricity Use kWh/capita/yr
SAARC	576
USA	12984
EU	6,592
BRAZIL	2,206
MALAYASIA	3,614
CHINA	3927
WORLD	3105



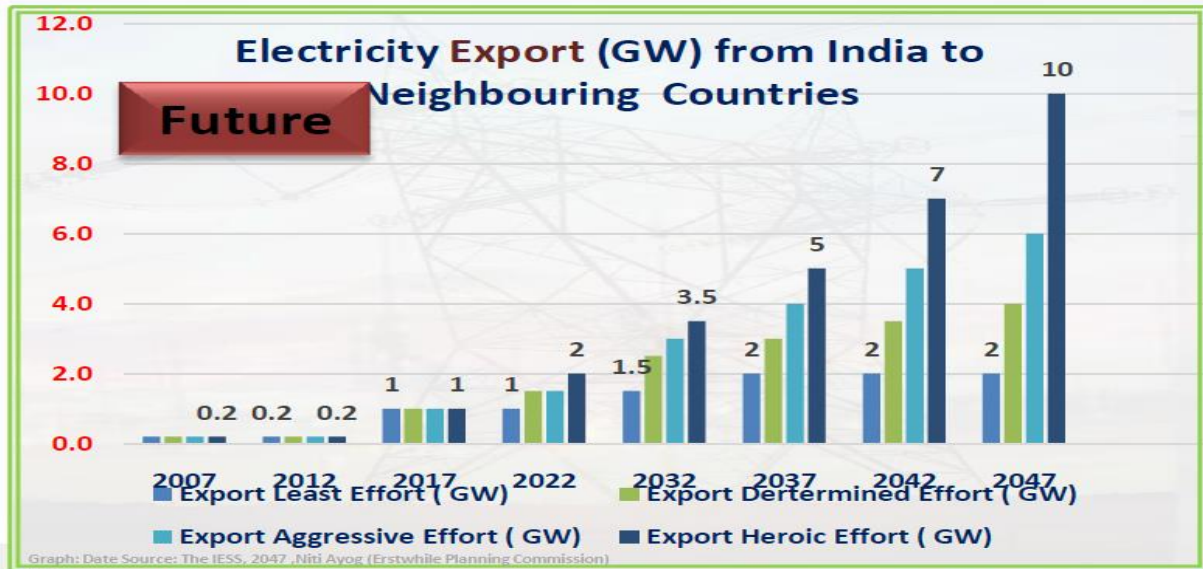
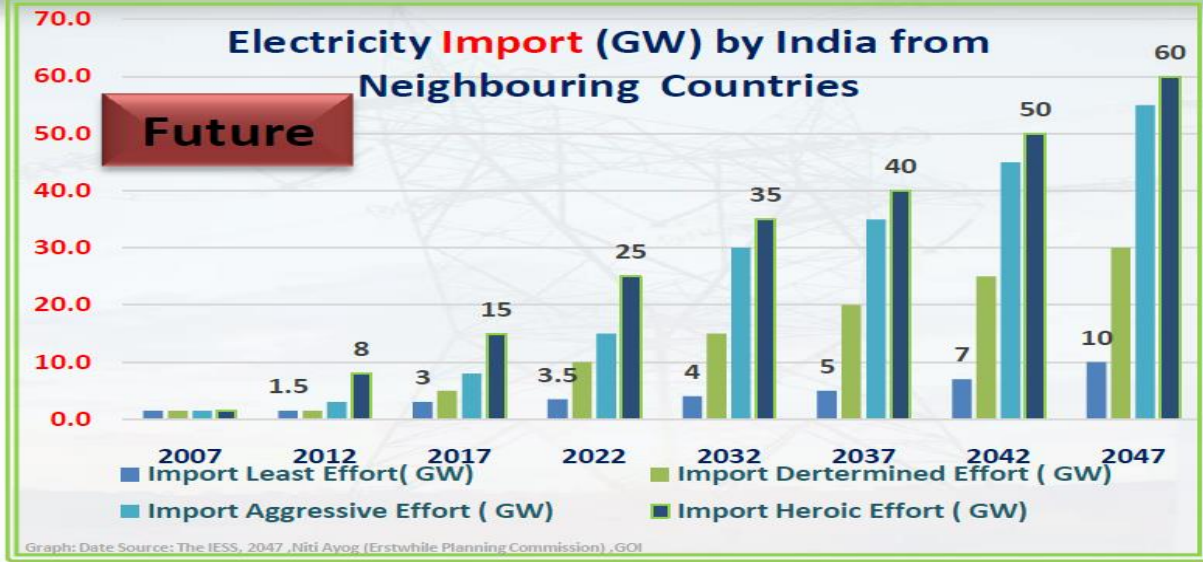
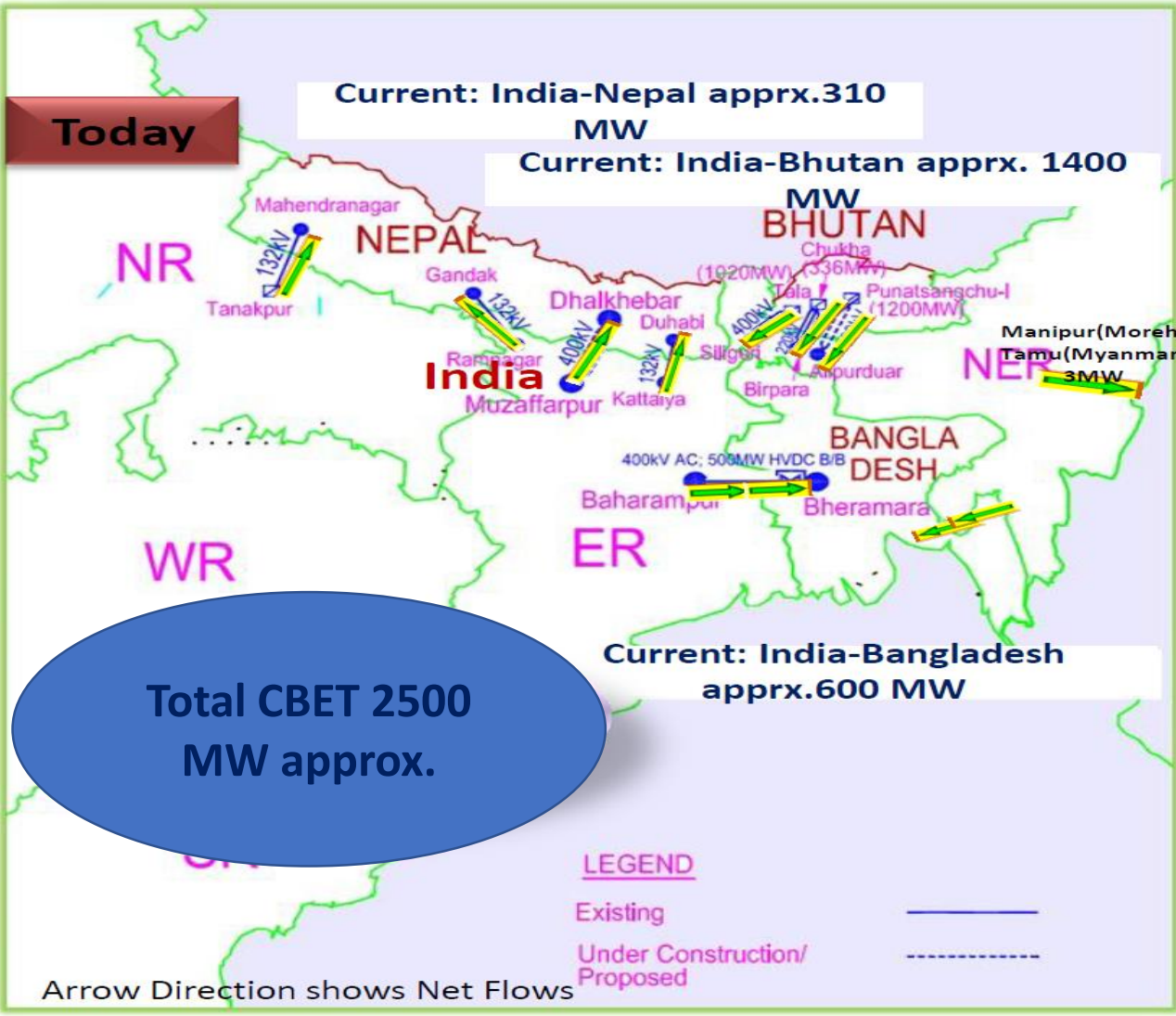
Low per Capita electricity consumptions

Optimal utilization of energy resources.

Access to electricity

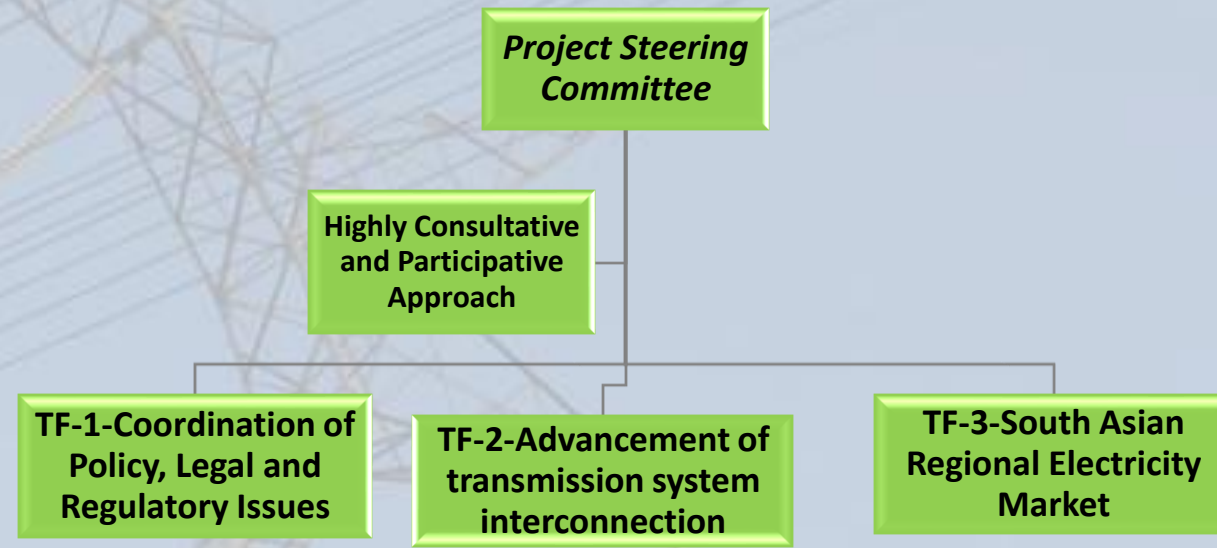
Economic benefits.

Current Status of Cross Border Electricity Trade (CBET) and Future Trading Scenarios



SARI/EI : Overview & Framework

- Long standing program of USAID started in the year 2000
- SARI/EI–Phase IV (2012-2018):
 1. Coordinate policy, legal and regulatory issues.
 2. Advance transmission interconnections.
 3. Establish South Asia Regional Electricity *Markets*
- **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



SARI/EI Overall Framework for development of CBET in SA

SAARC Framework Agreement on Energy (Electricity) Cooperation

Institutional Mechanism

SAFER

Investment Forum

SAFTU

CBET facilitation through

Demand Driven Studies

Regional
Regulatory
Guidelines &
Suggested
Changes/Amendm
ents in Electricity
Laws, Regulations

Regional
Investment
Framework and
Investment
Policy
Guidelines

Harmoniz
ation of
Grid
Codes

Assess
ment of
Trading
Potentia
l

Model
framework
for Open
Access
and
Trading
License
Regime

Transmi
ssion
Master
plan
and
Pricing

Model
Regulati
on for
Power
Market
Develop
ment

Standard
Contracts
(Bankable
PPAs/TSAs
)

Mock
Exercis
e for
SARPE
X

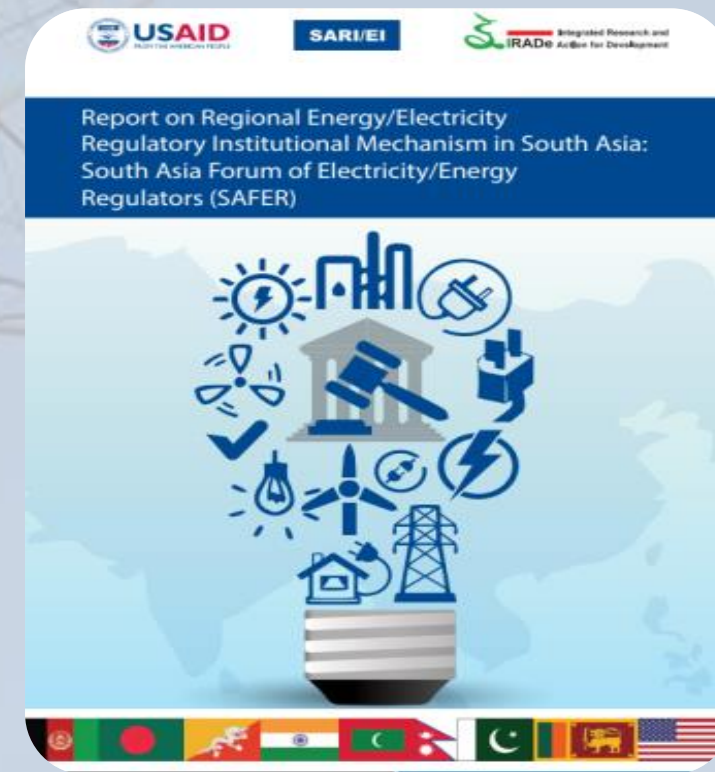
Analytic
al
Studies

Key Research Studies/Reports on Policy, Regulatory and Legal Harmonization/Coordination in South Asia

Regional Regulatory Guidelines

Suggested Changes/Amendments in Electricity Laws/Regulations/Policies

South Asia-South Asia Forum of Energy/Electricity Regulators (SAFER)

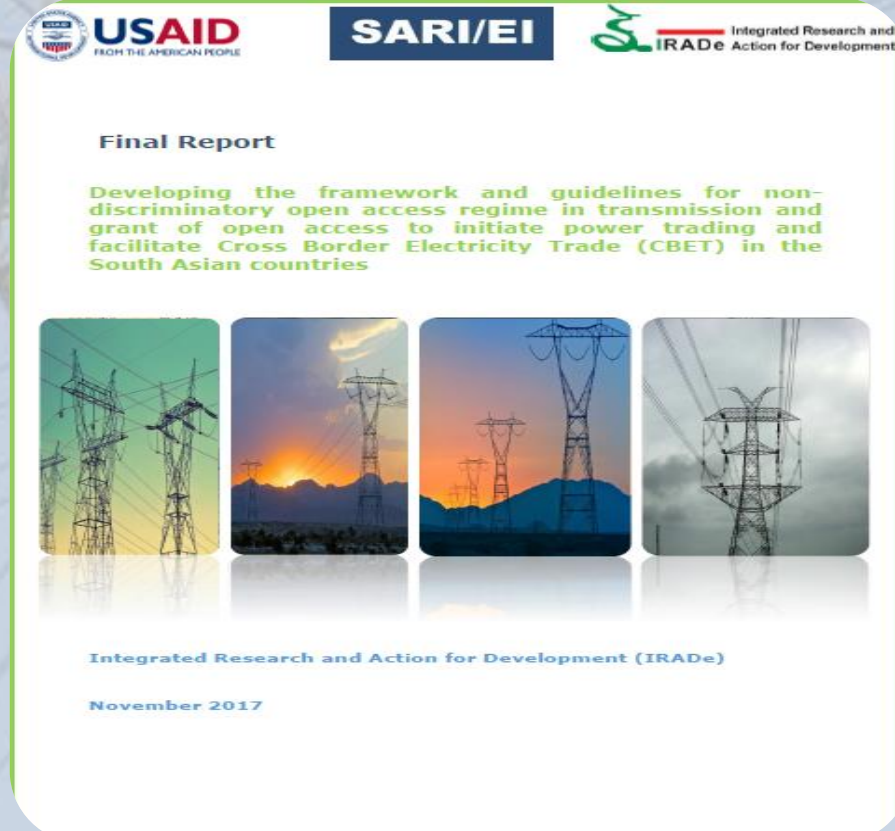


Key Research Studies/Reports on Policy, Regulatory and Legal Harmonization/Coordination in South Asia

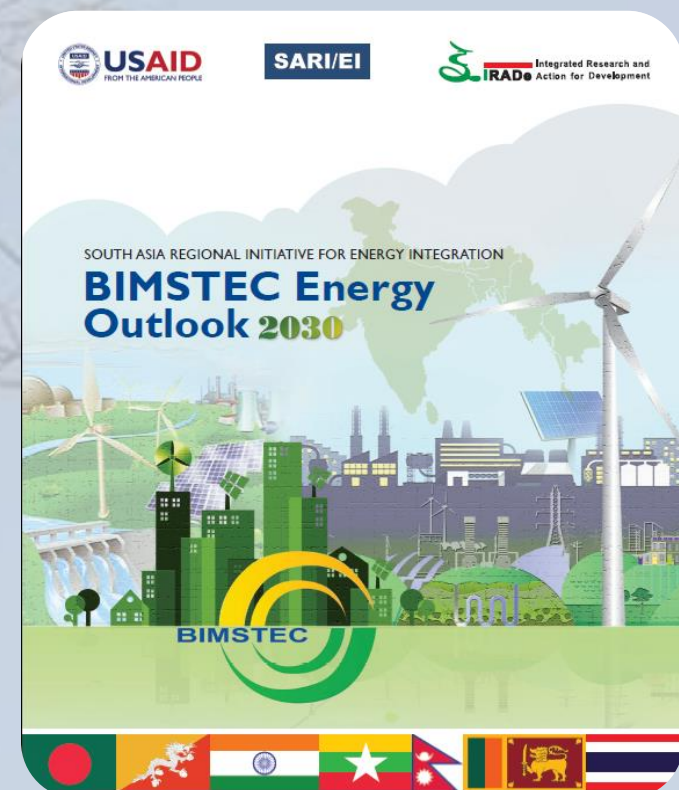
Regional Investment Framework



Open Access and Trading License Model Framework



BIMSTEC Energy Outlook-2030



Key Research Studies/Reports on Transmission Interconnection in South Asia

Harmonization of Grid codes, operating procedures and Standards for promoting CBET in South Asia

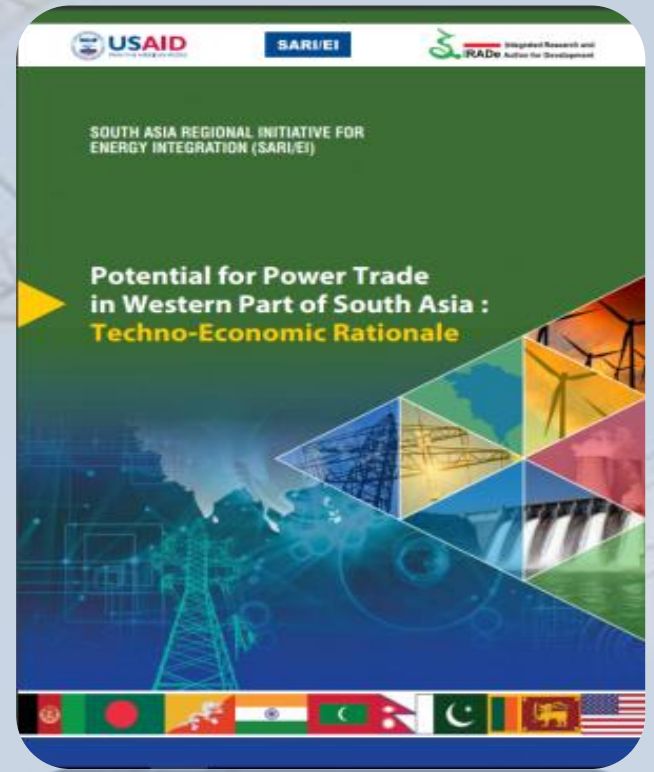


<http://irade.org/Harmonisation-of-grid-codes-operating-procedures-and-standards-to-facilitate-promote-cross-border-electricity-trade-in-the-south-asia-region-Framework-grid-code-guidelines-Rajiv-LR-1.pdf>
<http://irade.org/Report-on-Potential-for-Power-Trade-in-Western-Part-of-South-Asia-A-Techno-Economic-Analysis-High-Resolution.pdf>

Assessment of Power Trading Potential by 2034



Potential for Power Trade in Western part of South Asia- Techno-economic Rationale



Key Research Studies/Reports on Regional Power Market in South Asia

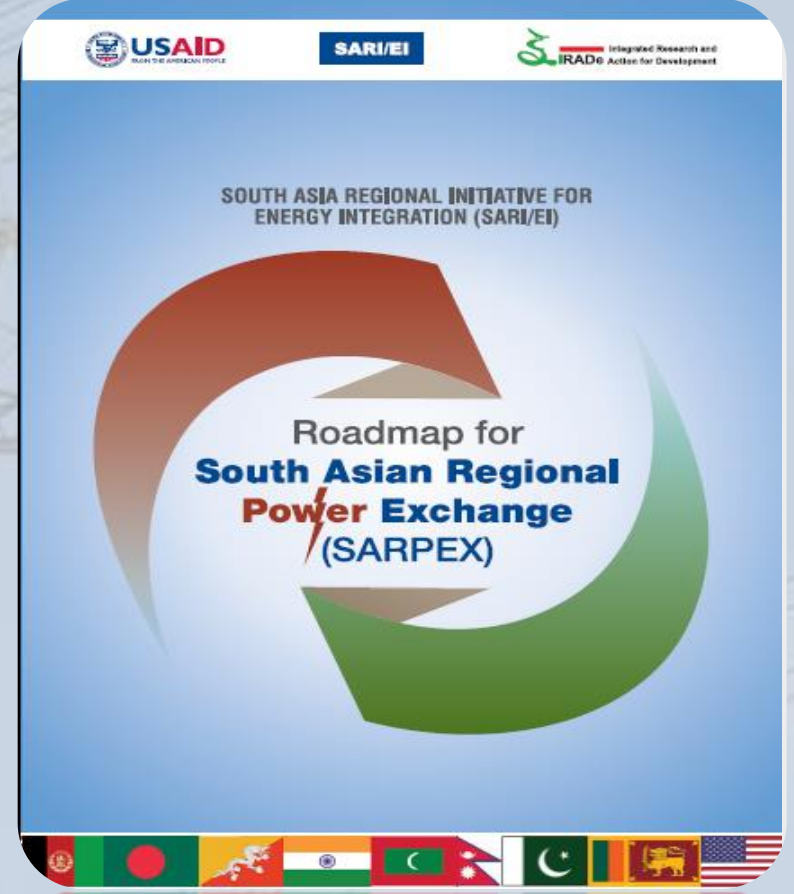
Model Power Purchase Agreements



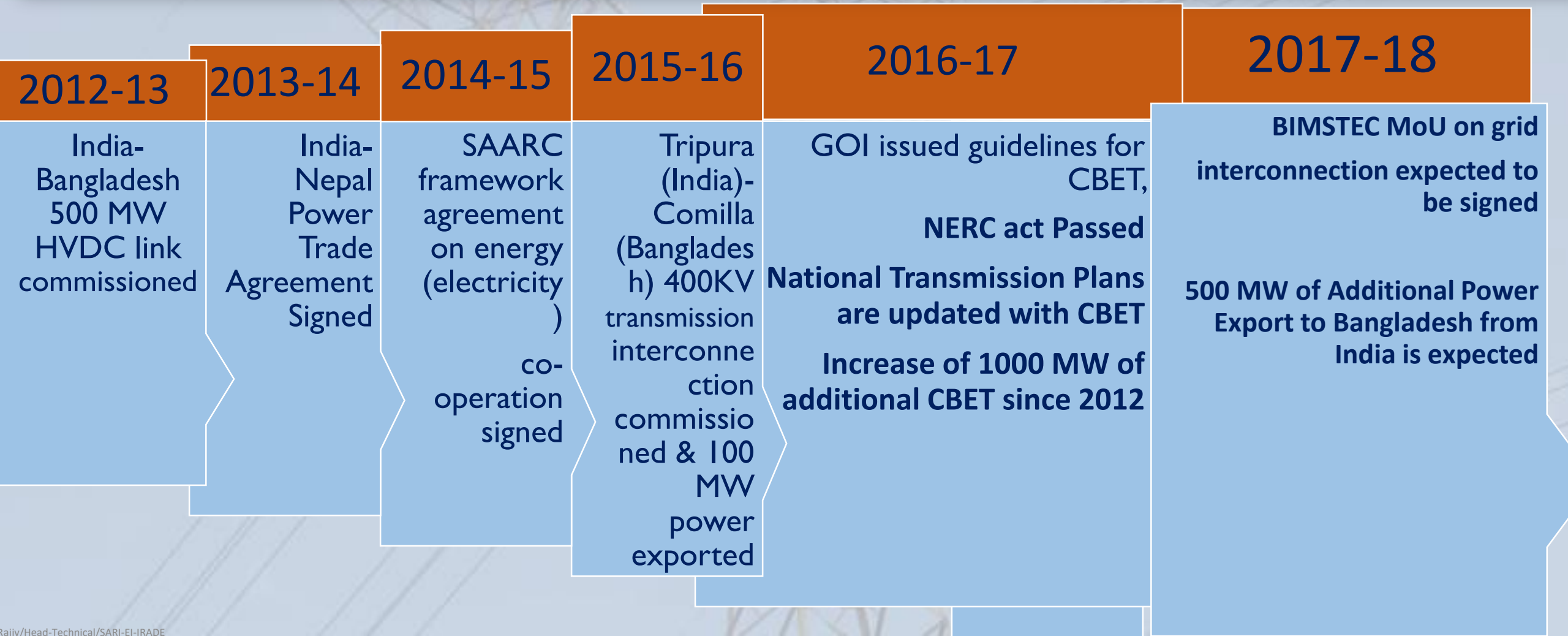
Model Transmission Service Agreements



Report on South Asia Regional Power Exchange



Key Impacts Milestone Achieved in South-Asian Region CBET since 2012-13



Our Strong Relationship in South Asia

- ✓ SAARC Secretariat
- ✓ SAARC Energy Centre
- ✓ SAARC Chamber of Commerce
- ✓ South Asia Forum of Infrastructure Regulations
- ✓ BIMSTEC Secretariat
- ✓ Secretary , Joint Secy. Of Ministry of power and Energy of SA countries
- ✓ Heads/Chief Engineer/Directors of the Power utilities.
- ✓ Regulatory Commissions
- ✓ MDBs such as ADB, AIIB.
- ✓ Private Sector, Think Tank



Way Forward

Implementation of Intergovernmental Framework Regional/bilateral Agreement/Treaties.

To take forward coordination of regulations by creating a common platform/institution/association/forum/working group in the South Asia Region

For Coordinated Transmission Planning, Operational aspects, to create technical institutional mechanism such as Forum/Association of Transmission utilities and system operators in the Region.

For Investment facilitation, to create Regional Investment Facilitation Forum/Association and also Regional Dispute Resolution Institutional Mechanism.

Need to promote development of Hydro Power and Renewable Energy, being clean, renewable, helps in reduction of CO2 emission, load balancing etc.

Financial Viability of power sector to be improved to sustain CBET in long run



Thank You