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

South Asian Power Sector : Investment Prospects, Challenges and Issues



SAARC Perspective Workshop on the Past, Present and Future of High Voltage DC (HVDC) Power Transmission

30th Sept & 1st Oct, 2015, Lahore, Pakistan



Outline of Presentation

- **Overview of South Asian Power Sector**
- **Resource Potential Across South Asian Region**
- **Key Drivers for Investment in CBET and Regional exploitation of Resources**
- **Country Wise**
 - a) **Capacity Addition Planned & Investment Required**
 - b) **Key cross border Transmission lines Planned and investment Required**
- **Issues related to investment and financing of Power projects ,CBET infrastructures**
 - ✓ Risk Profile
 - ✓ viability of the Projects
 - ✓ Lenders concerns
 - ✓ viability of the Power Sector
 - ✓ Source of funding and Financing options

Overview of South Asian Power Sector

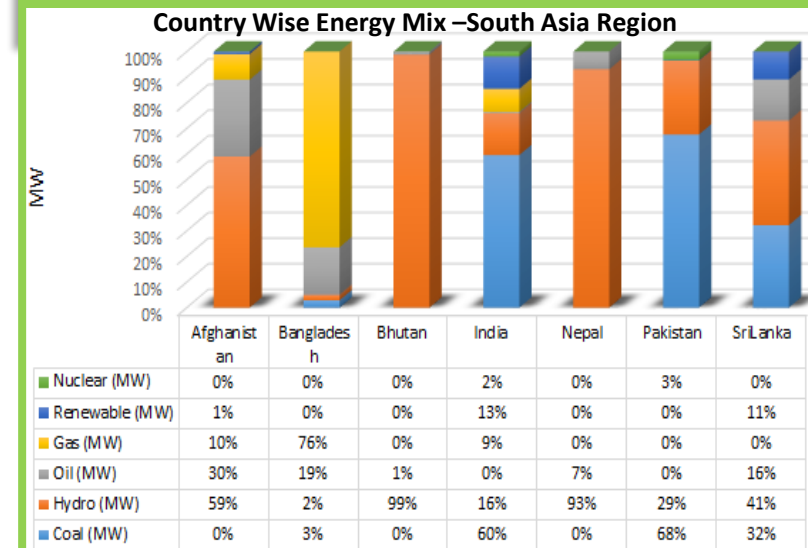
South Asian Power Sector. Total Installed capacity of around 3,18,588 MW.

- ✓ **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 flex 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)	Peak Deficit (%)
Afghanistan	1341	NA
Bhutan	1,614	9%
Bangladesh	11,088	6%
India	2,76,783	3%
Nepal	765	34%
Sri Lanka	3334	24%
Pakistan	23,663	NA
Total	3,18,588	

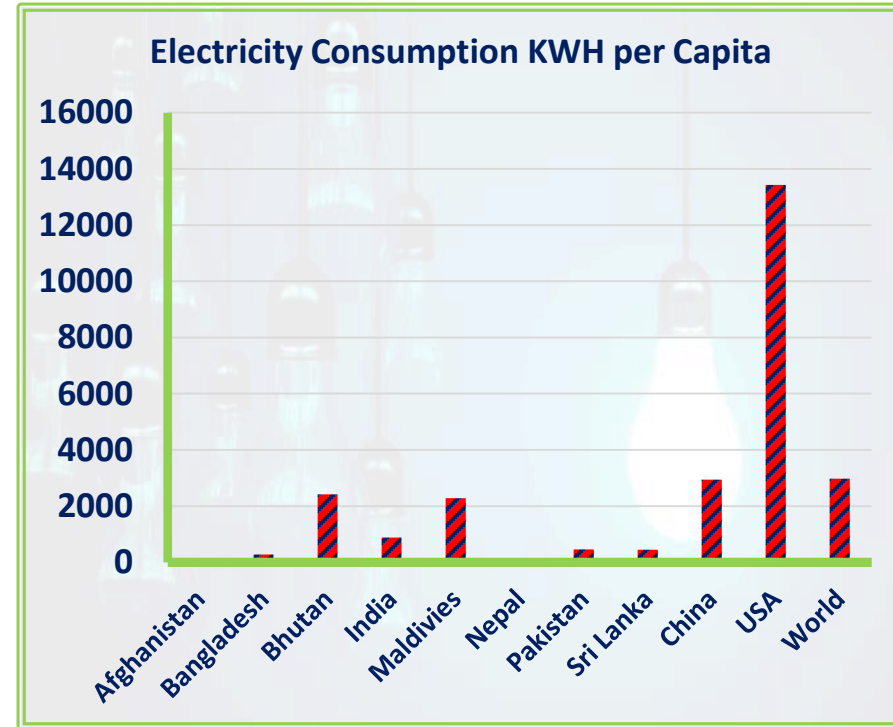
Source : Compiled form various sources PGCB, DGPC,CEA,Annual Report NEA, Status of Industry Report NEPRA, Task Force 1 Report IRADe Report on CBET in South



PER CAPITA ELECTRICITY

Country/ Region	Electricity Use kWh/capita /yr	CAGR in last 10 years
SAARC	517	4.1%
USA	12,914	-0.3%
EU	6,592	0.7%
BRAZIL	2,206	1.9%
MALAYASIA	3,614	3.3%
CHINA	2,631	11.2%
WORLD	2,803	2.0%

Source : SAARC Energy Center



- ✓ 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.

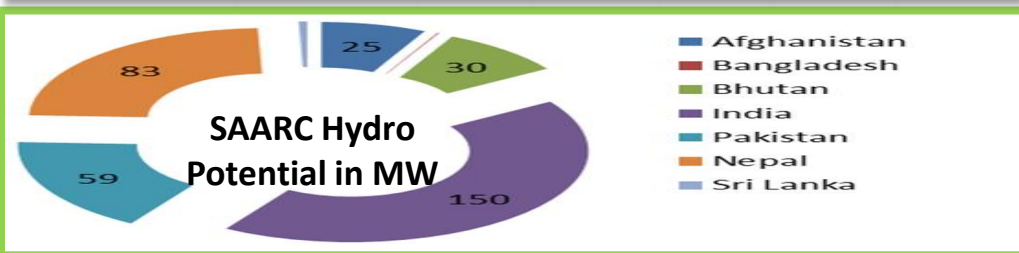
Resource Potential: Hydro Potential :350 GW !

- ✓ Vast potential of hydro power:350 GW
- ✓ Bhutan,Nepal, Pakistan, India, 30,83, 59,150 GW respectively.
- ✓ Nepal and Bhutan can build exported oriented hydro 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

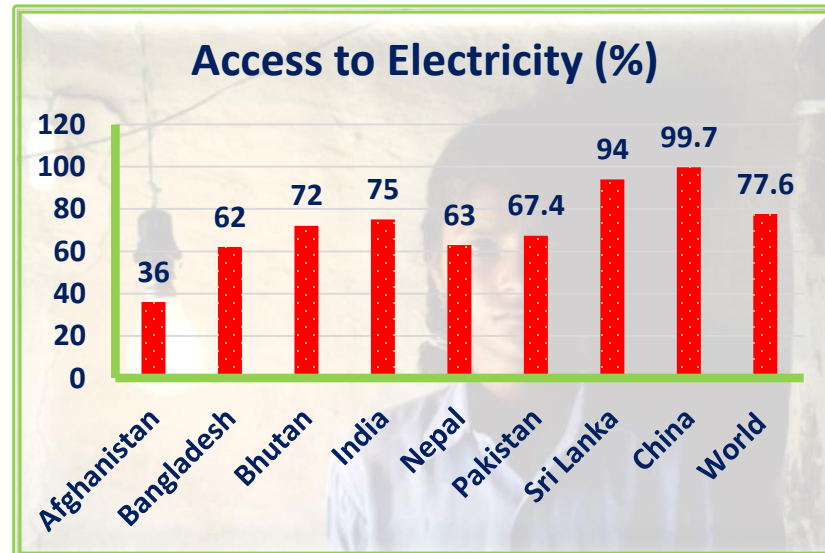
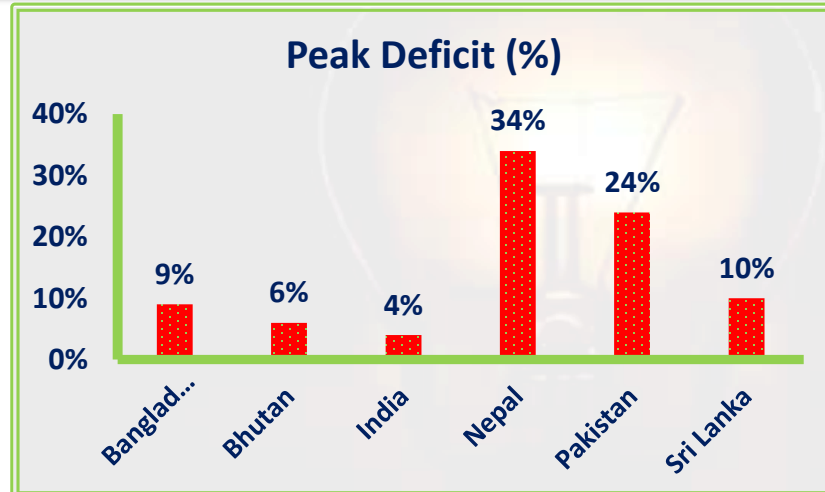
Source: SAARC Secretariat (2010) for Bangladesh, Bhutan, India, Nepal, Sri Lanka; CWC (2005) for Indian States and WAPDA (2011) for Pakistan

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

- ✓ Low per Capita electricity consumptions
- ✓ Electricity Shortages.
- ✓ Poor access to electricity.
- ✓ Optimal utilization of energy resources.
- ✓ Economic benefits.
- ✓ Resource Crunch (In Bangladesh)
- ✓ Regional electricity Market: Earlier reforms in energy creating a new dynamic for trade.
- ✓ Fostering Economic Growth and Regional Integration





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Country wise Capacity Addition(Generation and Transmission)Planned & Investment Requirements



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India: Capacity Addition(Generation and Transmission)Planned & Investment Requirements



India: Capacity Addition Planned & Investment Required



- Twelfth Plan period (2012-2017) the target has been fixed at **88,537 MW**.
- There is separate renewable energy capacity addition of around **30,000 MW** (5,000 MW wind, 10,000 MW solar, 2,100 small hydro)(target recently revised)
- **Total Capacity addition planned =1,18,536 MW (USD 92 Billion)**
- ✓ USD 30 billion required in power transmission .(**~29% is anticipated from private sector**)
- **1,200 MW import of hydro power from Bhutan is also considered.**
- **Total investment required is around Rs 13,72,580 crore (US\$ 228.76 billion)**

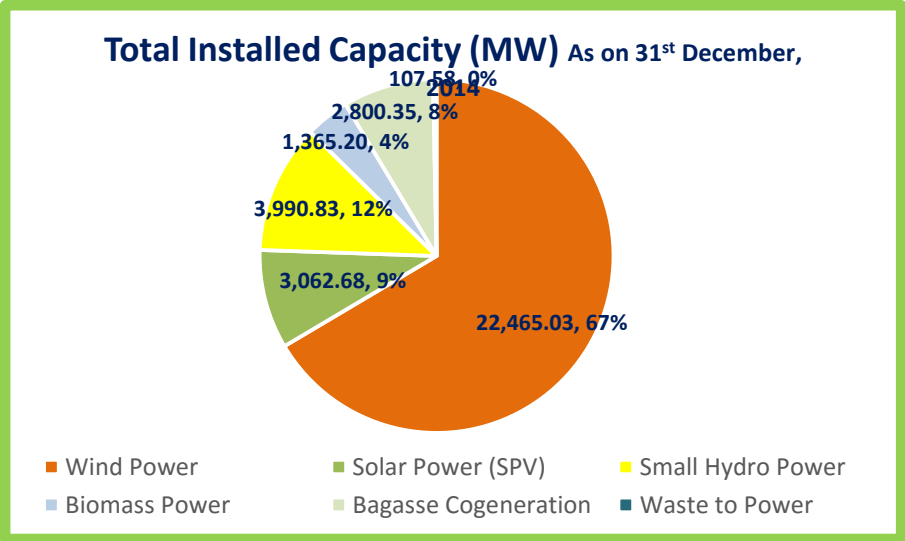
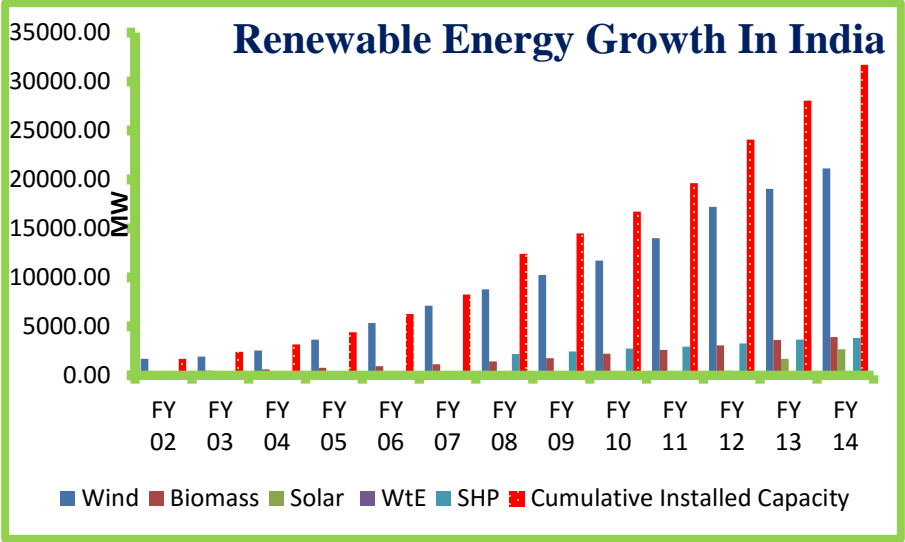
Distribution of funds during the 12th Plan (in Rs crore)

Expenditure Area	Centre	State	Private	Total
Thermal	48,650	55,734	1,73,117	2,77,500
Hydro	35,183	8,042	6,952	50,159
Nuclear	26,200	-	-	26,600
Biomass	-	-	-	10,500
Small Hydro Projects	-	-	-	8,000
Solar	-	-	-	49,400
Wind	-	-	-	67,200
Captive Projects	-	-	65,000	65,000
Total Generation Investment	5,54,359 (in Rs crore)			
Modernisation of Plants	19,847	12,040	-	31,887
Transmission	1,00,000	55,000	25,000	1,80,000
Distribution	48,191	2,38,082	19,963	3,06,235
Energy Efficiency	7,482	-	-	7,482
Human Resources	4,108	-	-	4,108
R&D	4,168	-	-	4,168
Advance for 13th Plan	1,65,372	15,417	91,793	2,72,582
Total Investment	₹ 13,72,580 crore (US\$ 228.76 billion)			

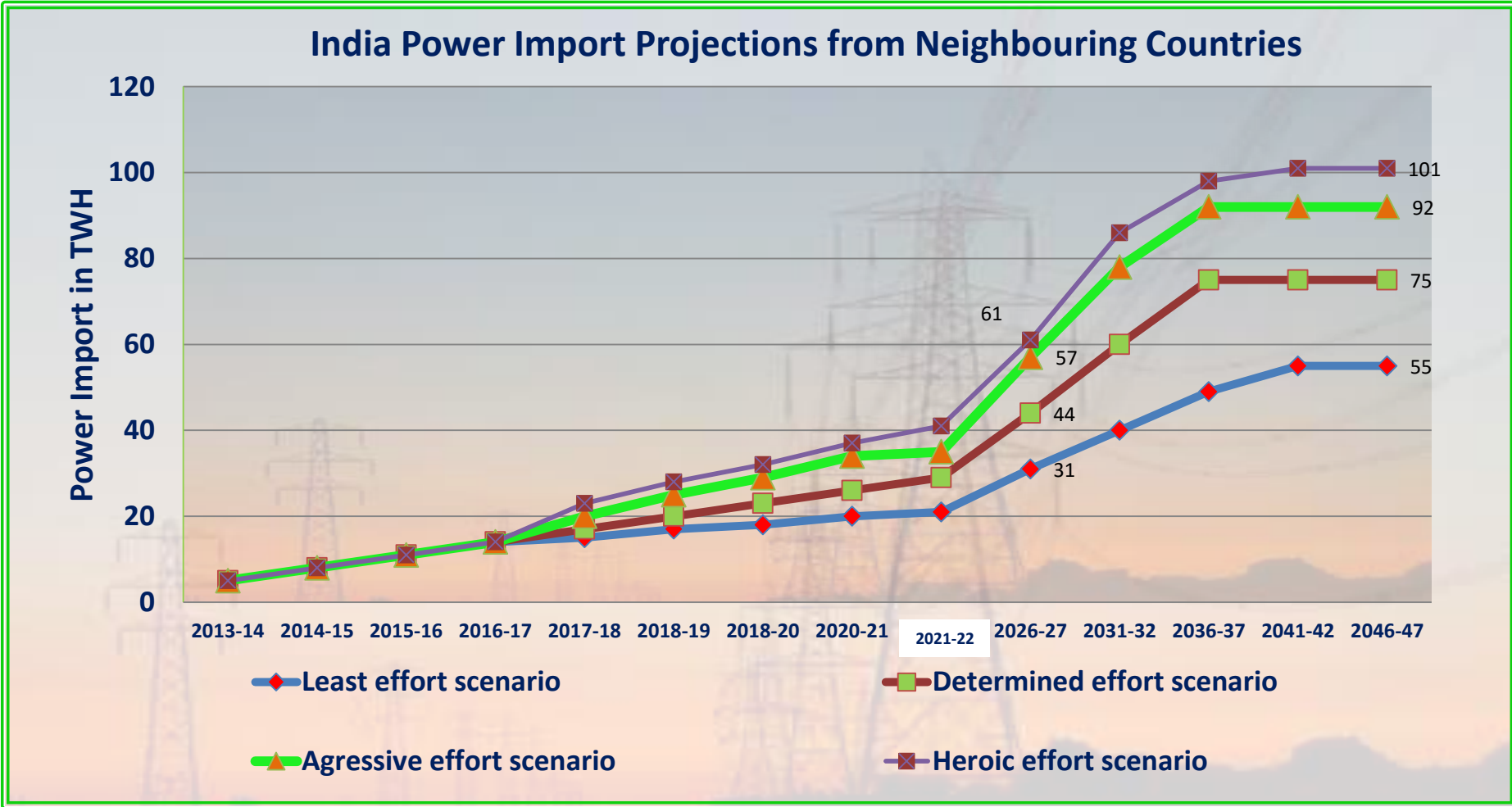
Source: Planning Commission – Report of the Working Committee on power

India: Significant Emphasis on Renewable Energy

- India has witnessed significant Growth in RE.
- Current RE installed capacity is 34 GW.
- India recently revised its RE targets with a increase in five fold to 175 GW by 2022. (100 GW solar, 60 GW wind, 10 GW biomass, 5 GW small hydro)
- Significant Investment Required in Renewable energy.



India: Electricity Imports India Energy Security Scenarios, 2047 (Niti Ayog)





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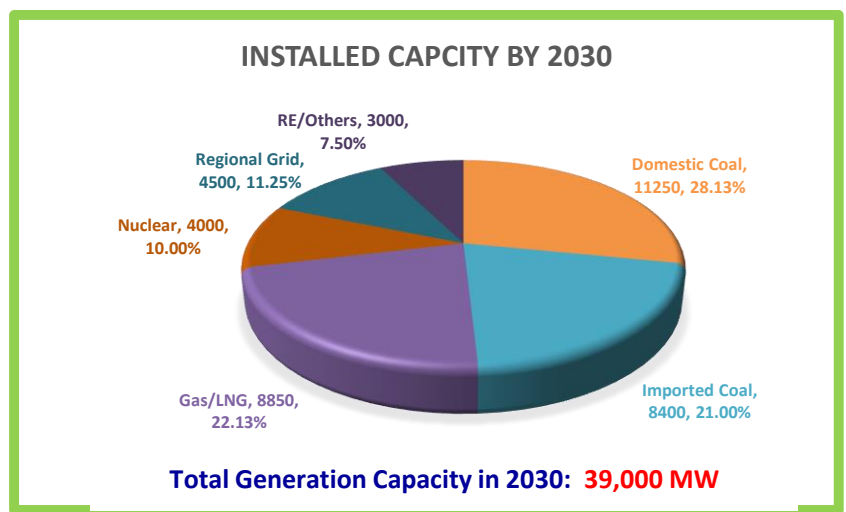
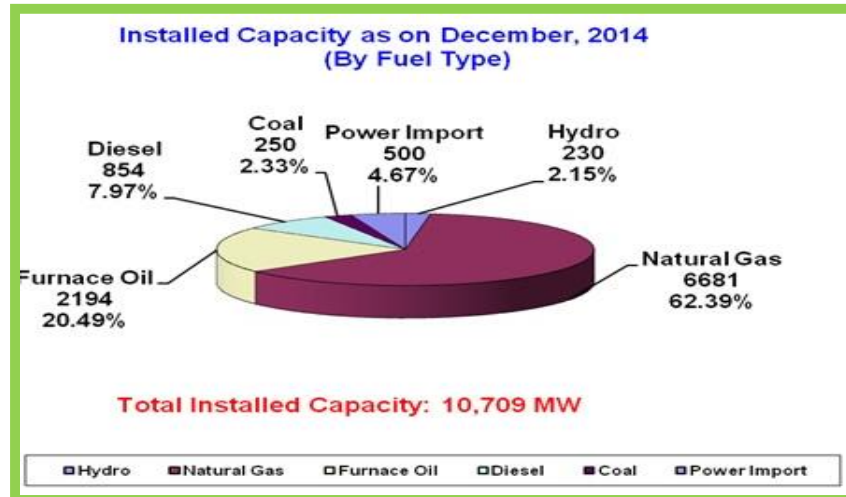
Bangladesh : Capacity Addition(Generation and Transmission) Planned & Investment Requirements



Bangladesh :Capacity Addition(Generation and Transmission)Planned & Investment Requirements



- ✓ Total installed capacity 11,088 MW.
- ✓ As per the PSMP 2010*: To attain 8% GDP, the installed capacity planned is 39,000MW by the year 2030.
- ✓ Bangladesh plans to diversify from gas-based generation to coal based by 2030.
- ✓ It also planned to import 4500 MW from regional Grid .
- ✓ The aggregated investments for generation, transmission and related facilities are worked out to Taka 4.8 trillion (US\$ 69.5 billion over a period of 2010-2030).
- ✓ The annual average of the investment amounts to Tk 241 billion (US\$ 3.5 billion).
- ✓ Envisages more Private sector participations.



* Source :PSMP



Bangladesh :Some of the Key Generation Projects

SI	Description	Capacity (MW)	Executing Agency	Fuel	Expected COD (Revised)
1	BIFPCL, Rampal 1320 MW Large Coal	1,320	BPDB-NTPC JV	Coal-I	2018
2	LNG based 1000 MW PP at Ctg/Moheshkhali	1,000	BPDB/IPP	LNG	2019
3	Karnafuli Hydro #6,7	100	BPDB	Hydro	2020
4	Matarbari 1 st Phase Coal	1,200	CPGCL	Coal-I	2021
5	Moheshkhali 2x600-700 MW Coal TPP (1 st)	1,200	JV	Coal-I	2021
6	Moheshkhali 2x600-700 MW Coal TPP (2 nd)	1,200	BPDB	Coal-I	2022
7	Rooppur Nuclear # 1, 1000 MW	1,250	BAEC	Nuclear	2023
8	Moheshkhali 2x600-700 MW Coal TPP (3 rd)	1,200	BPDB	Coal-I	2023
9	Moheshkhali 2x600-700 MW Coal TPP (4 th)	1,200	JV	Coal-I	2024
10	Matarbari 2 nd Phase Coal-I	1,200	CPGCL	Coal-I	2024
11	Rooppur Nuclear # 2, 1000 MW	1,250	BAEC	Nuclear	2024
Total:		12,120			



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Bhutan: Capacity Addition(Generation and Transmission)Planned & Investment Requirements



Bhutan: Capacity Addition Planned



- ✓ Installed Capacity 1614 MW and small domestic load.
- ✓ Hydro Projects of 11,044 MW are under various stages of implementation.
- ✓ Minimum of 5000 MW of export to India by the year 2020.
- ✓ Hydro capacity planned by the end of 2030 - 26534 MW.
- ✓ Projects are being Developed in various modes 1) Intergovernmental framework mode 2) Joint Venture 3) PPP

Sl. No.	Name of HEP	Installed Cap. (MW)	Year of Commissioning	Implementation Mode/Remarks
1.	Punatsangchhu-I	1200	2016/17	IG/Under construction
2.	Punatsangchhu-II	1020	2017	-do-
3.	Mangdechhu	720	2017	-do-
4.	Sankosh	2560	2023	IG/DPR under review
5.	Kuri-Gongri	2640	2025	IG/DPR to begin soon
6.	Wangchhu	570	2022	JV/DPR under review
7.	Bunakha	180	2020	JV/DPR cleared
8.	Kholongchhu	600	2021	-do-
9.	Chamkharchhu-I	770	2024	JV/DPR under review
10.	Amochhu	540	2022	IG/DPR cleared
11.	Nikachhu	118	2019	PPP/DPR cleared
12.	Dagachhu	126	2014	PPP/ commissioned
Total		11,044 MW		

Bhutan: Some of the Key project and Investment requirements



- ✓ A total investment of US\$ 12.62 Billion is required for Developing Generation and Transmission Projects.
- ✓ This cost may go up considering the cost escalation nature of hydro projects due to various uncertainties.

Project Name	Implementation Mode/Remark	Capacity	Investment Requirements (INR Cr.)	Associated transmission cost (INR Cr.)
Punatsangchhu-I HEP	IG*/Under construction	1200	Punatsangchhu-I HEP Is at Final Stage of Implementation and Dagachhu has been Commissioned	
Dagachhu HEP	PPP-commissioned	126		
Punatsangchhu-II HEP	IG/Under construction	1020	8160	434.1
Mangdechhu HEP	IG/Under construction	720	5760	905.5
Amochhu Reservoir HEP	IG/DPR cleared	540	4320	105.1
Chamkharchhu-I HEP	JV/DPR under review	770	6160	586.95
Kholongchhu HEP	JV/DPR cleared	600	4800	811.45
Wangchhu HEP	JV/DPR under review	570	4560	53.8
Sunkosh Main HEP	IG/DPR under review	2500	20000	
Sunkosh Barrage HEP	IG/DPR under review	85	680	296.95
Bunakha Reservoir HEP	JV/DPR cleared	180	1440	104
Nikachhu HEP	PPP/DPR cleared	210	1680	147
Kuri-Gongri HEP	IG/DPR to begin soon	1800	14440	809.9
Bindu Khola HEP	NA	13	104	4.75
		10334	72104	4259.5
Total Investment Required			76363.5 (12.62 US \$ billion)	



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Nepal: Capacity Addition(Generation and Transmission)Planned & Investment Requirements





Nepal: Capacity Addition Planned

- ✓ **Installed Capacity : 765 MW**
- ✓ **Nepal is expected to have peak load of 5622 MW by 2030.**
- ✓ **Nepal is expected to add 4541 MW of additional capacity by 2025 (3057 MW RoR and 1484 Storage)**
- ✓ **There are many projects are being pursued currently which are Cross Border Power in nature**

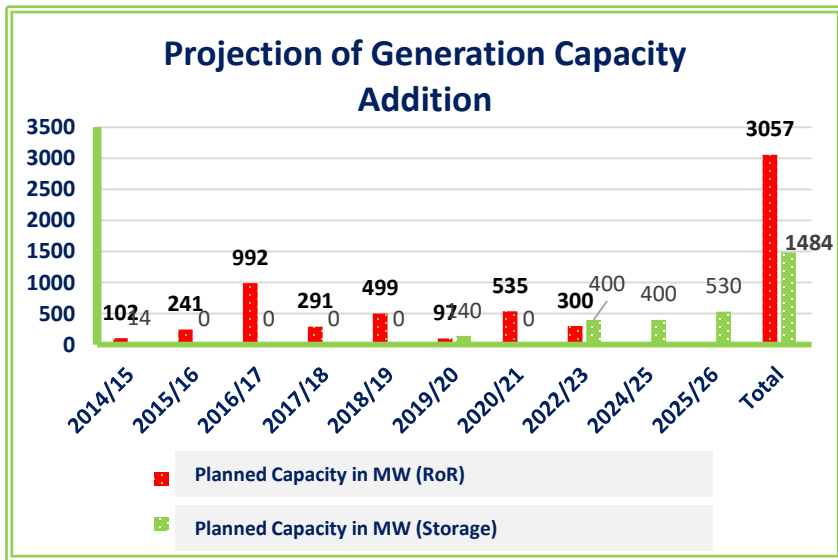
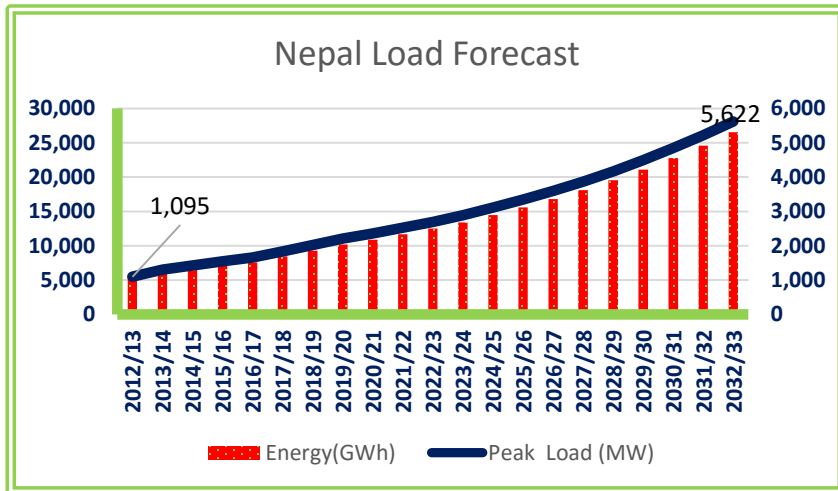
PDA Concluded:

1. 900 MW Upper Karnali with GMR India
2. 900 MW Arun -3 with SJVNL

PDA in the pipelines:

1. 600 MW Upper Marsyangdi - GMR
2. 750 MW West Seti – CWE (Three Gorges)
3. 880 MW Tamakosi III (SN Power)

- ✓ **For development of 10,000 Mw hydro power around US\$ 7.21 billion will be required.**
- ✓ **Investment required for transmission projected under Construction, planned and proposed is USD 1.786 Billion**





Nepal: Some of the Key Hydro Projects and Investment Requirement



Name of the Project	Capacity in MW	*Estimated Project Cost
Arun-3	900	\$ 944.5 million
Upper Karnali Project	300	\$450 million
Sapat Koshi	3300	\$ 4950 million
Karnali	10,800	\$ 16200 million
Naumure	225	\$ 337.5 million
Pancheshwar	5600	\$ 8400 million

* USD 1.5 Million per MW



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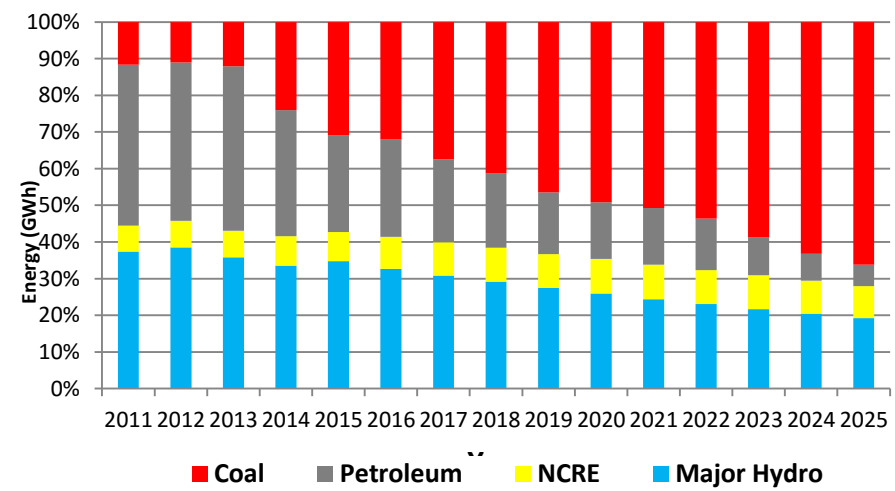
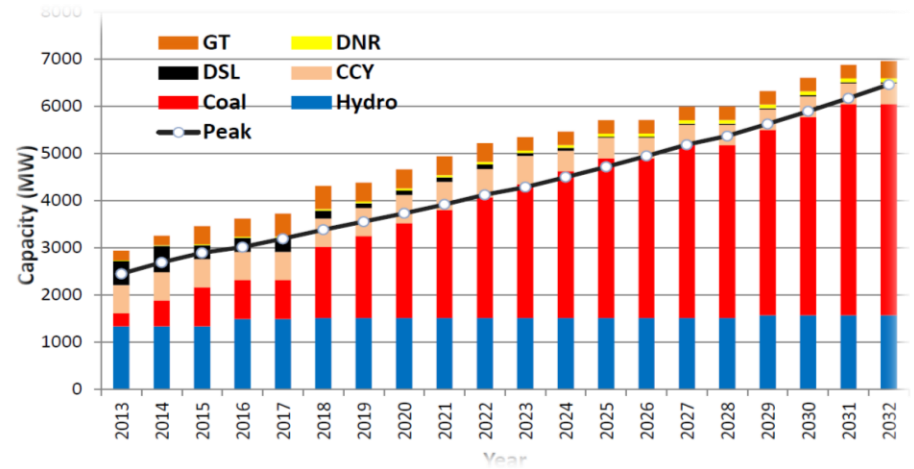
Sri Lanka: Capacity Addition(Generation and Transmission)Planned & Investment Requirements





Sri Lanka: Capacity Addition Planned and Investment Requirement

- ✓ **Installed Capacity: 3334 MW.**
- ✓ **By 2032, installed capacity planned 6985 MW.**
- ✓ **4600MW is planned from coal based generation.**
- ✓ **714 MW from Nonconventional renewable energy.**
- ✓ **Thermal share to go up from 49% to 68% by 2032.**
- ✓ **500 MW HVDC Indo-Sri Lanka**
- ✓ **As per the Long Term Generation and Transmission expansion Plan, total investment of US\$ 14.05 billion approx. is required by 2032.**

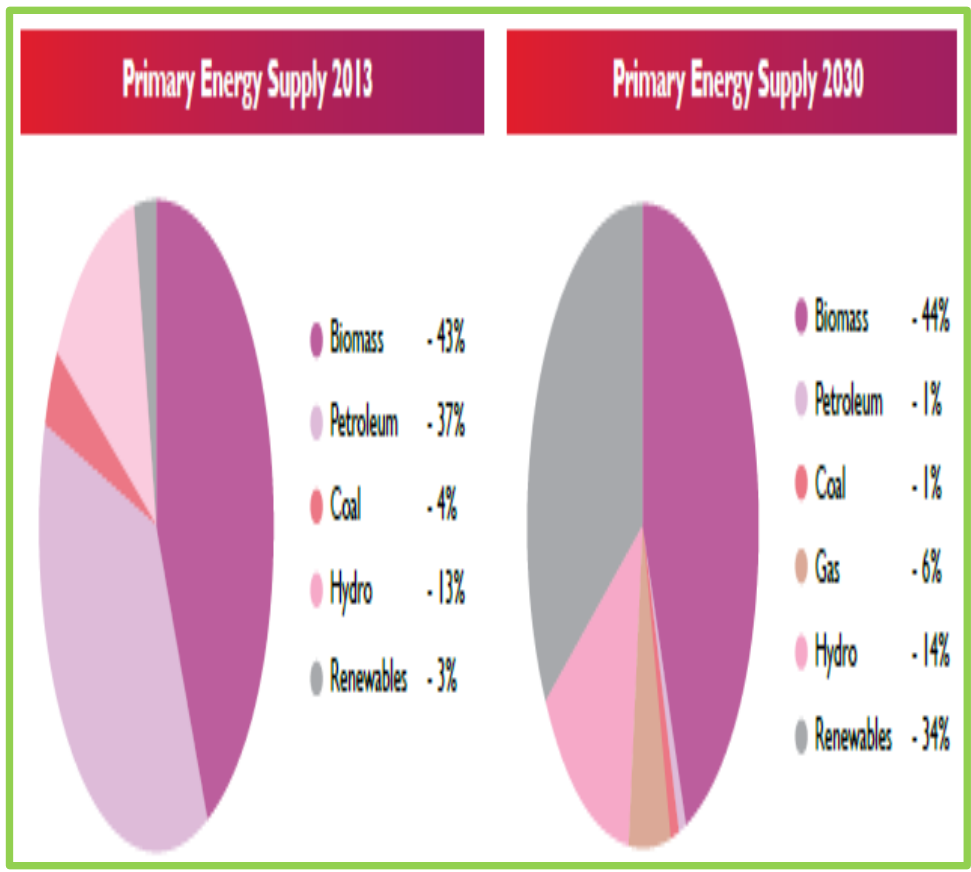


*Source: Base Case :Generation expansion plan 2012

Sri Lanka: The New “Energy Sector Development Plan”(March, 2015)



- ✓ To make Sri Lanka an energy self-sufficient nation by 2030.
- ✓ Increase the share of renewable energy in primary energy supplies from 3 % in 2013 to 34% by 2030 .
- ✓ Increase the electricity generation capacity of the system from 4,050 MW to 6,400 MW by 2025
- ✓ Generate a minimum 1,000 MW of electricity using indigenous gas resources discovered in Mannar basin by 2020
- ✓ Provide affordable electricity coverage to 100% of the people of the country on a continuous basis before end 2015
- ✓ Reduce the carbon footprint of the energy sector by 5% by 2025



Sri Lanka: Key Generation Projects and Investment Requirements



On-going Projects

Project/ Activity	Total Estimated Cost	Duration	Responsible Agency
01. Construction of 500 MW (2 x 250 MW) Sampur coal power plant – Joint venture between NTPC of India and CEB	USD 536.0 Mn (Equity portion US \$ 25.0 Mn)	2012-2018	CEB
02. Feasibility Study of 20 MW Seethawaka Ganga Hydro Power Project	US\$ 1.5 Mn	2015-2017	CEB
03. Construction of 30.5 MW Moragolla Hydropower Project	US\$ 125 Mn	2015 - 2019	CEB
04. Construction of 35 MW Broadlands Hydropower Project	US\$ 82.5 Mn	2015 - 2018	CEB
05. Procurement of New 3x35 MW Gas Turbine	US\$ 12.6 Mn	2015 - 2016	CEB
06. Polpitiya (Samanala) Power Station Rehabilitation Project	US\$ 25 Mn	2015 - 2018	CEB
07. Construction of 120 MW Uma Oya Hydropower Project	US\$ 529 Mn	2010 - 2016	CEB
08. Feasibility study of 600 MW pump storage power plant	Rs. 5.0 Mn	2015-2016	CEB
09. Master Plan study for Planning & Design of the Transmission & Generation Systems	US\$ 5 Mn	2015 - 2016	CEB

Future Projects

Project/ Activity	Total Estimated Cost	Duration	Responsible Agency
01. Construction of 2nd coal power plant in Sampur	USD 1000 Mn	2018 - 2022	CEB
02. Development of 375 MW wind power farm in Mannar (100 MW in Stage-I)	USD 180 Mn	2015 - 2020	CEB
03. Establishment of natural gas processing facility in Norochcholle	To be estimated		CEB
04. Establishment of a fuel wood exchange for guaranteed supply to users and purchase at a guaranteed price from the suppliers	To be estimated		CEB/SEA
05. Development of grid connected large scale wind and solar power based on the renewable energy development plan of CEB			M of P & E/ CEB
06. Conducting of detailed feasibility on conversion of Kerawalapitiya and Kelanithissa Gas Turbines to natural gas use	To be estimated		CEB
07. Rehabilitation/repowering old hydro power plants	To be estimated		CEB
08. Technical co-operation project for supporting energy planning (Nuclear Power) and pre-feasibility study for Nuclear Power	To be estimated	2015 - 2018	CEB
09. Optimizing the use of CPC furnace oil (Naphtha) for power generation by CEB	-		CPC/ CEB

Petroleum Sector Upstream and Downstream Development	USD 3,600.00 million
Electricity Generation	USD 1,800.00 million
Electricity Transmission	USD 1,725.00 million
Electricity Distribution	USD 220.00 million



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Proposed/Existing High Voltage Cross Border Interconnections and Estimated Cost.

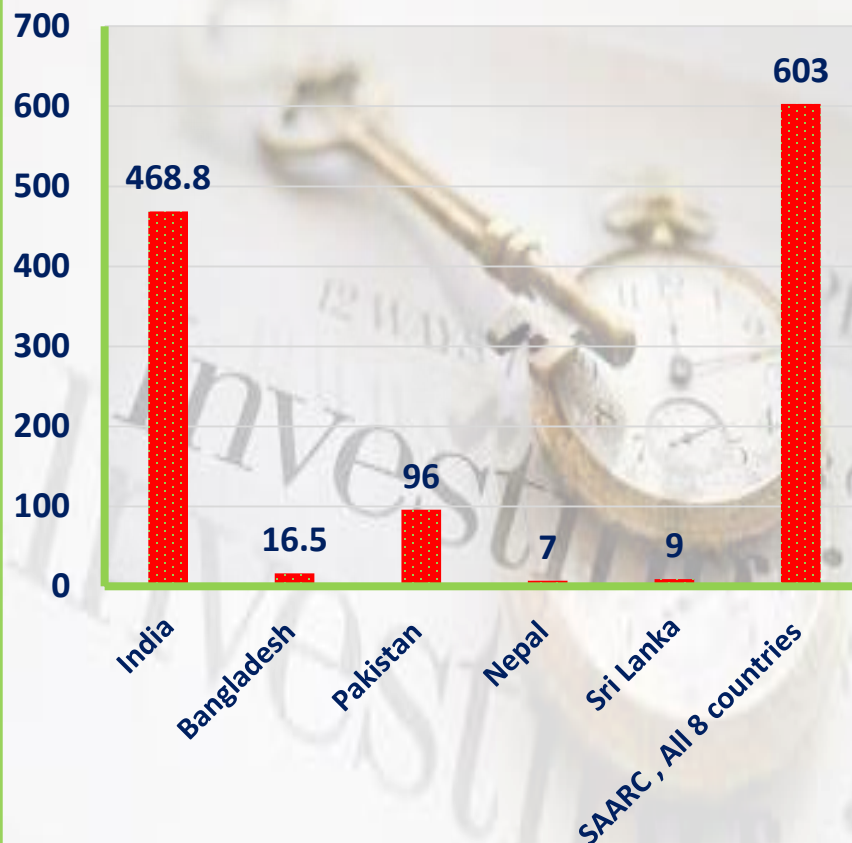
Cost of Cross border Transmission Interconnections

Countries	Interconnection Description	Capacity (MW)	Cost
Bhutan -India-	Grid reinforcement to evacuate power from Punatsangchhu I & II	Reinforcement of 2,100 MW	140-160 USD Million (2010 Estimate)
Nepal -India	Dhalkebar-Muzaffarpur 400 kV line	1,000 MW	186 USD Million (2010 Estimate)
Nepal -India	Bardaghat- Gorakhpur(400 KV)	2500 MW evacuation capacity	32 USD Million
Nepal -India	Duhabi- Jogbani (400 KV)	1800 MW evacuation capacity	16 USD Million
Sri Lanka- India-	400kV, 127 km HVDC line with submarine cable	500 MW in the short-term	600 Million USD
Bangladesh-India	400kV HVDC back-to-back asynchronous link	500 MW	190-250 USD Million(2011 Estimate)
Bangladesh-India	Capacity Up gradation(500MW) of Existing Bheramara HVDC Station Project	500 MW	184.37 USD Million Bangladesh side only)
Bangladesh-India	(Eastern Interconnection Project) Tripura (India)- Comilla(Bangladesh) Grid Interconnection project(400 kV)	100 MW	24.04 USD Million (Bangladesh side) and 2.73 USD Million (Indian side)
India-Pakistan	220 kV in the short-term (could be upgraded to 400 kV later)	250-500 MW	50-150 USD Million (2012 Estimates)
CASA	500 KV AC line from Datka(Kyrgyz Republic) to Khudjand(Tajikistan) 500 KV HVDC line :Tajikistan-Afghanistan-Pakistan	1300 MW	Apprx 1 billion(2011 Estimates)

Investment Requirement in Electricity in South Asia 2020

- ✓ South Asia is one the fastest growing regions in the world.
- ✓ As per world bank estimates at present economic growth rate, 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 in Electricity Infrastructure Development 2011-2020





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

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

- Policy & Regulatory Risk
- Lenders concerns.
- Viability of the Power Sector
- Protection of Investment
- Source of funding and Financing options





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Policy & Regulatory Risk

Policy & Regulatory Risk

- Political and Social stability
- Legal , Regulatory and Country Risk
- Overall business operating environment
- Overall Tax environment





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The logo for Integrated Research and Action for Development (IRADe). It features a stylized green graphic of a person or a plant, followed by the text "IRADe" in bold black letters, and "Integrated Research and Action for Development" in a smaller font above it.

Lenders Concerns

Lenders Concerns

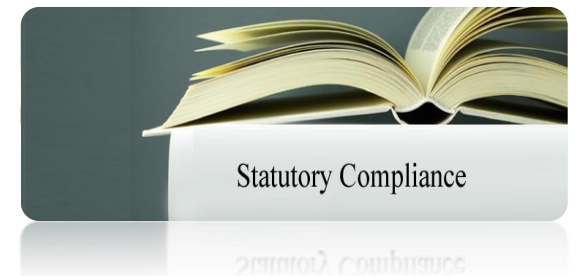


- ✓ Risk Profile & Project Viability
- ✓ Developers/Promoters Creditability



Lender Concern: 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



Lenders Concerns :Developers/Promoters Creditability

Developers/Promoters Creditability:

- a) Promoters financial strength
- b) Should not be a defaulter
- c) Capability to bring equity
- d) Sound DSCR
- e) Business History & experience of promoter
- f) Credit rating





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Viability of the Power Sector

Viability of the Power Sector

Power Sector Viability :

- a) Revenue gap.
- b) Financial health of Discoms/Overall profitability of the SA power sector.
- c) Balancing the Commercial and social aspects of the SA power sector.
- d) In long run can impact CBET

		India		
Year	Unit Cost in INR	Average Tariff per Unit in INR	Gap between Cost and Tariff	Gap as % of Unit Cost
2007-08	4.04	3.06	0.98	24%
2008-09	4.6	3.26	1.34	29%
2009-10	4.76	3.33	1.43	30%
2010-11	4.84	3.57	1.27	26%
2011-12	4.87	3.8	1.07	22%





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Protection of Investment

Protection of Investment

- a) Considering large scale investment requirement and long term nature of investment in power projects, there is a need for appropriate protection of investment.
1. Investment protection agreements
 2. Sovereign Guarantees
 3. Credit Guarantees



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Action for Development

Source of funding

Source of funding

- a) **Government Budget**
- b) **Foreign Direct Investments.**
- c) **Multilateral and bilateral funding**
- d) **Equity financing**
- e) **Debt financing**



Way Forward:

- ✓ SA GDP Growth 6%, One of fastest growing region in the world.
- ✓ Low per capita :Need to increase for economic growth , quality of life and sustainability and stability of the region.
- ✓ **Investor friendly policies are important for sustainable exploitation of the energy resources and protection of investments.**
- ✓ Need for single window clearances.
- ✓ Smooth and easy business operating environments.
- ✓ Potential to contribute significantly to mitigate climate change and Co2 emission in the region through development of Hydro power.
- ✓ Need to run power sector on commercial basis by making transparent subsidy provisions.
- ✓ Need for Public, Private and PPP mode of investments.



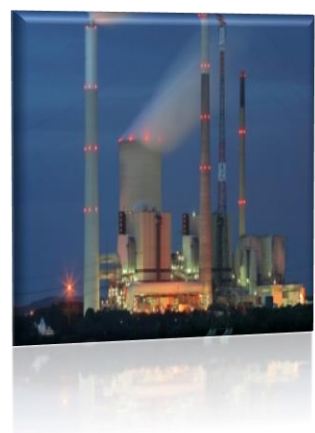
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Action for Development

Thank You

THANK YOU



Proposed/Existing High Voltage Cross Border Interconnections

S. No.	Countries	Interconnection Description	Capacity (MW)	Status
1	Bhutan -India-	Grid reinforcement to evacuate power from Punatsangchu I & II	Reinforcement of 2,100 MW	Under Implementation
2	Nepal -India	Dhalkebar-Muzaffarpur 400 kV line	1,000 MW	Under implementation
3	Nepal -India	3 number of 132 KV and 5 number of 33 KV connection with India	278 MW apprx. evacuation capacity	Existing
4	Nepal -India	Bardaghat- Gorakhpur(400 KV)	2500 MW evacuation capacity	Planned
5	Nepal -India	Duhabi- Jogbani (400 KV)	1800 MW evacuation capacity	Identified & Proposed
6	Sri Lanka- India-	400kV, 127 km HVDC line with submarine cable	500 MW in the short-term	Planning
7	Bangladesh-India	400kV HVDC back-to-back asynchronous link	500 MW	Existing
8	Bangladesh-India	Capacity Upgradation(500MW) of Existing Bheramara HVDC Station Project	500 MW	Under planning and finalization
9	Bangladesh-India	(Eastern Interconnection Project) Tripura (India)- Comilla(Bangladesh) Grid Interconnection project(400 kV)		Under implementation
10	India-Pakistan	220 kV in the short-term (could be upgraded to 400 kV later)	250-500 MW	Yet to be formally Finalized
11	CASA	500 KV AC line from Datka(Kyrgyz Republic) to Khudjand(Tajikistan) 500 KV HVDC line :Tajikistan-Afghanistan-Pakistan	1300 MW	Advanced stage of planning

SOUTH ASIA KEY STASTICS

	Afghanistan	Bangladesh	Bhutan	The Maldives	Nepal	India	Pakistan	Sri Lanka
Population (2013)	30.55 Million	156.6 Million	0.7 Million	0.3 Million	27.80 Million	1.252 Billion	182.1 Million	20.48 Million
GDP Growth Rate(2013)	4.2	6.0	5.0	3.7	3.8	5.0	6.1	7.3
Per Capita Electricity Consumption(Kwh Per Capita)	49	294	2420	2283	103	879	458	449
Access to Electricity(% Population 2010)	30	46.5	57.1	100	76.3	75	67.4	77.6
Electricity Demand in GWH (2010)	2600	28470	1749	800	3200	938,000	95,000	10,718
Projected Electricity Demand CAGR till 2020	10%	9%	7%	5%	8%	7%	10%	7%
Installed Capacity(MW)	522	8537	1488	78	740	2,53,389	20,415	3334
Key Generation Resources	Hydro, Oil	Natural Gas	Hydro	Oil	Hydro	Coal, Hydro, Wind , Solar	Coal, Natural Gas ,Hydro	Hydro oil
Investment Requirement for Electrty Infrastructure Development 2011-2020 (BUSD)		16.5	12.62		7	468.8	96	14.05 (2032)

