



Knowledge Report

by IPPAI

Developing a SAARC Electricity Grid and Cross - Border Trade

Harmonizing Regulations and
Policies for Risk Sharing and
Financial Settlement Issues

Date: 26th – 27th June, 2014

Venue: Hotel Soaltee Crowne Plaza
Kathmandu, Nepal



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Foreword

IPPAI's initiatives on working with the SAARC countries have become an ongoing exercise and the objective now is to move the interaction to a higher level where specifics can be discussed. There are issues related to cross border electricity trade which are of great interest to all the SAARC countries. This particular initiative is looking at harmonizing regulations and policies to encourage cross-border electricity trade. It also looks at technical, financial, operational, settlement and other related issues which normally come up in cross border electricity transactions governed by multiple jurisdictions of law, regulation, and policy.

On the occasion of the SAARC workshop on Harmonizing Regulations and Policies for Cross Border Trade, risk sharing and financial settlement mechanisms, it gives us great pleasure to release a knowledge report on developing a SAARC Electricity Grid. This document is meant as a reference for members of the SAARC countries with a future vision of working jointly in the interests of consumers of the SAARC countries, in not only ensuring 24x7 electricity but also electricity at a reasonable price.

We look forward to moving this initiative to the next level which would mean that the SAARC grid will become the energy hub of not just South Asia, but also become an important link in connecting the electricity grids right from Central Asia to South East Asia and from Tajikistan to Singapore, which is our vision.

We are very pleased to share this vision with members of the SAARC countries forum, besides the regulators and policy makers, the engineering community and most importantly, the consumers.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Harry Dhaul'.

Harry Dhaul
Director General
IPPAI

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Developing a SAARC Electricity Grid and Cross-border Trade

Overview

Trade in general and electricity trade in particular can play an important role in facilitating peace and prosperity in the SAARC region. There are many political and social barriers to true regional electricity cooperation and integration¹. To overcome these barriers requires, building political trust among countries in the region, which will, in turn, facilitate the creation of new institutions mandated with regional objectives¹. Developing an interconnected electricity grid in the SAARC region has been under discussion for a considerable period of time. In the 2010 SAARC summit held in Bhutan, India had submitted an approach paper on the subject, titled, “Road Map for Developing SAARC Market for Electricity”. The Paper highlighted the necessity of adequate transmission infrastructure as a prerequisite for trade of electricity. It underlined the importance of developing a dispute resolution mechanism for cross-border trade acceptable and binding to all participants.

Development of cross-border electricity trade in South Asia began in 1971 with the setting up of the Power Exchange Committee between India and Nepal. Bhutan started exporting electricity to India in 1986. The volume of electricity trade between India, Nepal, Bhutan and Bangladesh in 2013-14 is given in the table.

INDIA'S CROSS-BORDER EXCHANGE WITH BHUTAN, NEPAL AND BANGLADESH ² APRIL 2013 -MARCH 2014			
Cross-border Exchange: Import=(+ve), Export =(-ve) in million units			
MONTH	BHUTAN	NEPAL	BANGLADESH
Apr'13	179.42	-59.98	...
May'13	411.65	-44.45	...
Jun'13	800.48	-42.08	...
July'13	986.50	-57.06	...
Aug'13	1004.99	-57.94	...
Sep'13	793.52	-48.98	...
Oct'13	691.96	-47.60	-90.58
Nov'13	310.10	-39.75	-98.80
Dec'13	158.63	-70.43	-286.99
Jan'14	93.06	-78.01	-323.76
Feb'14	56.38	-70.87	-314.83
Mar'14	68.49	-84.88	-333.23
Total (MUs)	5555.18	-702.03	-1448.19

¹The E7 Guidelines for the Pooling of Resources and the Interconnection of Electric Power Systems

² <http://nldc.in/attachments/article/75/Monthly%20Report%20March%202014.pdf>

The aggregate volume is likely to exceed 10,000 million units per annum in 2014-15. The three power transactions between India and its neighbours have pressed home the advantage of cross-border electricity trade. With an overall deficit scenario and shortage of fuel, it will not be prudent for the SAARC countries to open up the long-term PPAs, undertake whole-sale market reforms or create a regional power pool with mandatory

participation. However, given the diversity of demand and generation sources in South Asia, a voluntary electricity market based on non-discriminatory open access would not only result in optimisation of resources but also act as a catalyst for investment in the region.

Gross generation vis-à-vis short term trade in India			
MONTH	Short Term Volume* (BU)	Total Generation (BU)	% age of total generation
FY 09-10	40.09	764.03	5.2%
FY10-11	53.48	812.22	6.6%
FY11-12	66.76	874.17	7.6%
FY12-13	74.18	907.49	8.2%
FY13-14	83.16	962.90	8.6%

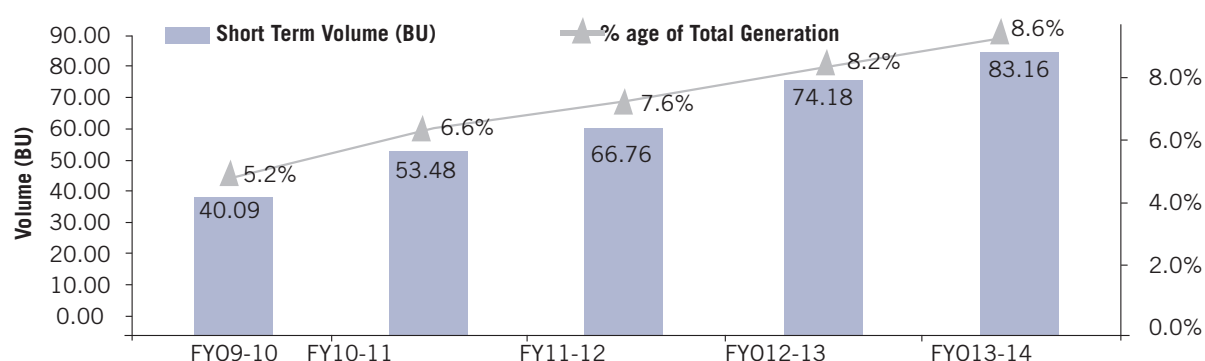


Figure 1: Short Term Market Volume for India

*Short term volume is the total volume of contracts traded for a period up to 3 months through bilateral contracts negotiated directly between participants or through traders and it also includes the volume traded through the Power Exchanges, on Day-Ahead basis or through Term Ahead Contracts ranging from the same day to a week in advance.

The voluntary power exchange set up in India in the private sector in 2008 has evolved into an important trading institution with good liquidity, growing volume, large number of participants and robust price discovery. India's major day-ahead power exchange, IEX, traded 22,380 MUs in 2012-13 and 28,925 MUs in 2013-14. This is good time to plug in regional entities. The regional entities can be straight away be plugged in with the Indian power exchanges by going through an Indian power exchange agent. The regional entity would have to establish a commercial relationship with the Indian agent through their respective bankers.

The transmission industry of the subcontinent has the competence to plan, implement, operate and maintain cross-border links. It took about three years to complete the India – Bangladesh HVDC link from concept to commissioning. It is evidence of what can be achieved with a clear mandate and mutual understanding.

Disputes, particularly commercial, can arise in the areas of generation tariff, capacity declaration, transmission tariff, reservation of transmission capacity, declaration of transfer capability, payment default, settlement of deviations from contracted quantities of electricity etc. There should be clarity on the dispute resolution mechanism. Disputes can be resolved through any agreed mechanism. However, as the number of cross-border plants, transactions and interconnections increase, individual dispute resolution mechanisms, such as arbitration in the court of a third country, become inefficient and time-consuming. Disputes related to a regional short-term market would require a quick response. In the long run we will have to think in terms of regional regulatory & commercial dispute resolution mechanism.

Status and prospects of cross-border trade and interconnections

Bangladesh-India

In December 2009, the prime ministers of the two countries agreed to set up a cross-border interconnection to enable supply of 500MW power to Bangladesh. A Joint Steering Committee and a Joint Working Group was set up to oversee and monitor the scheme. The grid interconnection between India and Bangladesh has been developed and commissioned on 5th October, 2013. India is supplying power to Bangladesh to the tune of 500 MW.

India-Bangladesh Interconnection

Bangladesh portion

- Baharampur (India) - Bheramara (Bangladesh) 400kV double circuit line : 27km
- Loop-in, loop-out of Ishurdi - Khulna South 230kV double-circuit line at Bheramara: 3km
- 500MW HVDC back-to-back Station and 230kV Switching Station at Bheramara

India portion

- Baharampur (India)- Bheramara (Bangladesh) 400kV double circuit line: 71km
- Loop-in, loop-out of Farakka - Jeerat 400kV single circuit line at Baharampur : 3 km
- 400kV Switching Station at Baharampur

Bangladesh portion of the works estimated to cost US\$ 156.44 million has been implemented by Power Grid Company of Bangladesh Ltd. with financial assistance from ADB. Work on the Indian side, estimated to cost US\$ 36.06 million, has been implemented by POWERGRID, India.

Agreements with Bangladesh

- PPA between Bangladesh Power Development Board (BPDB) and NVVN Ltd, India, for supply of 250MW power from the central generating stations of the Government of India. The price of power to be as per CERC tariff. Bangladesh to procure additional 250MW from the Indian market.
- Transmission Service Agreement between POWERGRID, India and BPDB for access through the Indian network.

Future prospects

Doubling the capacity of HVDC terminal Bheramara, Bangladesh

Bangladesh intends to import an additional 500MW from the existing cross-border interconnection on its western border with West Bengal, India. A joint team has been constituted and it will submit the initial report by July 2014, after which feasibility report would be prepared.

Supply through eastern border of Bangladesh

A radial feed to supply 100MW to Bangladesh at North Comilla from Tripura, India at 220kV is under joint examination.

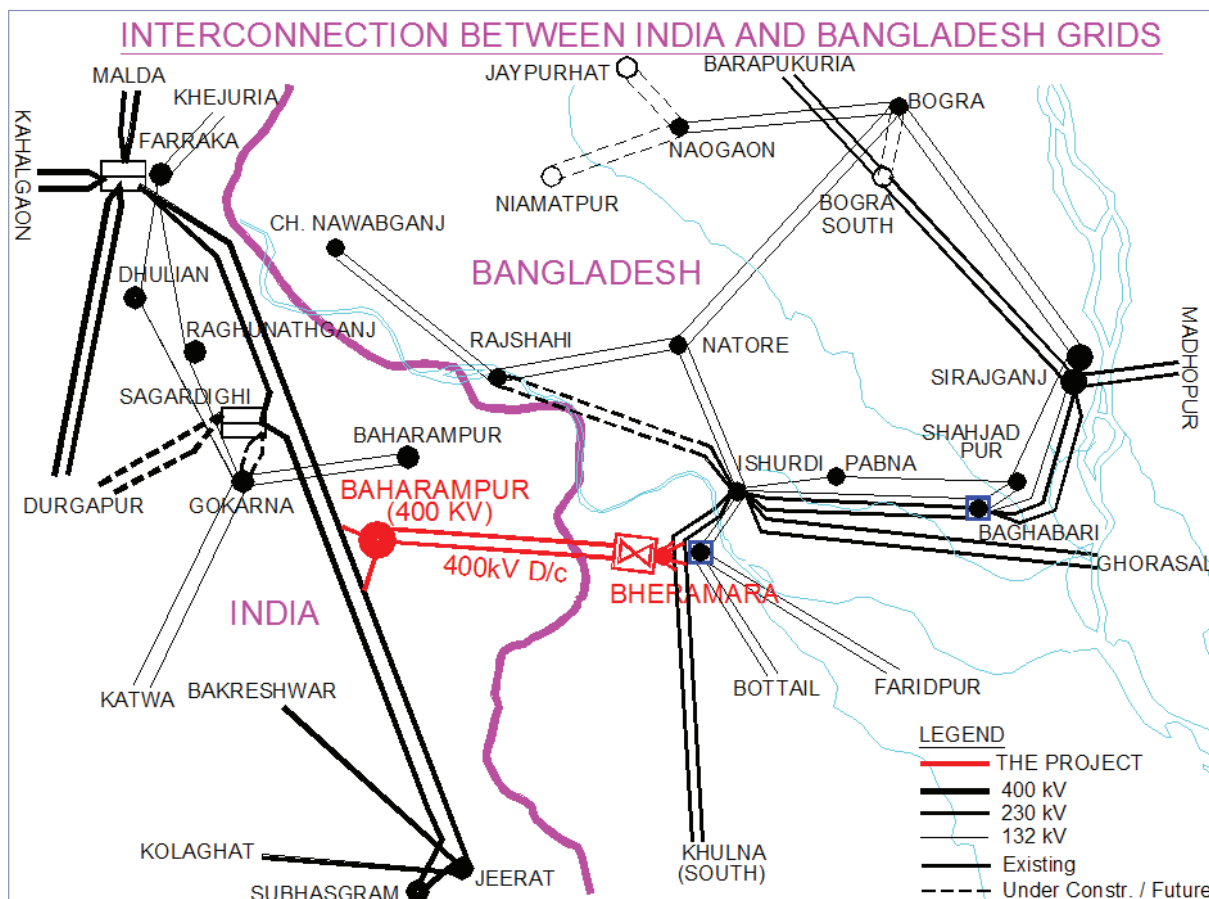


Figure 2: Interconnection between India and Bangladesh Grids

Supply from Assam, India

A number of HEPs are coming up at Tawang and Kameng river basins of Arunachal Pradesh, India. Their power would be pooled at Rangia /Rowta in Assam, India for further transmission to its northern / western regions through high capacity ± 800 kV, 6,000MW HVDC bi-pole line. The Rangia /Rowta would be connected to the Bishwanath Chariali HVDC & 400 kV AC substations, where power from on-going Lower Subansiri (2,000 MW) and Kameng (600 MW) projects and other future HEPs in Arunachal Pradesh would be pooled.

The two sides have agreed to lay this 6000MW HVDC line via north Bangladesh on the west side of Brahmaputra/ Padma River and to set up a 500-1000MW HVDC terminal at Jamalpur/Barapukuria for drawal of power by Bangladesh. Power from Jamalpur/Barapukuria would be transmitted to Dhaka area.

Bhutan-India

Power generated from Chukha (336MW), Kurichu (60MW) and Tala (1020MW) HEPs in Bhutan is exported to India after meeting its internal demand. The associated cross-border transmission system for evacuation and transfer of power from these HEPs is operated in synchronism with the Indian grid.

Existing Cross-border Links with Bhutan

Chukha HEP (336MW)

- 220 kV double-circuit, Chukha(Bhutan) - Birpara (India/West Bengal)
- 220 kV single-circuit, Chukha(Bhutan) - Birpara(West Bengal) via Singhgaon (Bhutan)

Kurichu HEP (60MW)

- 132 kV single-circuit, Kurichu(Bhutan) – Gelephu (Bhutan)-Salakati (Assam)

Tala HEP (1020MW)

- 400kV Two double-circuit, Tala (Bhutan) – Siliguri(West Bengal) lines (one of the circuit of is via Malbase substation in Bhutan)

Future prospects

Bhutan has plans to harness its huge hydro potential and has identified about 76 nos. new HEPs to be set up by 2030 on various river basins aggregating to 23,760MW. The grid master plan for Bhutan has been prepared by the Central Electricity Authority, India.

Ten projects were selected by Government of India and Royal Government of Bhutan for the development of 10,000 MW by 2020 under the Framework Agreement listed at 1 to 10 in the table. Six projects from the identified list would be developed bi-laterally by the two Governments.

In addition Druk Green Power Co (DGPC), Bhutan would be developing the four projects, namely, Nikachhu, Khomachu, Rotpashong and Gamri on its own.

Dagachhu HEP, which is a JV between DGPC and Tata Power, is nearing completion. Tata Power has been allowed to invest only 26% equity. Bhutan (DGPC and Pension Fund) has invested 76% equity. This may not be a viable financial model for future because Bhutan has limited financial resources. India allows 100% foreign equity in generation projects.

2020 Plan of Bhutan

	EP	MW	MoU date	Status	Mode
1	Punatsangchhu - I	1,200	Jul 2007	Under constn	Bilateral
2	Mangdechhu	720	Apr 2010	Under constn	Bilateral
3	Punatsangchhu - II	990	Apr 2010	Under constn	Bilateral
4	Sunkosh Reservoir	2,560	Mar 2010	DPR pending with CEA	Bilateral
5	Kuri-Gongri	1,800	2012	DPR not ready	Bilateral
6	Amochhu Reservoir	540	Dec 2009	DPR approved	Bilateral
7	Kholongchhu	600	Dec 2009	DPR approved	JV

8	Chamkharchhu - I	770	Dec 2009	DPR pending with CEA	JV
9	Wangchhu	570	Oct 2010	DPR approved	JV
10	Bunakha	180	Jun 2010	DPR approved	JV
11	Nikachhu	208	-	-	DGPC PPP
12	Khomachhu	327	-	-	DGPC PPP
13	Rotpashong	918	-	-	DGPC PPP
14	Gamri	102	-	-	DGPC PPP
15	Dagachhu	114	-	Under constion	DGPC-Tata Power JV

Projects under construction

Punatsangchhu-I (1,200MW), Punatsangchhu-II (1,020MW) and Mangdechhu (720MW) HEPs have been undertaken with assistance from India. The entire cost has been funded by the Government of India as grant and soft loan to Bhutan. It also includes massive transmission system on Bhutan side, cross-border links and strengthening on the Indian side. Orders have been placed and the projects are likely to be completed in 2017-19.

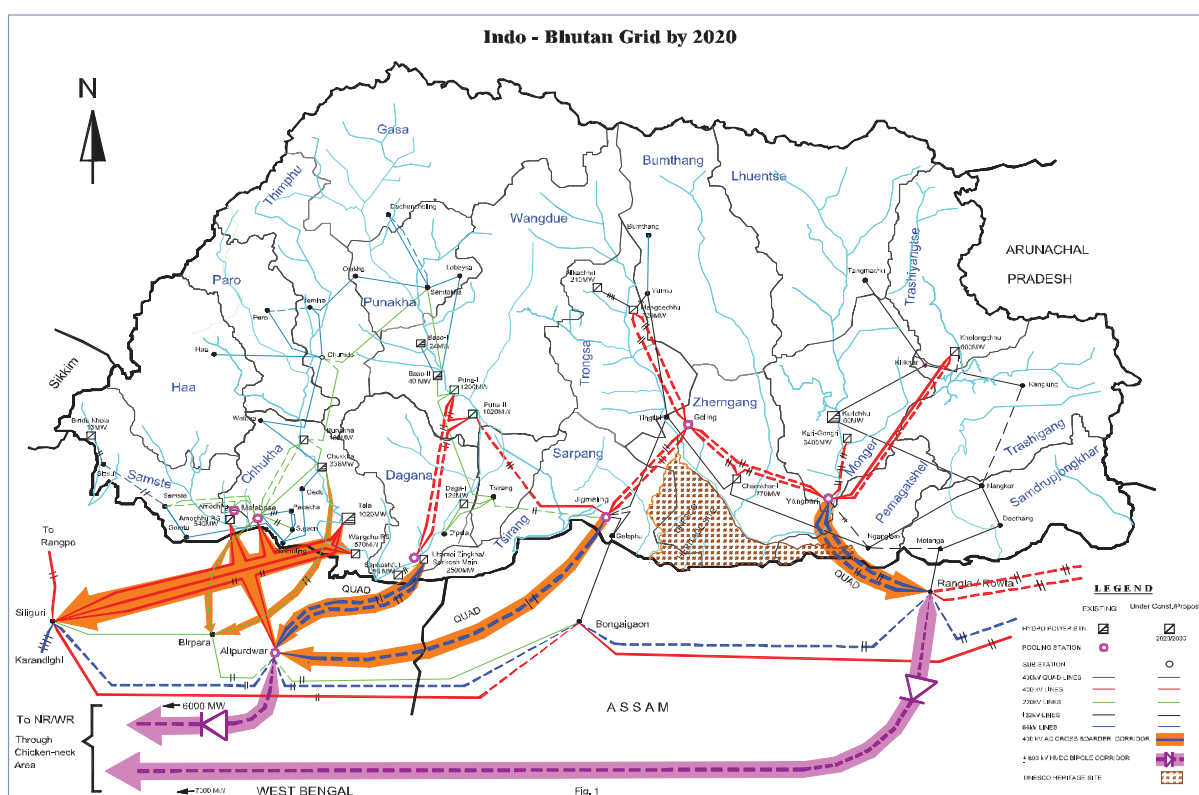


Figure 3: Indo-Bhutan Grid by 2020

Punatsangchhu-I and Punatsangchhu II Cross-border Line

400kV Lhamoizingha/Sankosh (Bhutan) - Alipurduar (India), Quad Moose double-circuit line

Mangdechhu Cross-border Line

400kV Jigmeling (Bhutan) – Alipurduar(India), Quad Moose double-circuit line

The power of Punatsangchhu-I (1,200MW) and Punatsangchhu II HEP (1,020MW) and Mangdechhu (720MW) would be pooled at Alipurduar, in the northern part of West Bengal near the Bhutan border. A 3,000MW HVDC terminal station would be built at Alipurduar to convert Bhutan power into HVDC for long-distance transmission to the northern heartland of India. From Alipurduar, power would be carried by ± 800 kV, 6,000MW Bishwanath Chariyali – Agra HVDC bi-pole line already under construction.

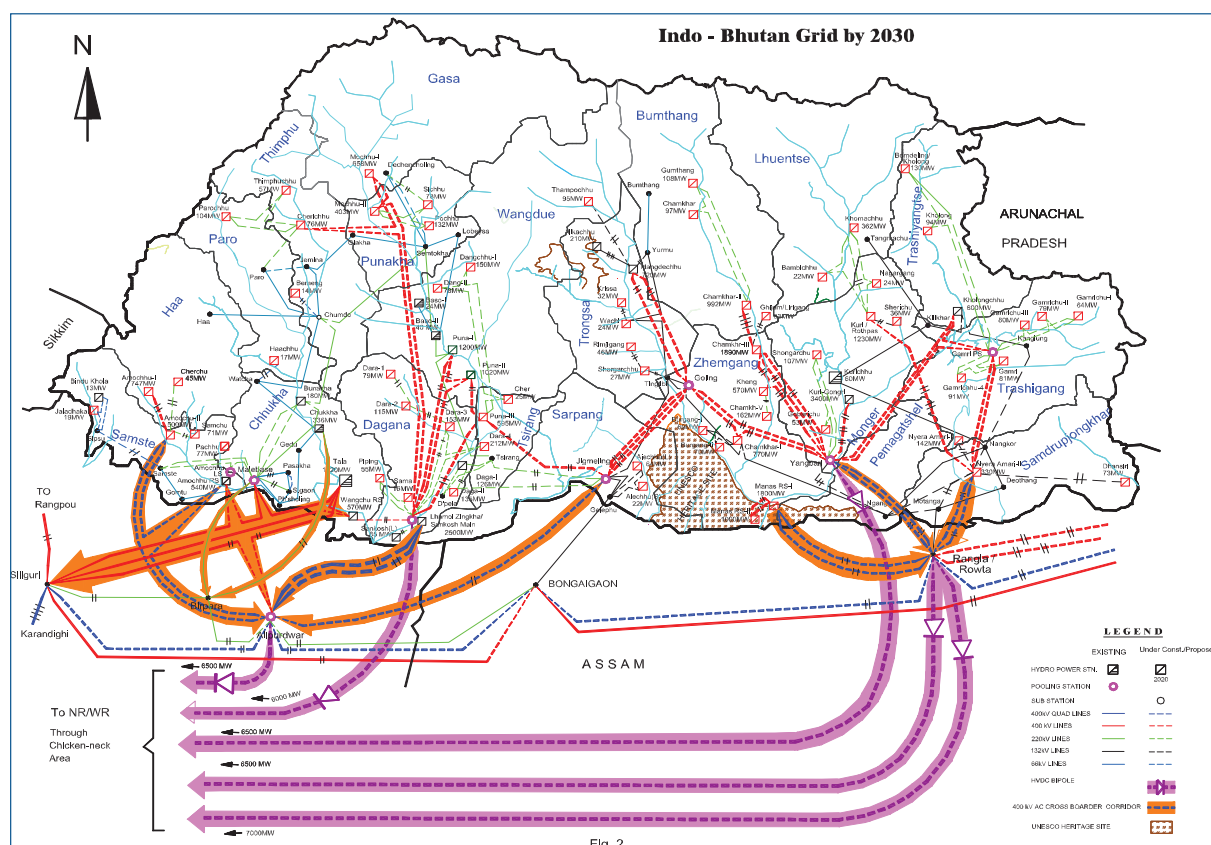


Figure 4: Indo-Bhutan Grid by 2030

Other than the three bilateral projects mentioned above, work has not started on the remaining three bilateral projects or the four JV projects. Therefore, the 2020 target of developing 10,000MW in Bhutan with Indian assistance is likely to be missed.

Challenges in expeditious development of HEPs in Bhutan

The two existing and three under construction bilateral projects have so far been implemented with 100% Government of India funding in the form of about 30-40% grant and 60-70% soft long-term loan. This is a huge financial burden on the Government of India, which can be avoided by any of the following options:

- Allow 100% FDI in generation projects in Bhutan
- Allow JV with Bhutan Company with FDI of 51% or 74% in the generation sector

It is understood that Indian IPPs are keen to invest in hydro projects in Bhutan with equity participation of not less than 51%. The JV companies could mobilise equity from their own sources or by going public. The JV could arrange debt from the market without leaning on the Govt. of India. The government could act as a facilitator and help the JVs in arranging soft loans from multilateral financing institutes such as ADB, World Bank, JICA, etc..

Out of the remaining seven projects out of the 2020 list, the DPRs are ready for Amochhu (Reservoir) HEP, Kholongchhu HEP, Wangchhu HEP and Bunakha (Reservoir) HEP. However they have been delayed essentially due to financial constraints. It would be advisable to restructure the financial model so as to get money from the financial market, preferably, soft loans from multilateral financing institutions.

- The Governments of India, Bangladesh and Pakistan as the case maybe, could facilitate the signing of long-term PPAs for the HEPs in Bhutan to achieve speedy financial closure.
- The government of India could give statutory directions to CERC under Section 107 of the Electricity Act for the wheeling charges for power which is being wheeled through India to determine the tariff of HEPs that are in the SAARC region and are selling more than 50% power to Indian entities on long-term PPAs (other than the existing ones with negotiated tariff).

India-Nepal

Indo-Nepal Power Exchange began in 1971 with exchange of 5MW of power on the principle of catering to the need of isolated pockets on either side of the border. The power exchange still takes place on radial mode between Nepal Electricity Authority and utilities on the Indian side. Most of the power supply is through Bihar.

There were 21 interconnections for power exchange through 11kV, 33kV, 132kV transmission lines. Out of these interconnections, some 11kV and 33kV levels were not being utilized and have been discontinued.

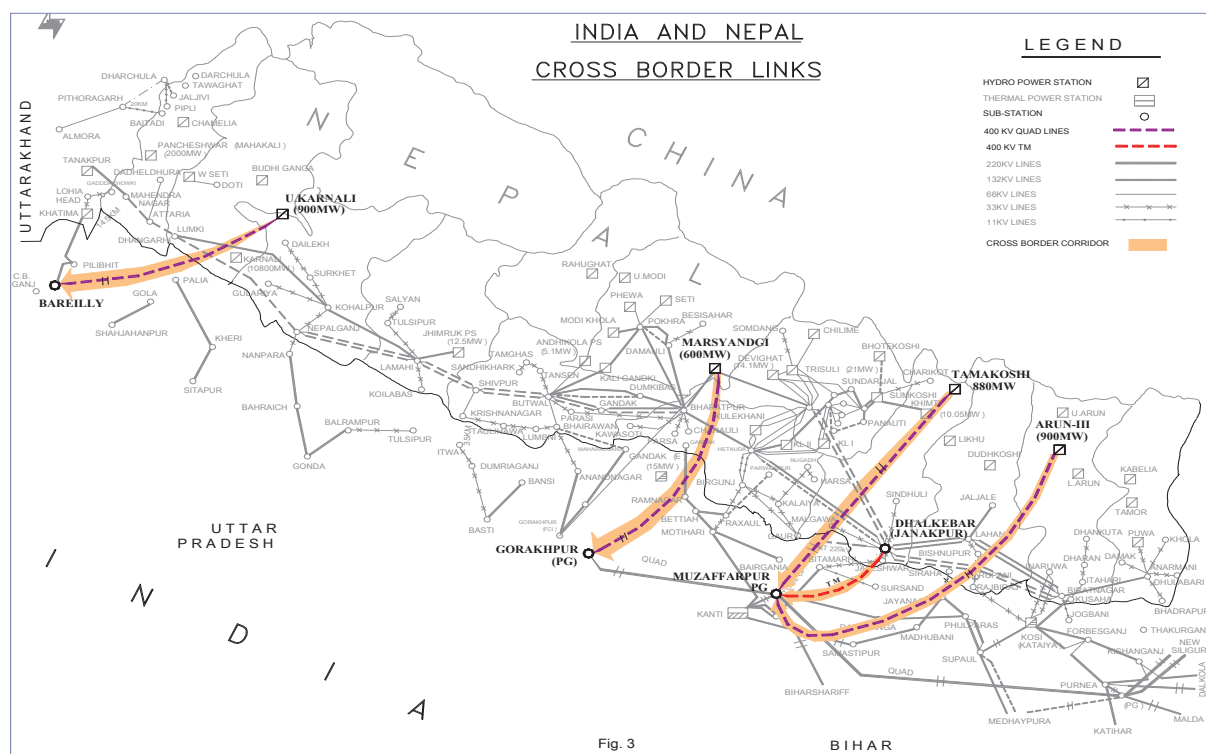


Figure 5: India and Nepal Cross Border Links

Transmission lines used for power exchange between India and Nepal

BSEB (Bihar)-Nepal

132 kV lines

1. Kataiya - Duhabi
2. Gandak East - Gandak/Surajpura(Nepal)

33kV lines

3. Birganj - Raxaul
4. Kataiya - Biratnagar(Rupni)
5. Kataiya - Rajbiraj
6. Sitamarhi – Jaleshwer

UPPCL (UP)-Nepal

33kV lines

7. Anandnagar - Bhairwan line
8. Nanpara-Nepalganj line

UPCL (Uttarakhand) – Nepal

33kV line

9. Lohia - Mahendranagar (Nepal)

11kV lines

10. Pithoragarh – Baitadi
11. Dharchula – Jaljibe
12. Dharchula – Pipli

Power tariff with Nepal

India-Nepal Power Exchange Committee (PEC) decides the tariff for bilateral power exchange with the Indian distribution utilities. The 10th meeting of the PEC, held in December 2011 in India, decided on tariff escalation of 5.5% per annum. Accordingly, since 2010 onwards, the base level tariff at 33kV is as follows:

Nepal has the option to buy from the electricity market but it prefers to transact with the distribution utilities of India.

Year	Base tariff (INR)
2010 (July 2010 to June 2011)	4.41
2011 (July 2011 to March 2012)	4.65
2012 (April 2012 to March 2013)	4.91
2013-14 (April 2012 to March 2013)	5.18
2014-15 (April 2012 to March 2013)	5.46

India also supplies 70MU free power annually from Tanakpur HEP (120MW) in Uttarakhand (India) to Nepal under the Mahakali Treaty through the cross border 132kV Tanakpur-Mahendranagar line.

An additional 75MW supply to Nepal by strengthening existing inter-connections was provided, and with this Nepal is able to draw 120-140MW since 2013. The

strengthening was done with Indian assistance on either side of the border.

Pending works for supplying another 75MW to Nepal

- 132kV single-circuit, 15km Line from Kataiya, Bihar to Kusaha, Nepal along with associated bay: Rs 8.63 crore
- 132kV single-circuit, 17 km Line from Raxaul, Bihar to Parwanipur, Nepal along with associated bays: Rs 9.2 crore

Future prospects

400 kV Muzaffarpur (India)- Dhalkebar (Nepal) double circuit line

The line was planned in 2008 with private sector participation on either side. It took as much as six years to get all the sanctions and start work. The construction work is in progress and the line is expected to be commissioned in 2015.

This is a stronger interconnection through which India and Nepal grids would be synchronised and it may be possible to transfer 800MW power.

The Indian portion of 86.43kms is being built by a JV with shareholders - PGCIL 26%, SJVNL 26%, IL&FS 38% and Nepal Electricity Authority (NEA) 10%.

Nepal portion of 39km is to be built by another JV with shareholders – NEA 50%, PGCIL 26%, HIDCL 14% and IL&FS-10%.

The Implementation and Transmission Service Agreement (ITSA) has been signed between NEA and Cross Border Transmission Company (CPTC) and NEA and Power Transmission Company Limited (PTCN), Nepal. The respective Share holder agreement (SHA) for the Indian portion and the Nepal portion was signed in July 2012.

Evacuation plan for HEPs in Nepal

Tentatively, power evacuation plan has been prepared for Arun-III HEP (900MW), Upper Karnali HEP (900MW) and Upper Marsyangdi HEP (600MW).

Arun-III HEP (4x225MW) Transmission Scheme

- 400kV Arun HEP – Muzaffarpur via Dhalkebar (Nepal) D/C Quad lines with LILO of one circuit at Dhalkebar 400/220kV substation - (310 kms).
- Augmentation of Dhalkebar (Nepal) 400/220kV substation with 315MVA transformer and provision of 420kV bus and line reactors at Dhalkebar S/S

Upper Karnali (900 MW) and Upper Marsyangdi (600 MW) HEPs Transmission Scheme

- Upper Karnali-Berilly (India) 400kV AC (Quad) cross border D/C links
- Upper Marsyangdi – Gorakhpur (India) 400kV AC (Quad) cross border D/C links

Nepal, India and the developers need to sit together, firm up the cross-border scheme, fix the time frame and enter into an agreement before the implementation process can begin. It can happen only after the generation end has been tied up.

- There is a need to develop a more efficient coordination mechanism between NEA, Nepal and POWEGRID, India for joint cross-border planning.

Challenges in developing HEPs in Nepal

a) Pancheshwar HEP

Pancheshwar with Rupaligad (5600MW + 240 MW) is the biggest major multi-purpose project appropriate for implementation through the government route. It has been pending for a very long time.

Pancheshwar Multipurpose Project is proposed on river Mahakali also known as Sarda. Development of the project is covered under integrated Mahakali Treaty.

Draft DPR for the project with 5600 MW power component was prepared by India in 2002. This is yet to be agreed due to issues like location of re-regulating structure i.e. Purnagiri or Rupaligad, water availability downstream of Pancheshwar, unit size and assessment of power benefits, apportionment of cost between power and irrigation and between India and Nepal.

In the Second Inter-Ministerial Meeting taken by Secretary (WR) on 01.10.2007, a new approach was suggested to expedite implementation of the project which included the formation of 'Pancheshwar Development Authority'.

b) SaptaKosi High Dam Multipurpose Project (3300 MW) and Sun Kosi Storage cum Diversion Scheme

Sapta Kosi High Dam Multipurpose Project, under discussion between the two governments, would provide irrigation and flood control benefits in Bihar, and power generation (15,730 MU) of which major portion would be available to India. In addition, development of inland waterways through Kosi and Ganga rivers is another important component of the project.

A joint project office was established at Birat Nagar on 17.8.2004 for carrying out detailed investigations/field works and preparation of DPR in a period of 30 months including 3 months for mobilisation activities. However, due to law and order situation in Nepal, the progress of works has been affected. In the meeting held in December 2012, it was agreed to revise the schedule to complete the DPR by February 2015.

c) IPPs in Nepal

Government of Nepal has issued 28 survey licences to IPPs for hydro generation projects having an aggregate capacity of 8,249MW. It includes:

Developer	HEP	Capacity	Developer	HEP	Capacity
SJVNL	Arun III	900MW	-do-	Bheri-1	212MW
GMR	Upper Karnali	900MW	-do-	Bheri-3	130MW
-do-	Upper Marsyangdi	600MW	-do-	Manang Marsyangdi	130MW
Bhilwara Energy Ltd	Likhu	120MW	-do-	Upper Marsyangdi	150MW
-do-	Balephi	50MW	Maytas Estates Pvt Ltd	Dhudkoshi-2	138MW
-do-	Mugu Karnali	194MW	Avanti Feeds Ltd	Seti Nadi-3	80MW
-do-	Humla Karnali	274MW	Essel Infraprojects Ltd	Lower Solu	40MW
Patel Engg	Budh Gandaki ka	130MW	Tata Power	Tamakoshi-3	880MW
-do-	Budh Gandaki kha	260MW	Jindal Power Ltd	Chaunpur – Seti	454MW
LANCO	Namlan	303MW	PES Energy	Phulkot Karnali	210MW
-do-	Karnali-7	300MW	-do-	Upper Trishuli-1	216MW
KSK Energy Pvt Ltd	Tila-1	400MW	Nanda Devi	Dudhkoshi-4	350MW
-do-	Tila-2	420MW	Agro		

* Source : CII

Out of these, SJVNL (Arun-III 900MW), GMR (Upper Karnali 900MW, Upper Marsyangdi 600MW) and KSK (Manang Marsyangdi 130MW) have made good progress.

For Upper Karnali-900MW project of GMR, the DPR has been completed, land acquired and environmental and forest clearance taken. It has 12% free power and 27% free equity for Nepal. The Project Development Agreement (PDA), which is the final clearance, is to be negotiated.

GMR (Upper Marsyangdi 600MW) is close behind. The land acquisition process has been initiated. There is no free power or free equity in this case.

KSK (Manang Marsyangdi 130MW) has reached the final stage of signing of PDA.

Arun-III Project has been awarded to Sutlej Jal Vidyut Nigam Ltd. (SJVN Ltd.) on build-own-operate-transfer basis through the bidding route. The Memorandum of Understanding was signed between Government of Nepal and SJVN Ltd. in March 2008. In addition to royalty, SJVN Ltd. would provide 21.9% of free power to Nepal. The PDA is yet to be signed.

It is understood that once the PDA is finalised and signed for Upper Karnali-900MW of GMR, the PDAs for other mature projects would be signed along similar lines.

PPA and financial closure are two major challenges after that.

d) Major issues for IPPs in Nepal

• Short licence period

The Nepal government grants generation licence for a period of 25 years, excluding the construction time. The licence period is very short and it makes the project unattractive to investors. It should be 35 years from the date of commissioning of the project.

• Royalty

The royalty to be given to Nepal is shown in the table. The capacity royalty shown in the table is for first year. As per the draft PDA there is a proposal to increase the capacity royalty at the compounded rate of 5%. This results in very high royalty at the end of 10 years. This is an issue between the developers and the Govt. of Nepal.

Royalty payable: Export oriented HEPs in Nepal

Sl. No.	Type	Up to 15 years		After 15 years	
		Annual Capacity royalty, per kW	Energy royalty, per kWh	Annual Capacity royalty, per kW	Energy royalty, per kWh
1	Export-oriented run-of-the-river project	NPR 400	7.50%	NPR 1,800	12%
2	Export-oriented storage project	NPR 500	10%	NPR 2,000	15%

• Taxes and duties

On the Indian side, there is uncertainty about levy of customs duty on the import of electricity, particularly, in the mind of the IPPs. Currently, the import of electricity (HS-code 27160000) into India does not attract any import duty (basic duty, countervailing duty or special countervailing duty). However as per the Customs tariff defined for FY 2013-14, an import duty of NPR 2/- unit is indicated

on the electrical energy imported to India¹. This has been exempted to 'nil' under the general exemption no. 165 2 by the Central Board of Excise and Customs (CBEC) under Ministry of Finance.

⁽¹⁾<http://www.cbec.gov.in/customs/cst2013-14/chap-27.pdf>

⁽²⁾<http://www.cbec.gov.in/customs/cst2013-14/cs-gen-exemptn.pdf>

- **Tariff determination and dispute resolution**

Large number of big hydro projects cannot be developed as merchant plants. At least 70% power could be tied up in long-term PPAs otherwise financial closure may be difficult.

The price of electricity in the short term market is discovered through a competitive mechanism. However in case of a long term PPA the tariff has to be either negotiated or determined by a regulatory mechanism.

A dispute resolution mechanism for cross-border trading and open access is also desirable. It is recommended that the Government of India should give statutory directions to CERC (Central Electricity Regulatory Commission) under Section 107 of the Electricity Act for determining the transmission charges for cross border electricity to be wheeled through India, and to regulate the tariff of HEPs in the SAARC region which are selling more than 50% power to Indian entities on long-term PPAs (other than the existing ones with negotiated tariff).

e) Recommendations for developing export oriented generation projects in Nepal

- The electricity import duty on the Indian side needs to be abolished
- Export oriented projects should be exempted from VAT on steel and cement in Nepal.
- The licence period for generation projects in Nepal should be 30 years from the date of COD.
- The 5% annual escalation on royalty after 15 years needs to be abolished in Nepal.

India-Pakistan

With its peak generation of 15,000MW and peak demand of the order of 20,000MW, Pakistan is facing a power famine and urgently requires importing electricity from India. Due to power shortage, industries have closed and unemployment has increased, which is ultimately affecting law and order. Pakistan is looking for a relief of 1000MW, while India has initially offered 500MW.

Many rounds of technical discussions have taken place since 2012 to establish the feasibility of power trade between India and Pakistan. Basically, there is no problem in tailoring one or more transmission links according to the quantum of power to be exchanged. The technical experts of the two sides have arrived at a common understanding on the architecture of the interconnection scheme. Political understanding is the key to further progress.

The progress in the matter is as follows:

1. Lahore is a very big load center and a strong grid point of Pakistan close to the Punjab border of India. The length of the transmission link between Amritsar and Lahore would be about 50km. The transmission line can be built in 12-18 months with mutual coordination and cooperation of the security agencies on either side.

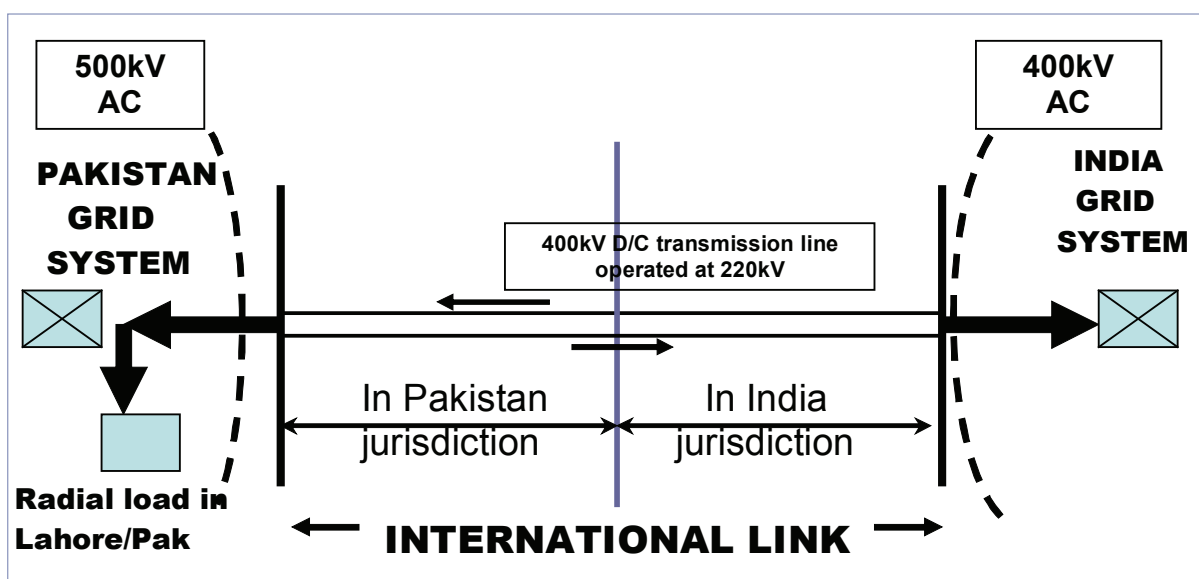


Figure 6: Possible mode of connectivity for India-Pakistan link

2. To prevent disturbances from travelling across the border, an HVDC back-to-back terminal could be installed on the Pakistan side which would act as a buffer and also control the flow of power. The scheme could be similar to the interconnection with Bangladesh.
3. The transmission line could be 400 kV double-circuit high capacity .Each circuit, capable of carrying 1,000MW power, could be strung on separate towers for enhanced security.
4. There could be hotline communication and real-time coordination between the control rooms of two countries for operating the cross-border link.
5. While the transmission line can be built in 12-18 months, the HVDC terminal could take three years. In the intervening period, it is possible to energize the line at 220kV and supply 200MW power on radial mode, to provide relief to Pakistan, while taking all necessary precautions for operating on radial mode.
6. The cost of the transmission link is expected to be about INR 200 crore, while the cost of 500MW HVDC terminal and 1000MW HVDC terminal is expected to be INR 500 crore and INR 1,000 crore respectively. In addition the two countries would have to undertake system strengthening beyond Amritsar (POWERGRID substation) and Lahore.
7. Pakistan could thus arrange power from the Indian electricity market.
8. Pakistan would have to appoint a nodal agency for obtaining open access and settling deviations from the contract.
9. On similar patterns power can be exported from Gujarat to Sind, Pakistan (Karachi) from power plants based on imported coal. This power could be transported through HVDC bi-pole lines.

India-Sri Lanka

The India – Sri Lanka transmission link is envisaged to be a +/- 400kV HVDC bi-pole line. The proposed link would consist of three segments:

- (i) Overhead line from Madurai to Panaikulam in India, 130km,
- (ii) Panaikulam (India) to Thirukketiswaram (Sri Lanka) submarine cable, 120km
- (iii) Overhead line from Thirukketiswaram to New Anuradhapura in Sri Lanka, 110km.

MoU was signed between the two governments on 9th June, 2010 for carrying out feasibility study for interconnecting India and Sri Lanka grids. POWERGRID (India) and CEB (Sri Lanka) were the implementing agencies.

The technical study was nearly completed in August 2012. Apart from overhead lines and submarine cable it includes 4x250MW HVDC terminal in two stages. The total cost of the scheme including interest during construction is estimated at US\$ 650 million.

Stage-I: 2x250MW US\$ 500 million
 Stage-II: 2x250MW US\$ 150 million (additional)

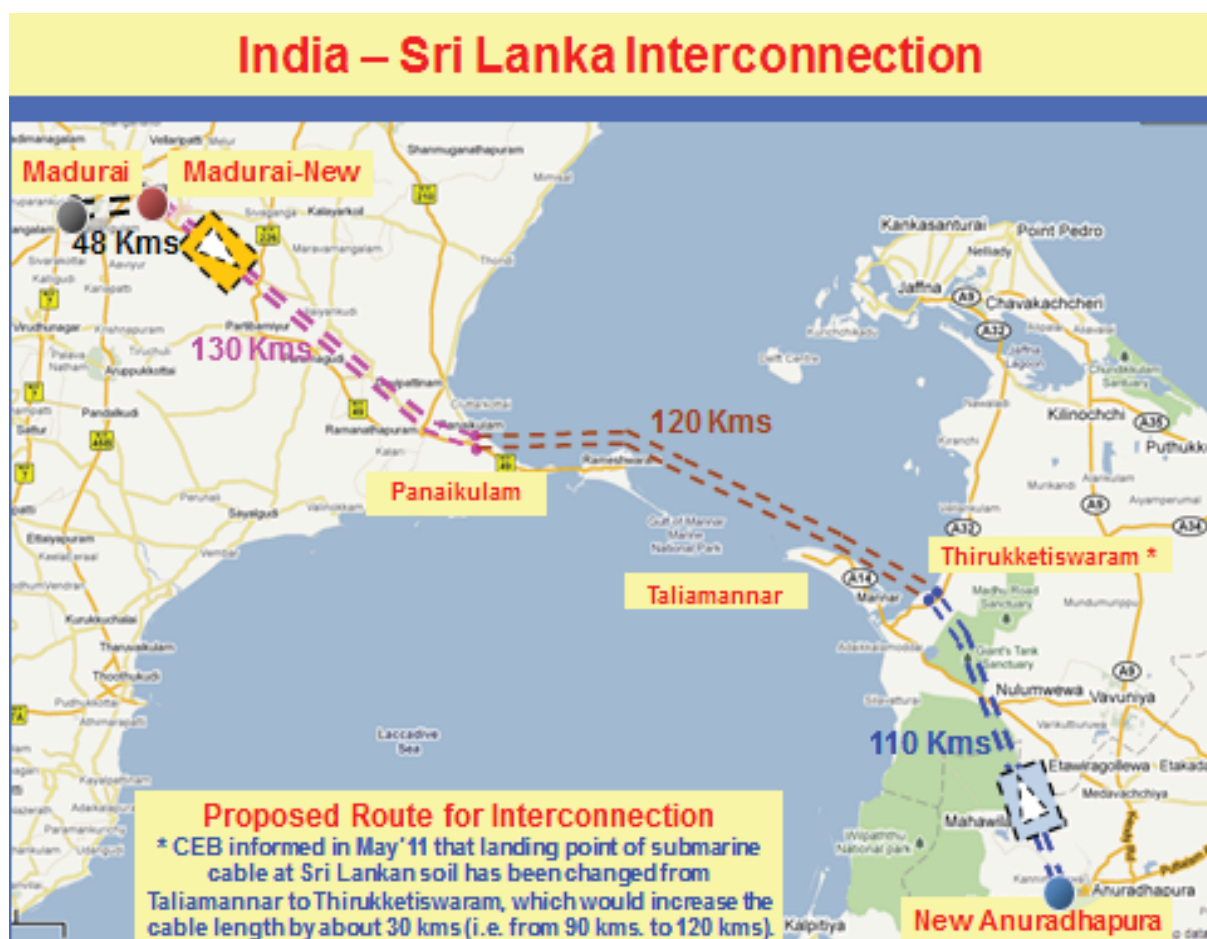


Figure 7: India-Sri Lanka Interconnection

Further progress has been stalled due to lack of clarity on the purpose of the interconnection. Sri Lanka has not shown interest in buying power from India and it does not have surplus power to offer to India. Interconnection would have a definite purpose if Sri Lanka intends to source power from the India, Nepal or Bhutan; or Sri Lanka plans to develop large wind farms along its coast for export of power to India.

India-Myanmar

The scheme to supply 2MW power to Myanmar on radial mode from Manipur border is under implementation. The distance between Moreh, Manipur and Tamu, Myanmar is hardly 20km. It is proposed to interconnect the two towns with a 33kV transmission line and build 33kV substations on either end. The nearest grid point for feeding Moreh is Kakching in Manipur at a distance of 70km. It is proposed to build a 33kV line between the Moreh and Kakching.

However, if Myanmar wants to import more power from India, say of the order of 150-200MW, then a supply could be provided from Silchar in India to a suitable grid point to be developed in Myanmar. The details would have to be worked out by the technical experts of the two countries.

Role of Electricity Traders in India

Trading of electricity is a licenced activity under the Electricity Act of India. CERC (Central Electricity Regulatory Commission) is the licencing authority for inter-state trading in India. Traders are market makers and they have a critical role to play not only in developing cross-border trade but also in promoting investment in cross-border generation.

So far, MEA (Ministry of External Affairs), India has followed the practice of authorizing one electricity trader for cross-border trading with one SAARC country. This leads to arbitrariness. Moreover, there is no rationale for restricting to one trader and creating a monopolistic situation. The fungible nature of electricity requires that there should be one nodal agency for settlement of real-time deviations from the contracted quantity of electricity for each trading entity/nation. The trading entity/nation should have the freedom to buy or sell through any number of licenced traders just as in the case of an Indian state/Discom.

Therefore, all CERC licenced traders in India should be made eligible for cross-border trading through a general order of the Ministry of External Affairs, India.

Evolution of India's grid and its relevance for SAARC

India is a vast country of sub continental dimensions. Its national grid has evolved in the last 50 years, beginning with state grids followed by regional grids and it is developing into a national grid, by building inter-regional connections. The evolution and architecture of India's national grid has relevance for developing cross border interconnections among the SAARC Nations. Each SAARC nation to be connected to India would be a separate control area and operated by a separate load despatch centre in a manner akin to the state grids in India. The energy accounting and settlement would be done in the same manner as it is done for the 28 control areas within India. The cross border day-ahead scheduling of power would be done by the National load Dispatch Centre of India in coordination with the National Load Dispatch Centres of SAARC member states. There is already a hotline audio/ video communication with Bangladesh to facilitate real-time operation of the interconnected grid. Similar procedure and communication facility would be eventually established with all the SAARC member states.

Development of India's National Grid

Transmission service is essential for wheeling electricity from the source to the sink, thereby enabling sellers or generators, distribution utilities or consumers to access the electricity market. A National grid is essential for bulk transmission of power as energy resources are unevenly distributed, with hydro potential concentrated in the Himalayan ranges covering India, Nepal and Bhutan and coal reserves concentrated in parts of Central and Eastern India. A National Grid thus enables harnessing of remotely located resources and enables economies of scale by setting up of large size pit-head based power stations. The cost of transmission of power being lower than the cost of transportation cost of fuel results in major cost saving.

India's national grid facilitates bulk transfer of power across long distances resulting in optimal utilization of generation resources, enables DISCOMs to meet their obligation to the consumers and helps in providing emergency support. A national grid is desirable for large scale integration of renewable energy. A large grid has more inertia and is inherently more stable. However, a large integrated grid requires greater grid discipline because the consequences of failure of a large grid can be massive. HVDC grid interconnections restrict the quantum of power flow and do not facilitate instantaneous grid support in terms of providing balancing power. HVDC grid interconnections allow independent frequency operation of the connected grids and do not allow the disturbance to travel from one grid to another.

India's synchronous electricity grid is the largest in terms of geographical area. It caters to an installed capacity of about 250GW and can meet a peak demand of about 150GW. Major milestones in the evolution of national grid in India are as follows:

- Eastern Region and North Eastern Region started operating in synchronous mode in 1992 through Birpara - Salakati 220kV double circuit link, while other regions interconnected in asynchronous mode.
- HVDC back-to-back links were established during 1990s and early 2000s. The links are as under:
 - 500 MW at Vindhyachal between the Northern Region and Western Region
 - 1000 MW at Bhadrawati between Western Region & Southern Region
 - 1000 MW at Gazuwaka between Eastern Region & Southern Region
 - 500 MW at Sasaram between Eastern Region & Northern Region
 - 2000MW, $\pm$ 500kV Talcher-Kolar HVDC between Eastern Region & Southern Region

- The Western Region was interconnected to the North Eastern Region – Eastern Region (NER – ER) system synchronously through 400kV Rourkela-Raipur double circuit line in 2003.
- The Northern Region was synchronously integrated with the North Eastern -Eastern -Western Region (NER-ER-WR) system with the commissioning of the 400kV Muzaffarpur - Gorakhpur line in 2006.
- The Southern Region was interconnected with North Eastern -Eastern -Western -Northern Region (NER-ER-WR-NR) grid through two HVDC back-to-back terminals and a HVDC bi-pole.
- The Southern Region has been synchronized with the rest of India on 31st December 2013 through 765kV single circuit Raichur – Sholapur line.

India: Transmission Lines (220kV and above)*

Transmission Lines (both AC and HVDC) (values in circuit km)	At the end of 10th Plan 2011-12	Add. in 11th Plan 2012-17	At end of 11th Plan 2016-17	Expected addition during 12th Plan 2017-22	Expected by end of 12th Plan 2021-22
HVDC Bipole lines	5,872	3,560	9,432	7,440	16,872
765 kV	2,184	3,536	5,250	27,000	32,250
400 kV	75,722	37,645	106,819	38,000	144,819
220 kV	114,629	2,5175	135,980	35,000	170,980
Total Transmission Line length	198,407	69,926	257,481	107,440	364,921

India: Substations (220kV and above)*

Substations(AC) and HVDC Terminals expected by end of 12th Plan (values in MVA / MW)	At the end of 10th Plan 2011-12	Add. in 11th Plan 2012-17	At the end of 11th Plan 2016-17	Expected addition during 12th Plan 2017-22	Expected by end of 12th Plan 2021-22
HVDC Terminals:					
HVDC back-to-back	3,000	0	3,000	0	3,000
HVDC Bipole terminals	5,000	1,750	6,750	12,750	19,500
Total- HVDC Terminal Capacity, MW	8,000	1,750	9,750	12,750	22,500
AC Substations					
765 kV	0	25,000	25,000	149,000	174,000
400 kV	92,942	58,058	151,027	45,000	196,027
220 kV	156,497	67,277	223,774	76,000	299,774
Total- AC Substation capacity, MVA	249,439	150,362	399,801	270,000	669,801

*Source: CEA National Electricity Plan

A major transformation of the electricity grid in India is in progress with massive addition of 765kV transmission lines and substations during 2012-17. The 400kV inter-state grid will be topped up by a 765 kV AC layer and +/-800kV HVDC lines which are akin to national power beltways. The high capacity transmission lines drastically reduce the right of way requirement. The evolution of national power beltways has been driven by the large scale development of power plants in the coal belt zone of Odhisa, Chattisgarh, Jharkhand and Vidarbha area of Maharashtra, and hydro power development plans for Sikkim, Bhutan and Arunachal Pradesh.

National power beltways would extend from Chattisgarh to Haryana/ Tamil Nadu, from Bhutan and Arunachal Pradesh to the load centres of North and West, from East to West, East to North, West to North and from the southern tip to Jammu and Kashmir.

Eventually these national power beltways could be integrated with cross-border links from Nepal, Iran, Central Asia, Sri Lanka and Myanmar depending on SAARC member states drive for power outreach and vision of developing economic bonds among the SAARC nations.

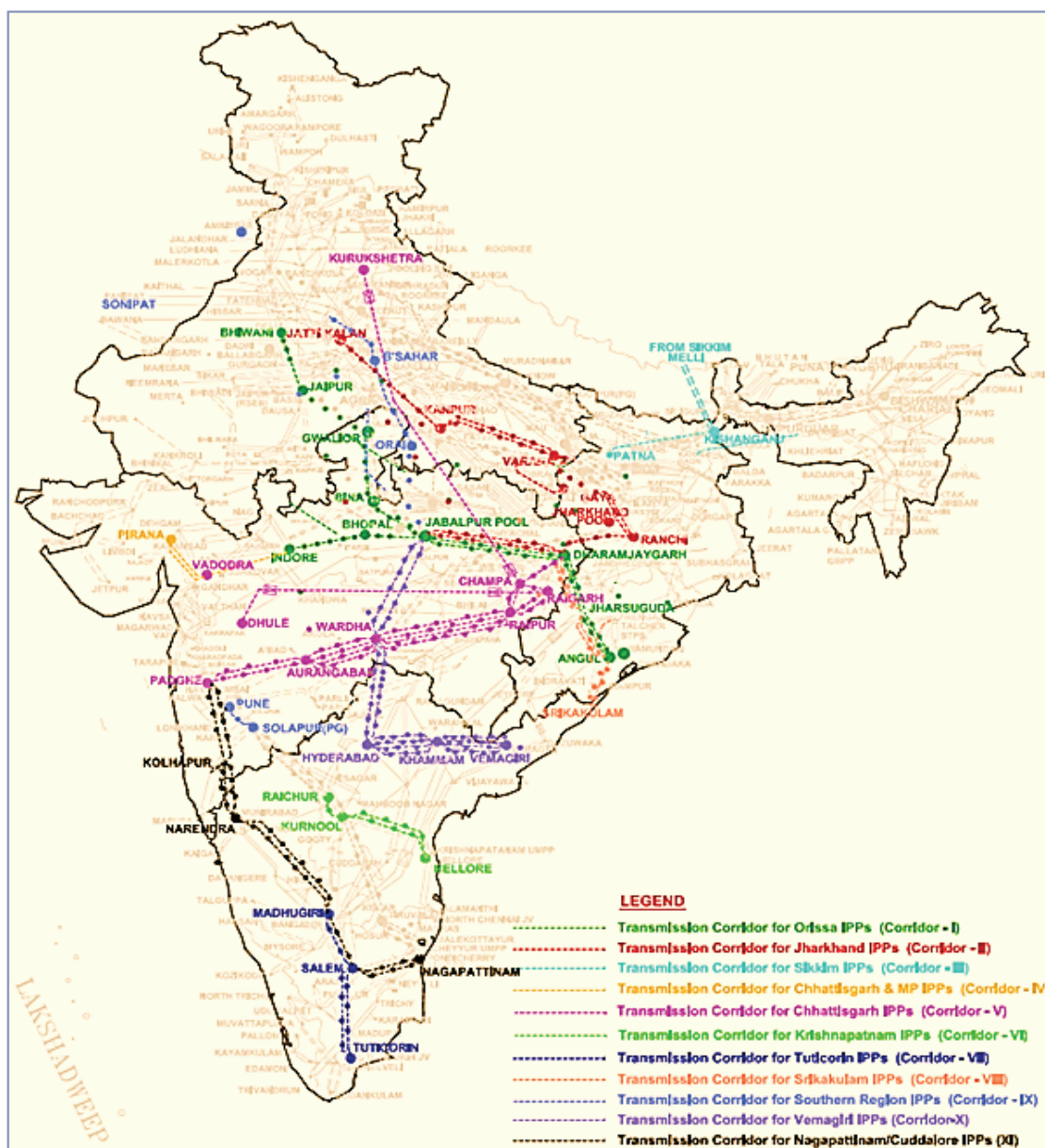


Figure 8: India's national power beltways

Nature of SAARC interconnections

The nature of cross-border interconnections have been basically determined by the evolutionary process and grid security aspects as listed below:

- Bangladesh-India: Mainly HVDC (Asynchronous)
- Bhutan-India: AC (Synchronous)
- India-Nepal: AC (Synchronous)
- India-Pakistan: Mainly HVDC (Asynchronous)
- India-Sri Lanka: HVDC submarine cable

Long distance transmission links with places such as Iran and Central Asia would be HVDC bi-poles.

Based on the experience so far, there are established procedures for planning, design and implementation of cross-border interconnections and there is no technical hitch in planning and implementing interconnections of desired size provided there is clarity and commitment on short-term and long-term quantum of power to be traded. The policy makers need to focus on the amount of power to be traded or exchanged, its time frame, PPA and law and order issues along the transmission corridor.

The planning principle is joint studies based on sharing of data. The commercial principle is buyer to pay for transmission charges and losses. So far the principle of each country owning, building and maintaining transmission system in its territory has been followed, but other options could also be explored for Central Asia and Iran.

India's National Power Beltway as a backbone for connecting Central Asia to South East Asia

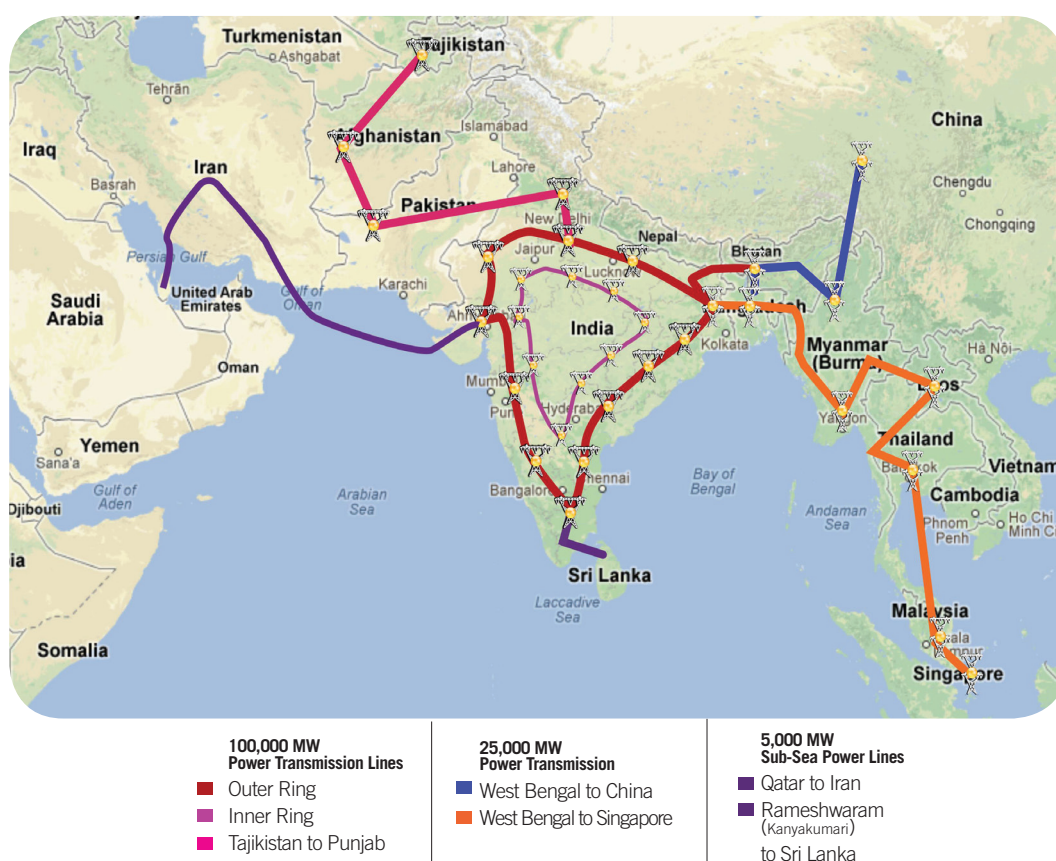


Figure 9: Proposed links connecting Central, South & South East Asia

Transmission pricing

The transmission tariff can be inclusive or exclusive of electricity tariff. In case of Bhutan the investment in transmission associated with a generation project is identified, added to the investment in generation project and a composite tariff is negotiated. This is easy to do when the transmission schemes are distinct. Once a number of generation projects come up and the transmission grid becomes a mesh, this method of inclusive transmission tariff loses sanctity and it is better to shift to postage stamp transmission tariff or point of connection tariff. A small country can have a national postage stamp tariff and bigger one can have zonal postage stamp tariff. The sharing of charges could be on the basis of monthly energy or contracted power.

In case of cross-border power transactions, the transmission charges for the interconnection as well as the national grids would be shared by the entities of other countries. It is desirable that transmission tariff and sharing methodology should be determined by the respective national regulator in a transparent and non-discriminatory manner.

Zonal transmission tariff leads to pancaking of charges and losses and can make trade unviable. When a transaction is across a large distance in a meshed grid the power is transferred by displacement from the nearest source. Adding the value of zonal price stamps is not logical.

India is the only country in South Asia which has implemented open access in transmission throughout the country. It is possible to trade electricity across the entire country as also to engage in cross-border trade of electricity. Though India is a large country, yet it is possible to trade electricity across states and electrical regions without piling up of transmission charges and losses. This makes India a user friendly market place. India has moved to a sophisticated load flow based transmission pricing called the point of connection tariff. This has reduced the cost of transaction across the five electrical regions of India and it is conducive to cross-border transactions. For instance, Bangladesh could source power from western India or Pakistan could source power from eastern India without bothering about cost loading due to transmission charges and losses. All the party has to pay is point of connection charge at the point of drawal (Drawal Charge) and point of connection charge at the bus bar of generating station (Injection charge). Similarly, the transmission losses are applied in kind to the scheduled quantum of power only at the point of drawal and injection irrespective of how many states or regions one may cross.

Issues in network access in India

India introduced open access to transmission system in 2004 by providing long-term service of 25 years and short-term service from one day to three months. Subsequently, medium-term service from three months to three years was introduced to meet the requirement of users. Inadequacy has started occurring in transmission system leading to frequent congestion due to increasing volume of short-term and medium-term transactions and users avoiding to declare their actual transmission requirement with the aim of reducing their liability to pay transmission service charges.

Under the existing CERC regulations, a generating plant seeking 'connectivity' with the inter-state grid is not obliged to pay transmission charges. The generator has the obligation to pay transmission charges only if it seeks 'long-term access' and he has the option to seek 'long-term access' lower than the capacity of his generating plant. CERC does not allow transmission system to be augmented for facilitating medium and short term access. This is a legacy of the times when it was considered possible to cater to the need of short-term market by utilising the margins available in the transmission system.

The task of transmission planning becomes simple if long-term buyers of a generating station are identified at the inception stage. However, in the case of IPPs, more often than not, long-term buyers are not tied up in advance and may never be tied up for hundred per cent capacity of the generating plant. For the untied or merchant capacity, the generator is bound to avail medium-term or short-term transmission service.

The transmission system takes as much time to build as a generating station. If adequate transmission system is not planned and developed along with the generating plant, it may eventually result in bottling up of generation, transmission congestion, and threat to grid security, sub-optimal planning and need of additional right-of-way to add new transmission lines.

Therefore, it has become necessary and urgent to redesign the transmission service in India so that adequate transmission can be created in advance to cater to diverse needs of the electricity market, whether it is a long-term, medium-term or short-term transaction.

Way forward: General Network Access (GNA)

General Network Access (GNA) is like a passport that allows its holder access to the all India inter-state transmission grid and avail transmission service of its choice.

GNA may be defined as the quantum of power in MW that can be drawn or supplied from the point of connection with the grid, which as per power system studies is not likely to cause congestion in the transmission grid.

GNA is a fungible transmission product which allows its holder to avail any type of transmission service be it long-term, medium-term or short-term. All that is required to be paid is the monthly GNA charge as per the point of connection tariff in vogue. The difference between long-term, medium-term, short-term and any other transmission service would be in the priority to be accorded in the scheduling of transactions and not in the payment of charges.

While determining or planning augmentation of the transmission system for the purpose of GNA, the transmission planner has to ensure that the seller has the flexibility to sell anywhere in the grid, and likewise the buyer has the flexibility to buy from anywhere. In other words, in order to provide GNA, the transmission planner would have to do extensive studies to assess the probability of congestion in the network under different scenarios and go on doing requisite improvements.

By mandating GNA equal to the installed capacity of a new generating plant, adequate transmission system can be put in place in a time frame matching with the commissioning schedule of an upcoming generating plant.

Since the creation of GNA requires sunken investment in transmission, it stands to reason that the person, including a cross-border entity, to which GNA is granted, undertakes to pay transmission service charges proportional to his GNA requisition, with a lock in period of about 10 years.

SAARC Inter-Governmental Framework Agreement for Energy Cooperation (Electricity)

A dispute resolution mechanism is part of every contract. The entities in cross-border transactions would be from different countries and the dispute resolution mechanism has to be acceptable to them. It has been observed from recent agreements in the electricity sector with Bangladesh and Sri Lanka that there is provision for adjudication in the court of a third place such as Singapore and London.

When short-term regional electricity trade develops, there would be multiple transactions every day. It would require a cheaper and faster mechanism of dispute resolution. Disputes could arise on a number of issues such as, interpretation of bilateral contracts between cross-border entities, payment default, transmission access etc. It would be desirable to move in the direction of creating a regional dispute resolution mechanism for electricity trade.

In order to promote investment in cross-border generation and regional electricity trade, there has to be clarity, commitment and stability about taxes and duties specific to electricity generation, import and export.

There is a need to develop an institutional mechanism for planning and implementing cross-border transmission links.

SAARC Regional Energy Trade Study (SRETS) completed with the assistance of ADB in March 2010 has recommended that there should be a regional trade treaty on the lines Energy Charter Treaty.

The SAARC expert group on electricity met in Udaipur, India on 18 January 2011 to discuss the SAARC Inter-Governmental Framework Agreement for Energy Cooperation (Electricity). The draft agreement finalised by the SAARC expert group on electricity is reproduced below:

Final Draft of SAARC Inter-Governmental Framework Agreement for Energy Cooperation (Electricity)

“Recognizing the importance of electricity in promoting economic growth and improving the quality of life; realizing the common benefits of cross border electricity exchanges and trade among the SAARC Member States leading to optimal utilization of regional electricity generating resources, enhanced grid security, and electricity trade arising from diversity in peak demand and seasonal variations; convinced of the need to create a larger and investor friendly electricity supply industry having greater degree of competition; and as a measure of increasing economic cooperation and creating new opportunities, we hereby resolve :

- 1. To allow unrestricted cross-border trade of electricity on voluntary basis subject to regulations of the respective Member States.*
- 2. To allow buying and selling entities to negotiate the terms, conditions, payment security mechanism and tenure of their Power Purchase Agreements as normal commercial agreements.*
- 3. To exempt cross-border trade and exchange of electricity from levy of any kind of import or export duty.*
- 4. To share and update technical and commercial data and information of the electricity sector as per the agreed template on SAARC website.*

5. *To encourage the process of reform, restructuring and opening up of electricity sector guided by respective national priorities with the aim of creating competition and improving availability and quality of supply.*
6. *To allow the transmission planning agencies of the Member States to jointly plan the cross-border grid interconnections based on the needs of the trade in the foreseeable future through joint studies and sharing technical information required for the same.*
7. *To allow the respective transmission agencies of the Member States to build, own, operate and maintain the associated transmission system of cross-border interconnection falling within respective national boundaries and interconnect the two at mutually agreed location.*
8. *To allow entities of the Member States to enter into Transmission Service Agreements with the Transmission Service Providers of any SAARC Member State for the purpose of cross-border electricity exchange.*
9. *To allow the national grid operators to jointly develop coordinated procedures for the secure and reliable operation of the inter-connected grids of the Member States and to prepare scheduling, dispatch, energy accounting and settlement procedures for cross border trade.*
10. *To allow, for the purpose of cross-border trade, non-discriminatory open access to the respective transmission grids of the Member States as per the applicable rules and regulations.*
11. *To allow electricity trader of any SAARC Member State to apply to engage in cross-border electricity trading subject to regulations of the respective Member States.*
12. *To facilitate participation of entities from Member States in Power Exchanges for collective physical trading of electricity in due course of time based on experience of multiple bilateral trades.*
13. *To allow transfer of technology related to power generation, transmission and distribution among the SAARC Member States.*
14. *To allow movement of energy sector experts and professionals within the SAARC region.*
15. *To encourage knowledge sharing and joint research in the fields of energy efficiency, reduction of transmission and distribution losses, and development of renewable energy resources.*
16. *To promote sourcing of equipment related to power generation, transmission and distribution among the SAARC Member States.*
17. *To develop the structure, functions and an institutional mechanism for regulatory issues related to electricity exchange and trade among the SAARC Member States."*

The above draft agreement should be expeditiously taken to the SAARC summit for signing by the SAARC head of states. Simultaneously, work should be started on developing a regional regulatory mechanism.

Recommendations for developing a SAARC electricity grid and cross border trade

Country specific recommendations

a) Bangladesh

Doubling the capacity of HVDC terminal Bheramara, Bangladesh needs to be expedited.

A radial feed to supply 100MW to Bangladesh at North Comilla from Tripura, India at 220kV needs to be expedited

b) Bhutan

Export oriented generation projects need to be developed in Bhutan. The Govt. of Bhutan may consider any of the following options:

- Allow 100% FDI in generation projects in Bhutan
- Allow JV with a Bhutan Company in the generation sector, with FDI of 51% or 74%.

The Governments of India, Bangladesh and Pakistan as the case maybe, could facilitate the signing of long-term PPAs for the HEPs in Bhutan to achieve speedy financial closure.

The Government of India could give statutory directions to CERC under Section 107 of the Electricity Act for the wheeling charges for power which is being wheeled through India, to determine the tariff of HEPs that are in the SAARC region and are selling more than 50% power to Indian entities on long-term PPAs (other than the existing ones with negotiated tariff).

c) Nepal

The following cross border lines to need to be expedited :

- 132kV single-circuit, 15km Line from Kataiya, Bihar to Kusaha, Nepal along with associated bay: Rs 8.63 crore
- 132kV single-circuit, 17 km Line from Raxaul, Bihar to Parwanipur, Nepal along with associated bays: Rs 9.2 crore

There is a need to develop a more efficient coordination mechanism between NEA, Nepal and POWEGRID, India for joint cross-border planning.

The electricity import duty on the Indian side needs to be abolished.

Export oriented projects should be exempted from VAT on steel and cement in Nepal.

The licence period for generation projects in Nepal should be 35 years from the date of COD. The 5% annual escalation on royalty needs to be abolished in Nepal.

d) Pakistan

An India Pakistan cross border link of 500-1000MW should be developed on the pattern of India Bangladesh HVDC interconnection. The most appropriate and immediate option is to interconnect Amritsar and Lahore.

Gujarat, India and Sind, Pakistan could be interconnected through +/- 500kV HVDC bi-pole, 2500MW for exporting power from a generation project in Gujarat based on imported coal.

India and Pakistan could jointly import electricity from a mega project or a cluster of projects in Nepal and to have symmetry of transaction, India and Pakistan could jointly import power from Central Asia and Iran.

e) Sri Lanka

Once Sri Lanka is connected with the Indian grid through the HVDC submarine cable, then it will open up options for Sri Lanka to import electricity from anywhere including Nepal, Bhutan, India, Central Asia or Iran.

f) Afghanistan

Afghanistan can play an important role in wheeling fair amount of energy to other SAARC countries; this goal can be achieved only when Afghanistan establishes a unified national grid, resolves synchronization issue with neighboring countries, and reinforce the transmission system to enable large scale power transmission between surrounded countries.

Afghanistan power system also needs to be equipped with modern protection and automation equipments and mobilize experienced and skillful operation personnel.

Other Recommendations:

Trading to be liberalised

All licenced traders should be made eligible for cross-border trading.

SAARC Inter-governmental Framework Agreement

The draft agreement should be expeditiously taken to the SAARC summit for signing by the SAARC head of states.

Regional Mechanisms

Work should be started on developing a regional regulatory mechanism.

Regional entities from the member states can be plugged in with the Indian power exchanges by going through an Indian power exchange agent. The regional entity would have to establish a commercial relationship with the Indian agent through their respective bankers.

A regional commercial dispute resolution mechanism needs to be worked on for cross border trade of electricity.

List of Abbreviations

BPDB	Bangladesh Power Development Board
CEA	Central Electricity Authority
CEB	Ceylon Electricity Board
CERC	Central Electricity Regulatory Commission
CII	Confederation of Indian Industry
DGPC	Druk Green Power Corporation
HEPs	Hydro Electric Power Projects
HVDC	High Voltage Direct Current
IEX	Indian Energy Exchange
IL&FS	Infrastructure Leasing & Financial Services Limited
JICA	Japan International Cooperation Agency
JV	Joint Venture
KV	kilo Volt
MEA	Ministry of External Affairs, India
MU	Million Unit
NEA	Nepal Electricity Authority
NPR	Nepalese Rupee
NVNL	NTPC Vidyut Vyapar Nigam Ltd
PEC	Power Exchange Committee
PGCIL	Power Grid Corporation of India Limited
PPA	Power Purchase Agreement
SJVNL	Satluj Jal Vidyut Nigam Limited



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