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Cross-Border Electricity Trade in South Asia: Challenges and Investment Opportunities

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

South Asia Investor's Workshop on 'Cross-Border Electricity Trade'

24th–25th SEPTEMBER 2014, NEW DELHI, INDIA

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This study is made possible by the support of the American people through the United States Agency for International Development (USAID). The contents of this study do not necessarily reflect the views of USAID or the United States Government.

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Preface

Over the last two decades, South Asia (SA) has been one of the fastest growing regions in the world, with an average annual GDP growth rate of six percent. The region has a variety of energy resources with major potential for hydropower. This potential offers a huge scope for tapping clean energy and meeting South Asia's energy needs. Yet, despite the potential and the macroeconomic growth in this region, the power sector has not been able to keep pace with the demand. The region continues to experience problems of shortage of electricity supply and its quality. Cross-border transmission interconnections and trading transactions are taking place to a limited extent. The systematic deployment of huge energy resource potential, especially hydropower, along with an investment in infrastructure build-up and a market-based trade system, can help harness untapped sources of clean energy.

South Asia has been driven by first generation reforms relating to the correction of macroeconomic imbalances and the adoption of more liberal regimes relating to trade, investments, and exchange rates. The region's energy security requires sustained progress in energy cooperation among the South Asian nations. Energy security, access to electricity, and climate change are critical components of regional stability and play key roles in supporting economic development and national security. The need to ensure energy security in today's economic climate is imperative and urgent as the gap between the latent demand and supply of energy is a major concern for South Asia. It is estimated that the regional average economic growth rate of six percent per year is constrained by two to three percent annually. Member nations could capitalize on the complementarities of their resource base and energy needs. Regional sharing and diversifying the use of available energy resources would address many of the growing energy security concerns, advance geopolitical interests, and accelerate economic development.

Another major concern is mobilization of investment for energy infrastructure. Availability of finances for capital-intensive power projects is crucial to their implementation. Huge investments in generation and transmission are required to meet the growing demand of power in the region. In addition, the generation and transmission infrastructure requires a long gestation period. Therefore, there is a need for enhanced public/private sector investment and participation, which will help make the region energy secured and self-sustainable. Although the bulk of financing comes from national governments, who usually hold majority stakes in the projects, various financial institutions, Multilateral Development Banks (MDBs), and private players are willing to invest given the right circumstances and incentives. In South Asia, barriers to investment include insufficient data for review; entrenched ways of doing business that provide no incentives for investors; limited seed and longer term capital/guarantee options for development; significant contract and procurement inefficiencies; virtually non-existent legal systems for investment guarantees; and weak basic infrastructure to support investment.

The South Asian region would have to invest in the range of US$ 1.7 trillion to US$ 2.5 trillion until 2020 in order to meet existing infrastructure gaps. Given the massive financing requirements, private sector participation, either direct or via Public-Private Partnerships (PPPs), is essential to source funds and maximize returns on investment. Investment in cross-border interconnections can be justified, if one is able to identify and assess the benefits from regional cooperation. This would then enable the decision-makers to make informed decisions based on benefits that are visible and quantifiable.

I hope this paper will initiate thought-provoking discussions among power sector stakeholders and provide a platform for investors, developers, financial institutions, MDBs, and high-level officials from the South Asian countries to engage in a dialogue on challenges and investment opportunities in South Asia's power sector and to enhance Cross-Border Electricity Trade (CBET).

We welcome your valuable suggestions.

Dr. Jyoti Parikh
Executive Director, IRADe

CROSS-BORDER ELECTRICITY TRADE: SOUTH ASIA POWER SECTOR OVERVIEW

The countries of South Asia (SA), comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka, are home to one-fifth (23 percent) of the world's population. Over the last two decades, South Asia has been one of the fastest growing regions in the world, with an average annual growth rate of six percent as measured by GDP per capita. This robust macroeconomic growth has translated into declining poverty and significant improvements in human development indexes in the region. The average annual growth rate of six to seven percent is expected to be maintained over 2014–2015, driven by increased export demand, policy reforms, stronger investment activity, and normal agricultural production.[1] To sustain high-level economic growth in the long run, it is imperative that the electricity sector grows in a sustainable manner, as power is one of the fundamental inputs to the economy. However, despite this impressive macroeconomic growth, the power sector in the region has not been able to keep pace, and each of the countries continues to experience electricity shortages and poor quality of supply due to various factors such as the sub-optimal utilization of energy resources both domestic & imported and inadequate investments in the power sector. The existing power shortages and growing import of fossil fuels impose a heavy cost of energy insecurity to the region. Thereby, the need to ensure energy security in today's economic climate is imperative and urgent as the gap between the latent demand and supply of energy is a major concern for the South Asian region.

Lack of investments in electricity generation, transmission, and distribution also inhibits development in manufacturing/industry and other key economic activities, thus limiting the GDP growth of the region. Shortage of electricity also impedes other developmental pursuits ranging from education, healthcare, economic progress, scientific research, quality of life, prosperity, and happiness in the region.

As mentioned, South Asia's growing economies is placing a significant demand for electricity. Unfortunately, the electricity supply has not been able to match the demand, resulting in large demand-supply gaps and frequent power interruptions. With the exception of Bhutan[2] and the Maldives, most other South Asian countries face electricity deficit. For instance, Nepal faced electricity peak deficit as high as 44 percent[3] during the year 2011–12 whereas the electricity deficit in India, Bangladesh, and Pakistan was 11 percent, 26 percent, and 25 percent in 2011–12, respectively. These electricity supply deficits are inflicting significant cost to the economy, leading to a loss of economic output. The average loss of economic output due to electrical outages (as a percentage of sales) was 6.49 percent for Afghanistan (2008), 10.56 percent for Bangladesh (2007), 4.33 percent for Bhutan (2009), 6.62 percent for India (2006), 9.16 percent for Pakistan (2007), 3 percent for Sri Lanka (2011), and a staggering 27 percent for Nepal in 2009.[4] To meet these electricity shortages, industrial, commercial, as well as domestic users are forced to invest in costly alternate sources of generation such as diesel, furnace oil, and so on.

In South Asia, the current per capita electricity consumption is also very low, ranging around 563 kWh per capita (Table 2), as compared to developed economies (13,246 kWh per capita in the USA and 2,977 kWh per capita in the world) (Table 2). The region also lags behind its developed

[1]http://www.worldbank.org/en/region/sar/overview
[2]Currently Bhutan experiences shortages during the winter season and imports electricity from India. However, it is forecasted that Bhutan will be able to meet the demand during the winter season as well by 2017.
[3]World Bank, 2013.
[4]USAID/IRADe/SARI/EI 'Prospects for Regional Cooperation on CBET in SA'.

Table 1 Projected Electricity Demand (GWh) vis-à-vis CAGR

	Demand (GWh)		CAGR	Key Generation Resources
	Year 2010	Year 2020		
Afghanistan	2,600	6,750	10 percent	Hydro, oil
Bangladesh	28,470	67,400	9 percent	Natural gas
Bhutan	1,749	3,430	7 percent	Hydro
India	938,000	1,845,000	7 percent	Coal, hydro, wind, solar
Maldives	800	1,300	5 percent	Oil
Nepal	3,200	6,910	8 percent	Hydro
Pakistan	95,000	246,000	10 percent	Coal, natural gas, hydro
Sri Lanka	10,718	21,040	7 percent	Hydro, oil
Total	**1,080,537**	**2,197,830**	**7.4 percent**	

Table 2 South Asia Per Capita Electricity Consumption and Access to Electricity

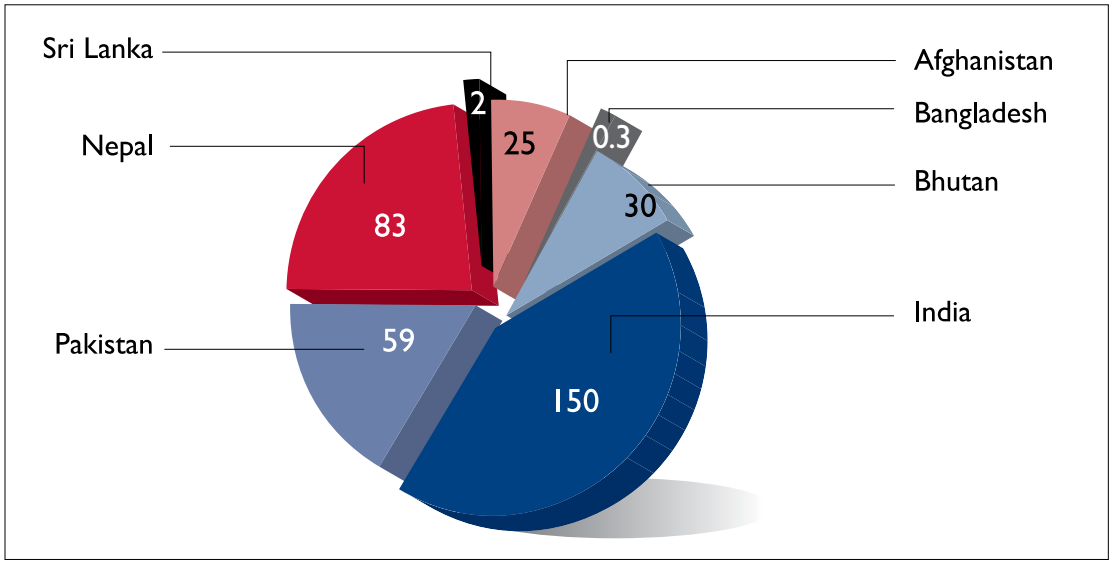
	Electricity Consumption kWh Per Capita	Access to Electricity % of Population
Afghanistan	49*	30
Bangladesh	274	46.5
Bhutan	2,420#	60
India	879^	75.3
Maldives	2,283*	100
Nepal	103	76.3
Pakistan	458	67.4
Sri Lanka	449	76.6
South Asia	563	70.7
Compared to		
China	2,944	99.7
USA	13,246	100
World	2,977	78

Source: World Bank 2013, * = 2009 IRENA, # = 2012 RGoB, ^ = 2013 CEA.

counterparts in terms of electricity access. Around 70.7 percent (Table 2) of South Asia's population has access to electricity whereas countries such as China and the USA have almost 100 percent population with access to electricity. The per capita electricity consumption in the region is expected to rise with increased economic prosperity, improved access to electricity, and lifestyle changes. The projected demand for electricity is expected to grow at a CAGR of 7.4 percent (Table 1). This calls for significant investment in sustainable utilization of the energy resources in each country of South Asia as well as new approaches to regional cooperation for energy resources utilization and the development of its associated electricity generation, Transmission and Distribution (T&D) infrastructures.

South Asia is endowed with limited fossil fuels but has a huge hydropower potential of 350 GW (25 GW in Afghanistan; 30 GW in Bhutan; 150 GW in India; 83 GW in Nepal; and 59 GW in Pakistan) (Figure 1), that is largely untapped due to inadequate investment and development of associated transmission infrastructure for evacuation of power to the load centers. There is, however, disparity in the distribution of these energy resources across the region (Table 3). Limited oil and gas resources have led to a growing import dependency. Electricity generation largely depends on available domestic resources. Some countries in the region depend significantly on coal while others on hydro resources to generate electricity. For example, Bhutan and Nepal rely on hydro resources to generate electricity while Bangladesh, the Maldives, and Sri Lanka are largely dependent on fossil fuels. Sri Lanka's power demand has exceeded the capacity of viable hydropower projects, and, therefore, it is banking on thermal power plants, based on imported coal and diesel. Bangladesh, which relies on gas for about 63 percent of its power generation,[5] is rapidly consuming its reserves and is already facing electricity shortages, with demand expected to almost triple in the next decade.[6] The two large economies, namely, India and Pakistan, depend on a mix of hydro and fossil fuel-based capacity, though they are increasingly becoming more dependent on fossil fuels. For example, in India, currently more than 70 to 75 percent of the total

Figure 1 Hydro-electric Potential of around 350 GW in South Asia



Source: SAARC Secretariat (2010) for Bangladesh, Bhutan, India, Nepal, Sri Lanka; CWC (2005) for Indian States and WAPDA (2011) for Pakistan and USAID/IRADe/SARI/EI 'Prospects for Regional Cooperation on Cross-Border Electricity Trade in South Asia', 2013.

[5]Bangladesh Power Development Board: Key Statistics, http://www.bpdb.gov.bd
[6]Bangladesh Power Sector Master Plan, 2010.

Table 3 **Energy Resource Endowments in South Asia**

Country	Coal (million tons)	Oil (million barrels)	Natural Gas (trillion cubic feet)	Biomass (million tons)	Hydropower* (gigawatts)
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: ADB (2012).

*Note: As per ADB (2012), the estimated hydro-electric potential of the region was only 294.33 GW due to lower estimates for Nepal and Pakistan. The above estimate is based on SAARC Secretariat (2010) for Bangladesh, Bhutan, India, Nepal, Sri Lanka; CWC (2005) for Indian States and WAPDA (2011) for Pakistan.

power generation comes from coal. The limited and disperse fossil fuel resources available to generate electricity across South Asian countries through the utilization of domestic energy resources present a challenge to meet the growing demand of electricity in these countries which, in turn, poses serious environment challenges. To combat these challenges, the SA nations are investing in enhancing their own resource bases; promoting the R&D of new and better technologies to optimally exploit available resources; expanding/diversifying their energy baskets and supply sources; and exploring regionally available energy resources, particularly hydro resources. The development of regional hydropower resources and their associated transmission infrastructures require a huge capital, which is beyond the means of any single country. There is, therefore, a need to have coordinated investment in generation and transmission among the SA countries to utilize regional hydro resources. This will lead to optimal investment in generation and transmission infrastructure, capacity utilization, and significant reduction in the carbon footprint of the region.

The SA region as a whole has significant demand diversity, that is, intra-seasonal and peak time differences, different load curves as well as differences in lifestyles, festivals, holidays, and so on. To meet these demand diversities, there is a need to develop a regional grid in South Asia for facilitating CBET projects. Developing CBET projects by sharing generation and transmission infrastructure, trading in surplus power, and jointly developing sustainable and renewable energy projects, will create harmonious, consistent, and cost-efficient power networks, which will benefit all participating nations that are either generating power, purchasing or serving.

At present, limited power is being traded through bilateral arrangements between Bangladesh and India (500 MW), Bhutan and India (1,416 MW), and Nepal and India (150 MW), although the total potential for CBET is immense. There are several cross-border transmission interconnections that are proposed or under implementation (Table 4). For example, the Dhalkebar–Muzaffarpur 400 kV interconnection between India and Nepal is under implementation and is the first of its kind in which the transmission line is being constructed under the PPP model in a commercial arrangement.

Similarly, various power generation projects are being jointly developed through government-to-government cooperation, by the private sector, and through PPP mode by the respective SA countries. For example: Bhutan is developing its hydropower plants with the support of the Government of India, through PPP mode, Joint Venture, and so on (Table 5). Similarly, India and Nepal are discussing four joint projects with a combined potential of 20,165 MW (Table 6). Further, the Bangladesh India Friendship Power Company Limited (BIFPCL), a Joint Venture of NTPC Limited and Bangladesh Power Development Board (BPDB), is working to develop a 1,320 MW coal-fired power station at Rampal Upazila of the Bagerhat District in Khulna, Bangladesh. The BIFPCL is a 50:50 Joint Venture between NTPC and BPDB and was incorporated in Bangladesh in October 2011. Similarly, NTPC and the Ceylon Electricity Board (CEB) of Sri Lanka had signed an agreement in 2011, to set up a coal-based 500 MW power plant at Trincomalee in Sri Lanka.

Table 4 Cross-Border Transmission Interconnections

S. No.	Countries	Interconnection Description	Capacity (MW)	Status
1	Bhutan-India	Grid reinforcement to evacuate power from Punatsangchhu I and 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 numbers of 132 kV and 5 numbers of 33 kV connection with India	278 MW approximate evacuation capacity	Existing
4	Nepal-India	Bardaghat-Gorakhpur (400 kV)	1,800 MW evacuation capacity	Planned
5	Nepal-India	Duhabi-Jogbani (400 kV)	1,800 MW evacuation capacity	Identified and proposed
6	Sri Lanka-India	400 kV, 127 km HVDC line with submarine cable	500 MW in the short-term	Planning
7	Bangladesh-India	400 kV HVDC back-to-back asynchronous link	500 MW	Existing
8	India-Pakistan	220 kV in the short-term (could be upgraded to 400 kV later)	250-500 MW	Yet to be formally discussed
9	CASA	500 kV AC line from Datka (Kyrgyz Republic) Khudjand (Tajikistan) 500 kV HVDC line: Tajikistan-Afghanistan-Pakistan	1,300 MW	Advanced stage of planning

Table 5 Generation Expansion Plan in Bhutan

Sl. No.	Name of HEP	Installed Capacity (MW)	Year of Commissioning	Implementation Mode/ Remark
1	Punatsangchhu-I	1,200	2016/17	IG*/Under construction
2	Punatsangchhu-II	1,020	2017	IG/Under construction
3	Mangdechhu	720	2017	IG/Under construction
4	Sankosh	2,560	2023	IG/DPR under review
5	Kuri-Gongri	2,640	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	JV/DPR cleared
9	Chamkharchhu-I	770	2024	JV/DPR under review
10	Amochhu	540	2022	IG/DPR cleared
10	Nikachhu	118	2019	PPP/DPR cleared
11	Dagachhu	126	2014	PPP/Under commissioning stage

*IG-Intergovernmental projects between India and Bhutan.

Source: Department of Hydropower & Power Systems, Ministry of Economic Affairs, Bhutan, 2014.

Table 6 Mutual Interest Projects Under Discussions between India and Nepal

Name of the Project	Capacity
Pancheshwar with Rupaligad	5,600+240 MW
Sapta Kosi High Dam and Sunkosi Diversion-cum-Storage	3,300 MW
Karnali	10,800 MW (not being pursued at this stage)
Naumure	225 MW

Source: http://www.cea.nic.in/reports/hydro/nepal.pdf

It has now become evident that without regional utilization of energy resources and synergistic exchange/trade of energy, it will be an arduous journey for each of the SA nations to achieve an all-inclusive, cost-efficient, and sustainable access to electricity for their developing economies. Therefore, the governments of different SA countries have taken steps for interconnecting the power systems for CBET and are investing in building more cross-border interconnection projects. Improved system reliability, economies of scale, system optimization, developing generation capacities, and the development of national power markets are the positive outcomes of cross-border electricity trade.

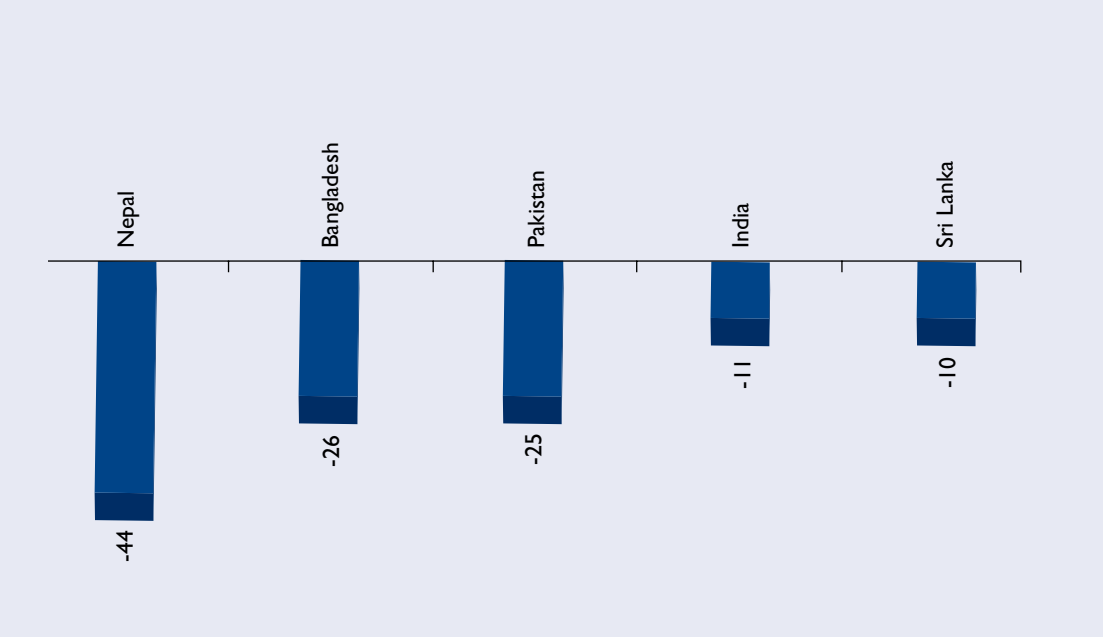
2 KEY DRIVERS FOR INVESTMENT IN CBET

South Asia has a host of energy resources including coal, gas, hydro, solar, wind, and so on. It is endowed with significant hydropower potential (350 GW) that has largely remained untapped. The sustainable utilization of hydropower, a clean source of energy, and the development of associated cross-border electricity transmission infrastructure will lead to optimal investment in the generation and transmission, capacity utilization, and significant reduction in the carbon footprint of the region. In addition, there are various macro and regional factors that drive investment in CBET.

2.1 ELECTRICITY SHORTAGES AND BRIDGING THE DEMAND-SUPPLY GAP

South Asia is expected to witness moderate to high economic growth in the future. The region is growing at an average annual rate of 6 percent GDP per capita and this is expected to be maintained in the coming years. To sustain this high-level economic growth in the long run, the electricity sector needs to grow in a sustainable manner as power is one of the key inputs/drivers to the economy. The projected demand for electricity to meet this annual average GDP rate is expected to grow at a CAGR of 7.4 percent (Table 1).

Figure 2 **Electricity Supply Peak Deficits (2011–2012 [%])**



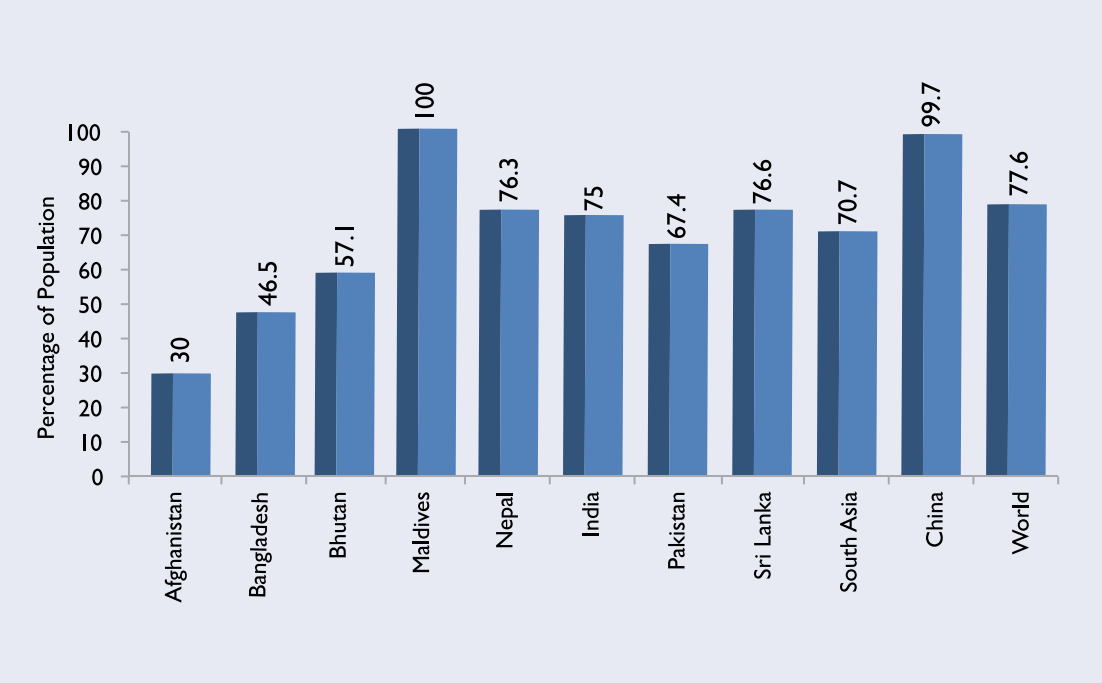
Source: World Bank, 2013.

Currently most of the SA countries are facing huge electricity supply peak deficits (Figure 2). To bridge the demand-supply gap, SA governments in cooperation with the public, private power sector players plan to invest heavily in building new generation capacities through the utilization of domestic resources an augmentation of transmission system networks, and so on. Given the current status of energy resources in each SA country, it presents a challenge as a large percentage of power in the region is generated from fossil fuel, except in Bhutan and Nepal. A two-fold increase in electricity demand through the utilization of domestic resources would also place a significant environmental burden on the region. Therefore, there is an increasing understanding among the SA governments for the need of regional cooperation for the utilization of energy resources and promotion of CBET. This calls for large-scale investment for the sustainable growth of the power sector in South Asia.

2.2 ELECTRICITY ACCESS

Electricity access is instrumental in accelerating economic growth in South Asia and improving the quality of life. The widely acknowledged linkage between energy provision and economic development has spurred governments to develop ambitious plans to increase electricity access to the remotest parts of the region. However, a significant proportion of the population continues to lack access to electricity (Figure 3) and even those with access continue to face power outages and have a poor quality of supply. This has attracted the attention of the governments and policy-makers of the region and they have come up with massive rural electrification programs to enhance the access to electricity. While these efforts are laudable, the challenges are daunting, primarily due to the magnitude of investment required to finance these projects. This calls for the need for making huge investment not only in expanding

Figure 3 Access to Electricity (2010)



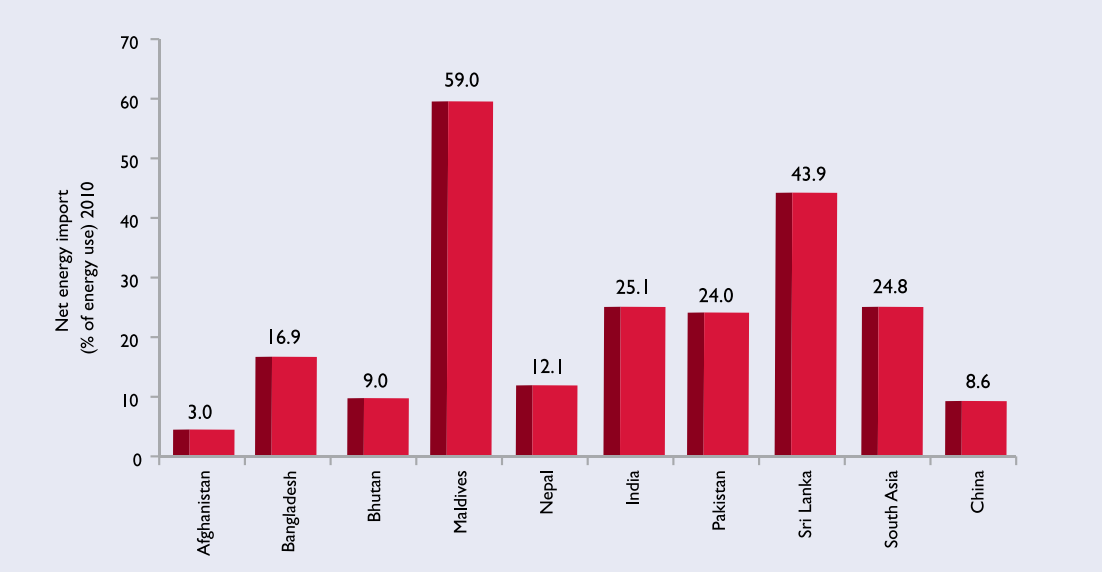
Source: USAID/SARI/EI/IRADe/Prospects for Regional Cooperation on Cross-Border Electricity Trade in South Asia, 2013.

the distribution and transmission networks but also adding fresh generation capacities to meet the additional demand for the newly-connected consumers. This demand can be met through CBET, which would eventually drive the investment.

2.3 DEPENDENCE ON FOSSIL FUEL IMPORTS

Currently most of the SA economies are hugely dependent on fossil fuel resources for electricity generation and meeting energy requirements. To meet the growing demand for energy, primarily for electricity generation, these countries are importing fossil fuel resources from other regions of the world (Figure 4). An increasing proportion of oil import is being used to run millions of diesel-based agricultural pumps and back-up electricity support due to an unreliable grid supply. Those countries with a proportionately large share of diesel-based grid-connected generation capacity (especially the Maldives, Nepal, and Sri Lanka) also face the challenge of passing on an increasing oil cost to the ultimate consumers of electricity. For example, due to the lack of domestic energy resources, Bangladesh and Sri Lanka are planning imported coal-based power plants (8,400 MW in Bangladesh by 2032 and 4,600 MW in Sri Lanka by 2030), thereby increasing their dependency on coal imports. Further, in India, coal import for power plants in 2012–13 reached 62.5 million tons (CEA, 2013b) and is expected to be around 200 MT the end of the 12th Plan (2012–2017). Import of energy resources expose these countries to the vagaries of fluctuation in prices, as this is linked to international dynamics, causing macroeconomic stress. To protect themselves from the increasing dependence on fossil fuel imports and price vulnerabilities, the South Asian nations are investing in the utilization of regional energy resources and cross-border transmission infrastructure.

Figure 4 Net Energy Import (2010) as a Percentage of Total Energy Use in South Asia



Source: World Bank, 2013.

2.4 SUSTAINABLE CLEAN ENERGY DEVELOPMENT

Energy and the environment have a close relationship. A regional thrust to clean energy development in SA would enhance the use of more hydro and renewable energy resources, thus reducing the adverse environmental impact of fossil fuels use. In the global context, this would mean an ultimate reduction in greenhouse gas emissions and mitigating the impacts of climate change. India and Sri Lanka have drawn up ambitious plans to increase the use of large-scale renewable energy resources such as biomass, wind, and solar. Bhutan and Nepal plan to tap their enormous hydropower resources. These options are now being mainstreamed and are being reflected in the national energy plans of SA countries. There is a need for a regional approach for the sustainable development of clean energy vis-à-vis the promotion of investment in renewable energy development.

2.5 SYNERGIES IN REGIONAL POWER SYSTEM DEVELOPMENT AND OPERATION

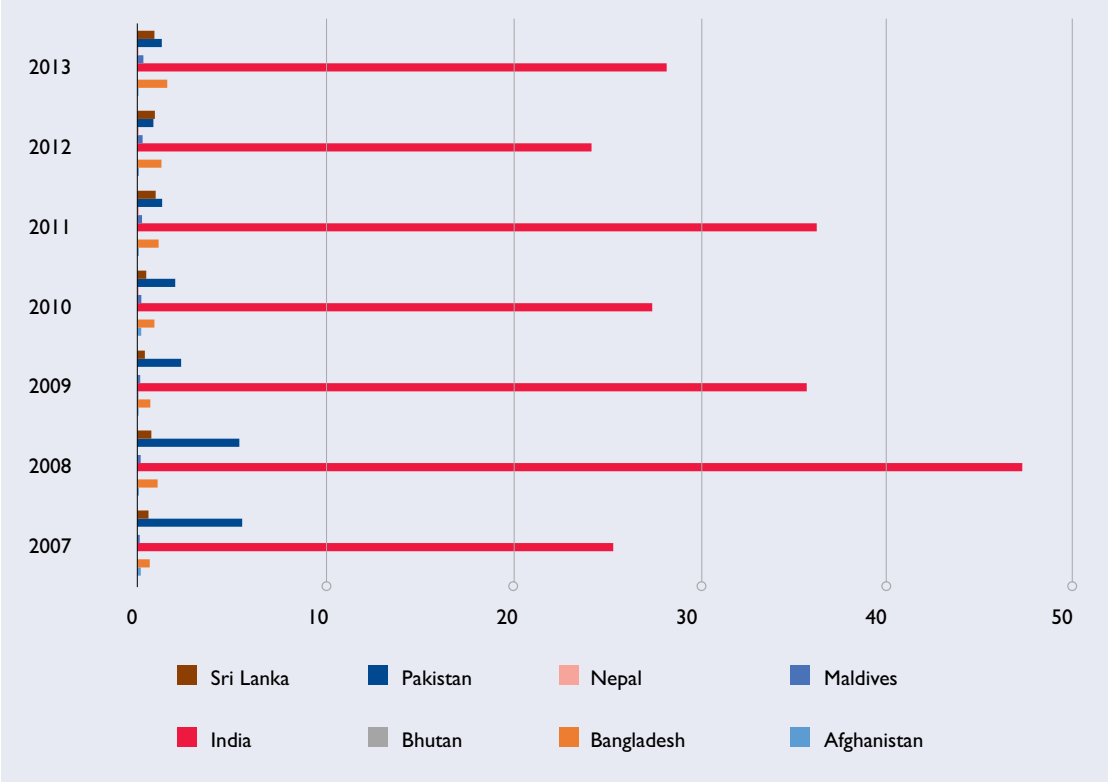
South Asia currently witnesses power shortage and has limited capacity for reserves in the national power systems of each country. As the situation improves, the regulatory requirement could necessitate each country to maintain a certain degree of reserves in their power system. Interconnected or a regional power system can significantly reduce the costs of maintaining such reserves. Further, smaller nations cannot exploit the economies of scale. By pooling cross-border electricity requirements, economies of scale in generation and investment can be utilized, thereby reducing the cost of supply to the exporting nation. SA nations can also learn from each other about energy sector reforms and policies to attract private investment, which is crucial for the long-term financial sustainability of the sector and for developing the region's energy resources.

3 INVESTMENT CLIMATE IN SOUTH ASIA POWER SECTOR

South Asia is one of the fastest growing regions in the world and is an important destination for investments. The region received significant Foreign Direct Investment (FDI) to the tune of US$ 32.51 billion in 2013, a major amount of which was received in India (28.19 billion US$) (Figure 5).

The investments in the region have, however, declined since 2013 due to the rebalancing of global portfolios in favor of advanced economies. Gross capital inflows into the region declined by 70 percent between May to August 2013 across bank loans, equity, and bond issues. Financing current deficits have become much more difficult across SA and particularly in India, where greater reliance on portfolio inflows increased the exposure to sudden changes in investor sentiment. The FDI share in total capital inflow into the region declined from 91 percent in 2008 to 31.9 percent in 2012. Lack of transparency and accountability, low returns on investments, and poor confidence on long-term sustainability, these CBET projects are rarely lucrative for private investors. However, in recent times most SA countries have shown improvements in investment.

Figure 5 **FDI Inflows in South Asia (US$ Billions)**



Source: UNCATD Statistics.

Most SA governments have initiated reforms in the domestic power sector, which led to the reorganization of the power sector to bring competition, improving operational efficiencies, encouraging private sector participation, promoting investment, open access regulation, setting up of independent regulatory institutions, encouraging renewable energy development, developing a competitive power market, and so on. The reforms have helped in moving to a more market-oriented sector and bringing more private sector investment into the power sector. For example, in India, private sector participation in the power sector has significantly increased from 17 GW in 2007 to 62 GW in 2012–13.

To promote investment in transmission and generation infrastructure for CBET projects, the key ingredients are:

- Harmonization of laws, regulation, policies, and grid codes
- Investor-friendly policies
- Commercial mechanism/frameworks such as PPAs
- Fair transmission pricing
- Access to transmission networks
- Developing effective congestion management systems
- Settlement rights, allocation of risks, and dispute resolution mechanism
- Adequate evacuation plan/infrastructures and
- Development of power market, trading, and so on

At the broader level, an intergovernmental treaty for CBET, backed by a comprehensive legal and supportive policy framework, regulations, and so on are essential for a sustainable investment environment for CBET in the long run.

Many steps have been taken by the South Asian governments bilaterally to enhance CBET in the region. Efforts are also on to promote multilateral forms of trade. Bangladesh has expressed its desire to buy power from Bhutan and Nepal. While bilateral investments are extremely important, regional investment can yield more optimal results, as from the political angle it reduces insecurities and increases the trust factor, which gets reflected in a conducive investor-friendly legal, regulatory, and policy framework. It also reduces costs.

4 SOUTH ASIA POWER SECTOR: KEY INVESTMENT CHALLENGES

There are various key challenges that affect the cross-border electricity trade vis-à-vis investment in the region. These include political consensus, harmonization of policies/regulations, adequate regional infrastructure, financial viability of the South Asian power sector, regional master plan, dispute settlement mechanisms, and so on and have been detailed in the following section.

4.1 POLITICAL CONSENSUS

A strong political consensus both at the domestic as well as regional level is important to trigger the much-needed reform process in the region in order to support and promote the regional utilization of energy resources and investment in CBET. Political commitment at the highest level is fundamental for the success of the development of regional CBET, as has been proven globally. In the recent past, the SA region was one of the most politically hostile in the world and has gone through significant transitions, which have impacted the growth of CBET and investment.

While bilateral political consensus is important, it is also extremely important to have consensus at the regional level. Recognizing this, at the regional level, the South Asia Association for Regional Cooperation (SAARC) is working on cross-border electricity trade and the creation of regional electricity market/ power exchange in South Asia. SAARC has drafted a SAARC Intergovernmental Framework Agreement for Energy Cooperation (Electricity), which is presently under discussion.

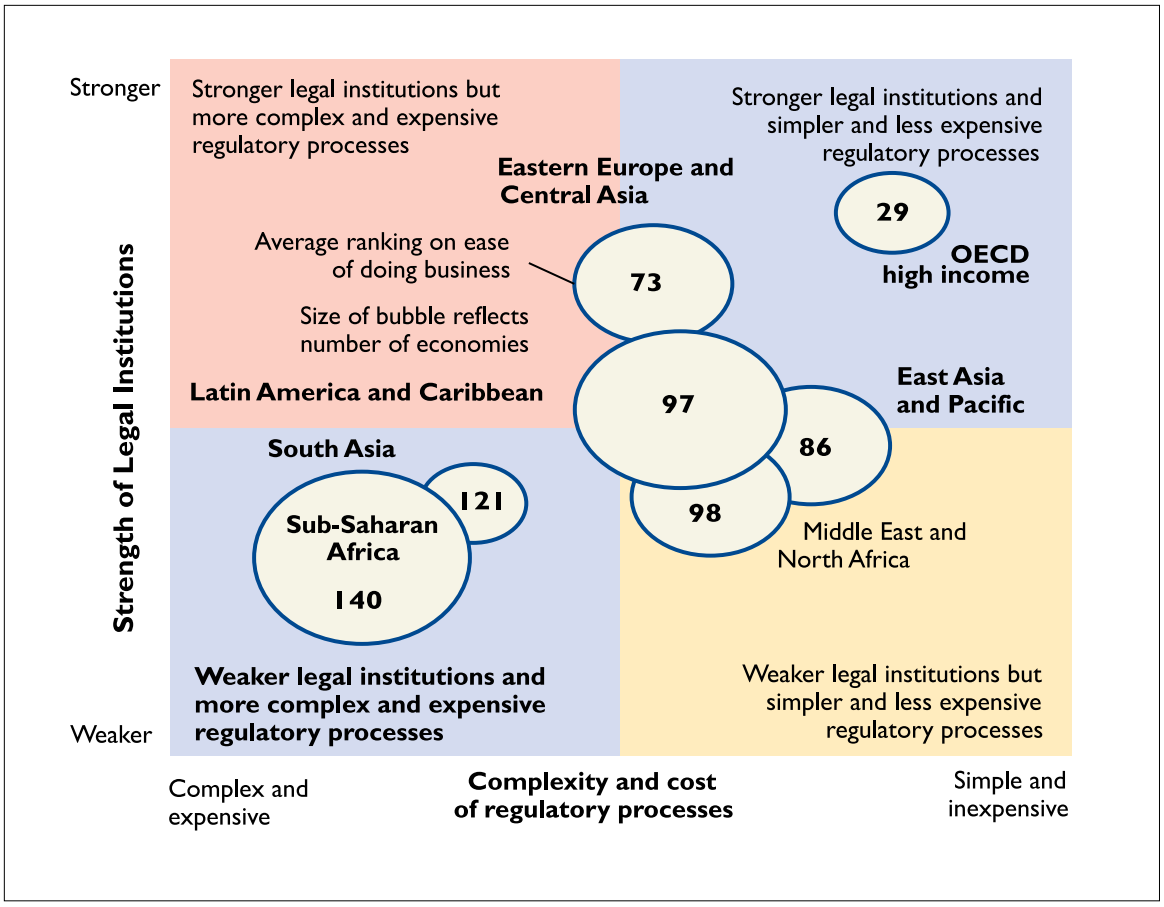
4.2. LACK OF COORDINATED/HARMONIZED POLICY, LEGAL, AND REGULATORY FRAMEWORKS

The power sectors of the SA nations are at different stages of reforms in policy, regulatory, and legal frameworks. The current policy/regulatory/legal frameworks are primarily designed with the objective of the utilization of domestic resources and therefore have limited provision for the regional utilization of energy resources and the development of CBET projects. This poses significant challenges for financial institutions, developers, and banks for making investment in the regional utilization of energy resources (in particular, hydro resources) and developing CBET projects, as currently it involves significant legal, regulatory, and policy risks. Very often these risks act as a strong barrier and get translated into higher costs for the financing of the projects, thereby making them risky and unviable.

The SA region is one of the lowest ranked regions in terms of 'ease of doing business' and it has weaker legal institutions and more complex and expensive regulatory processes as compared to other countries of the world (Figure 6). Therefore, the development of cross-border physical infrastructure and investments in cross-border power generation and transmission infrastructures requires complementary investor-friendly policies and regulatory framework, which should be evolved in the SA regional context and each participating country needs to adopt it. The legal and regulatory institutions need to be strengthened to streamline and ensure smooth regulatory approvals and compliances.

The consistent, credible, and investor-friendly policy, regulatory and legal framework in South Asia is essential for facilitating investments in cross-border power generation, transmission, and associated infrastructure.

Figure 6 **Ease of Doing Business Data Base**



Source: Doing Business Report 2013 (World Bank).

4.3 LACK OF ADEQUATE TRANSMISSION AND REGIONAL INFRASTRUCTURE

Physical transmission interconnection is a necessary pre-condition to CBET in South Asia. Currently, limited cross-border transmission interconnections exist between India-Bhutan, India-Bangladesh and, to a lesser extent, between India-Nepal. For the SA region, without creating adequate cross-border transmission interconnection, the business case for the development of hydropower/renewable resources will be difficult to achieve.

4.4 LACK OF REGIONAL POWER SECTOR MASTER PLAN

Currently, most of the generation and transmission interconnection projects are being planned bilaterally between SA countries. The lack of having a long-term regional generation and transmission master plan for CBET also hampers the investment prospects. It is globally experienced that a long-term regional generation and transmission master plan for CBET proves helpful in drawing the attention of the investor community.

4.5 FINANCIAL VIABILITY OF THE POWER SECTOR

The power sector in most SA countries is largely owned by governments. Further, the financial viability of the power utilities is largely affected by unrealistic tariffs, high T&D losses, non-transparent subsidy mechanisms, operational inefficiencies, and so on. The tariff in most of these countries is kept low and there is a large gap between the average cost of supply and the average tariff. This leads to poor operating and financial performance of the utilities, and over time, leaves them insolvent and dependent on already scarce state funds. This, in turn, impacts the investment prospects of the utilities, as they get constrained in making fresh investment in expanding and maintaining distribution networks.

Though some SA countries have introduced power sector reforms such as encouraging competition, commercialization of the sector, promoting investment, unbundling and changing ownership patterns, increasing the role of private investors, upgrading from the prevalent single-buyer model to a multi-buyer/multi-seller one, and establishing regulatory authorities to create level playing fields for all participants. But slow implementation has been an impediment to the growth of the sector. Currently most of the distribution utilities are cash strapped and operating under losses. For example, in India the accumulated losses of all the distribution utilities are estimated at INR 1.9 lakh crore[7] (US$ 31.13 billion approximately). Further, the Nepal Electricity Authority (NEA) is also running under huge losses; the net loss of NEA stands at INR 8.55 billion in 2011/2012 and INR 6.51 billion in 2010/11.[8] The Government of Nepal (GoN), as part of NEA's financial restructuring plan, decided to write off NEA's accumulated loss of over NR 27 billion as at the end of 2010/11. From the CBET point of view, the financial health of the distribution utilities (which are primary buyers of electricity) is extremely important as it affects the creditworthiness of the utilities for buying electricity.

4.6 LACK OF FUNDING

The development of cross-border electricity projects and associated transmission infrastructures is capital-intensive in nature due to a high gestation period, large scale of operations, and associated risks. Currently, such infrastructure power projects are being supported/funded largely by governments via national authorities and the public sector, but they rarely have the finances to fully sponsor such projects due to various other social responsibilities and competing priorities. This creates an undue reliance on grants and credits from the Government, international funding agencies/MDBs and investments in the power sector remain constrained. The South Asian power sector (Bangladesh, Bhutan, India, Nepal, and Sri Lanka) needs US$ 368.33 billion[9] as per its national plan and policies. To finance such huge investments requirements, there is a need to explore various alternative and innovative funding options. Moreover, most of the SA countries do not have a mature and robust financial market (India has a relatively better financial sector). Thus, the lack of robust capital markets to raise the funds poses significant challenges in terms of arranging finance for the projects.

The funding of projects are also being affected due to various risks associated with projects such as project viability, competitive tariff, return on investment, developer's credibility, forward and backward linkages, and so on.

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[7] http://powermin.nic.in/whats_new/pdf/Financial_restructuring_of_State_Distribution_Companies_discoms_Oct2012.pdf
[8] http://www.nea.org.np/images/supportive_docs/AnnualReport12.pdf
[9] For India, the investment requirement has been taken as per the 12th Five-Year Plan (2012–2017). For Bangladesh, the investment requirement has been taken for 2010–2030 as per its power system master plan. For Nepal, the investment requirement has been taken for 2013–2022. For Bhutan, the investment requirement has been taken for 2013–2020. Source: Compiled from different sources by authors.

Finally, investment in the power sector by a country also depends on its own economics and demand-supply ratios. For example, for India to purchase hydropower from Bhutan and Nepal, the cost must be competitive versus its own indigenous sources such as coal-based thermal power.

4.7 COMMERCIAL CHALLENGES AND DISPUTE SETTLEMENT

There are various commercial challenges such as payment risk and exchange rate risk that affect investment prospects. Further, there are risks associated with the restriction on foreign exchange availability, convertibility or transferability, and the level of risk arising from these potential restrictions, which may vary from country to country according to the governments' macroeconomic policy and currency availability. For CBET projects there is a need to have a regional commercial settlement framework/payment security mechanism, without which the sustainability of the projects will be affected.

Currently disputes in SA countries are being settled through mutual cooperation between parties, regulatory commission/appellate tribunals, and arbitration. However, for cross-border trade projects there is a need to have regional dispute settlement frameworks/mechanisms. In the absence of such strong regional commercial and dispute settlement mechanisms, the investment in the CBET projects remains extremely challenging.

4.8 DEVELOPERS' CONCERNS

Developers face various challenges in developing CBET projects and associated cross-border transmission infrastructure. Most South Asian countries do not have a single-window clearance for the projects and delay arises due to various administrative processes such as licensing, land use permission, right of way, environmental, social impact controls, and so on.

Developing the hydropower project in the Himalayan region poses significant challenges that include geological and hydrological uncertainty, natural calamities, non-availability of supporting infrastructures, that is, approach roads to the project sites, which may result in time overrun vis-à-vis cost overrun, thereby affecting the overall project viability and tariff. For building a transmission line, right of way is one of the biggest challenges faced by the developers in the SA region.

In the absence of single-window/strong institutional mechanisms, investments in CBET projects are extremely challenging.

4.9 HARMONIZATION OF GRID CODES AND REGIONAL SYSTEM OPERATIONAL MECHANISMS

There are issues related to the interconnection of transmission systems (AC interconnection/installation of HVDC system) across the SA nations. While AC interconnection would require harmonization of grid codes, operation protocols, standardization of equipment, system operating procedures, protection code, etc, HVDC interconnection would not require any harmonization, though it would entail significant capital cost. This cost may result in higher transmission tariffs and it may thereby become relatively uneconomical to transmit power. On the other hand, the AC system requires significant harmonization, which demands effective coordination among the power system operators of the SA countries. In the long run, there is a need to establish regional operational protocols for the safe, secure, and reliable operation of interconnected power systems and the settlement of imbalances. In the absence of such regional harmonization of grid codes and operational mechanisms, the investment in the CBET project remains to be extremely challenging.

4.10 ABSENCE OF COMPETITIVE POWER MARKETS

Currently most of the power trading among SA countries is not based purely on commercial/market principles and the tariff is based on cost plus basis/negotiated between the participating country governments. For example, between Bhutan and India, the tariff is decided jointly by the Royal Government of Bhutan (RGoB) and the Government of India (GoI). In the case of India-Bangladesh (500 MW trade), tariff for 250 MW is decided between the GoI and the RGoB and the balance 250 MW is competitive and market-based. In the long run, large-scale power trade among SA countries would, however, ultimately be decided by the sound economics that would, in turn, depend on the demand and supply situation of each SA country. Except India, most of the SA countries do not have domestic power markets/power exchange in place. India has allowed electricity trade as a commodity and two power exchanges are operating in the country. The prices get determined in a fair, efficient, robust, and quick manner and give the right price signal to investors. A regional power market/region power exchange, if established in the SA region, backed by enabling legal, regulatory, and policy provisions can provide a significant boost to the investment in CBET.

5 CROSS-BORDER ELECTRICITY TRADE: INVESTMENT OPPORTUNITIES IN SOUTH ASIAN POWER SECTOR

South Asia is the one of fastest growing regions in the world and, to sustain this growth, each of the countries in the region is expanding its power sector to meet the growing demand for electricity. SA countries have come up with long-term plans for generation, transmission, and various cross-border electricity trade projects. This has resulted in immense opportunities for investment. The World Bank estimates that at the present rate of economic growth, which is steadily widening the gap between existing and needed infrastructure, the SA countries will have to spend in the range of US$ 1.7 trillion to US$ 2.5 trillion in the decade of 2011–2020 to bring its power grids, roads, and water supplies up to the standard needed to serve their population.[10] Of this, one third will have to be spent on transport, another one-third on electricity, and the rest on water supply, sanitation, solid waste management, irrigation, and telecommunication.[11] Bangladesh, India, Nepal, Pakistan, and Sri Lanka are expected to invest around US$ 16.5 billion, US$ 468.8 billion, US$ 7 billion, US$ 96 billion, and US$ 9 billion, respectively, by 2020 in their power sector (Table 7).

Table 7 **Investment Requirement for Electricity in South Asia by 2020**

Investment Requirement for Electricity Infrastructure Development 2011–2020		
	US$ Billion	**% of GDP**
Bangladesh	16.5	1.65
India	468.8	2.71
Nepal	7	4.46
Pakistan	96	5.49
Sri Lanka	9	1.82
SAARC, All 8 Countries	603	NA

Source: Andres et al, 2013; estimates as of 2010 values.

[10]http://www.worldbank.org/en/news/press-release/2014/04/02/up-to-25-trillion-needed-south-asia-infrastructure, April 2014.
[11]Reducing Poverty by Closing South Asia's Infrastructure Gap, 2014.

5.1. BHUTAN

Bhutan's total estimated hydropower potential is around 30 GW. The Royal Government of Bhutan has embarked on developing its huge hydropower potential at various basins in the country. The RGoB has planned to harvest over 10,000 MW potential from 14 hydro projects by 2020 (Table 8). For evacuation of power from these projects, the RGoB has prepared a National Transmission Grid Master Plan (NTGMP) to meet its load growth and to export surplus power to India. The total investment required for building these projects and associated transmission systems is around US$ 12.62 billion by 2020.

The GoI and RGoB signed an umbrella agreement on 28th July, 2006, to cooperate on the development of hydropower and trade of power through both public and private sector participation. Further, the GOI has agreed to a minimum import of 5,000 MW of electricity from Bhutan by 2020.

In Bhutan, so far most of the projects are being developed primarily, through a combination of bilateral grants and concessional loans from the GoI (60 percent grant and 40 percent loan). While this model is expected to continue, the ability to accelerate the development of hydropower projects through it is limited on the account of resource constraints.[12] The sustainable hydropower development policy of Bhutan, 2008, envisages to simultaneously look for private and public sector participation in hydropower development, while the government continues to develop the projects through bilateral arrangements.

Table 8 Total Investment Requirement in Bhutan for Development of Hydropower and Associated Transmission Infrastructure

S.No.	Project Name	River Basin/Location	Implementation Mode/Remark
1	Punatsangchhu-I HEP	Punatsangchhu/Wangduephodrang	IG*/Under construction
2	Dagachhu HEP	Punatsangchhu/Trongsa	PPP/Under commissioning
3	Punatsangchhu-II HEP	Punatsangchhu/Wangduephodrang	IG/Under construction
4	Mangdechhu HEP	Mangdechhu/Trongsa	IG/Under construction
5	Amochhu Reservoir HEP	Amochhu/Samtse/Chukha	IG/DPR cleared
6	Chamkharchhu-I HEP	Mangdechhu/Zhemgang	JV/DPR under review
7	Kholongchhu HEP	Drangmechhu/Trashiyangtse	JV/DPR cleared
8	Wangchhu HEP	Wangchhu/Chukha	JV/DPR under review
9	Sunkosh Main HEP	Punatsangchhu/Lhamoizingkha	IG/DPR under review
10	Sunkosh Barrage HEP	Punatsangchhu/Lhamoizingkha	IG/DPR under review
11	Bunakha Reservoir HEP	Wangchhu/Chukha	JV/DPR cleared
12	Nikachhu HEP	Mangdechhu/Trongsa	PPP/DPR cleared
13	Kuri-Gongri HEP	Drangmechhu/Mongar	IG/DPR to begin soon
14	Bindu Khola HEP	Mongar	NA
Total			
Total investment requirement			

* NTGMP plan

[12]http://www.moea.gov.bt/documents/files/pub5wr1764ka.pdf

The Inter-Governmental Agreement between the Royal Government of Bhutan and the Government of India concerning the development of Joint Venture Hydropower Projects through the Public Sector utilities of the two Governments was signed on 22nd April, 2014, in Thimphu.[13] This agreement provides the framework for implementing four hydro electric projects (HEPs), totaling 2,120 MW (Table 9).

Table 9 Joint Venture Projects between India and Bhutan Based on Intergovernmental Agreement

Capacity and Name of HEP	JV Partners
600 MW Kholongchu HEP	SJVN Ltd. of India and Druk Green Power Corporation (DGPC) of Bhutan
180 MW Bunakha HEP (with 230 MW downstream benefit from Tala, Chukha, and Wangchu HEPs)	THDC Ltd. of India and Druk Green Power Corporation (DGPC) of Bhutan
570 MW Wangchu HEP	SJVN Ltd. of India and Druk Green Power Corporation (DGPC) of Bhutan
770 MW Chamkarchu HEP	NHPC Ltd. of India and Druk Green Power Corporation (DGPC) of Bhutan

Source: http://www.indianembassythimphu.bt/events.php?eid=41

	Installed Capacity (MW)	Expected Generation Cost (INR Cr.)*	Associated Transmission Cost (INR Cr.)	Expected Year of Commissioning
	1,200	Under implementation	Under implementation	2015
	126			
	1,020	8,160	434.1	2017
	720	5,760	905.5	2017
	540	4,320	105.1	2018
	770	6,160	586.95	2018
	600	4,800	811.45	2018
	570	4,560	53.8	2019
	2,500	20,000	296.95	2020
	85	680		
	180	1,440	104	2020
	210	1,680	147	2020
	1,800	14,400	809.9	2020
	13	104	4.75	2020
	10,334	**72,064**	**4,260**	
				76,324 (US$ 12.62 billion)

[13]http://www.indianembassythimphu.bt/events.php?eid=41

KEY OPPORTUNITIES FOR INVESTMENT

- Out of 30,000 MW of hydro potential, only 1,480 MW (that is, five percent of the total potential) has been tapped so far. Bhutan is already planning to generate more than 10,000 MW installed capacity primarily for export to India.
- The total investment required for building hydro projects and associated transmission systems is US$ 12.62 billion.
- Apart from bilateral, grant, and concessional loan-based funding from the GoI, in the long run the investment requirement will also come from the private and public sectors.
- Power sector project developers and equipment manufacturers, EPC companies can invest in developing hydropower projects and associated transmission infrastructure in Bhutan.
- In the future, there is scope for investment from other SA countries who may like to invest in developing hydropower projects in Bhutan, as power could be exported to all the SA countries through a regional power market.

5.2 NEPAL

Nepal has a significant hydro potential of 83 GW (Table 10) across various river basins, out of which only 770 MW has been tapped so far. Nepal faces acute electricity peak deficits (44 percent in 2011). The Government of Nepal (GoN) is giving priority to developing its vast hydropower reserves in order to meet its growing demand for electricity in Nepal and export to India. The GoN plans to develop 10,000 MW in 10 years and 25,000 MW in 20 years to ease out the power crisis. To meet its shortages, Nepal is currently importing electricity from India (about 746.07 MU in 2012–13). Nepal is working on various hydropower projects that are expected to export electricity to India and other SA countries in the long run. For example, discussions are under way between the GoI and GoN to jointly develop the Pancheswar project (5,600 MW), Sapat Koshi (3,330 MW), Karnali (10,800 MW), and Naumure (225 MW). Various cross-border transmissions interconnections for the evacuation of power from these hydropower projects are also under various stages of planning and construction.

Table 10 Hydropower Potential in Nepal (River Basin-wise)

River Basin	Power Potential		Total
	Major	Small	
Kosi	18,750	3,600	22,530
Gandak	17,950	2,700	20,650
Karnali (Ghagra)	28,840	3,170	32,010
Mahakali (Sarda)	3,840	0,320	4,160
Southern rivers	3,070	1,040	4,110
Total	**72,450**	**10,830**	**83,280**

Dhalkebar (Nepal)-Muzaffarpur (India), a 400 kV transmission interconnection for the evacuation of 1,200 MW, is currently under an advanced stage of completion. Contrary to most cross-border transmission interconnection projects that are developed with government funding, it is being developed on a PPP model with an investment of US$ 52 million (US$ 20 million from Nepal and US$ 32 million from India). It is expected that there will be more PPP projects through public and private sector participation.

The total investment required for the development of 10,000 MW hydropower is around US$ 7.21[14] billion. Nepal is encouraging public and private sector participation for developing its hydropower projects. For example, Satluj Jal Vidhyut Nigam Limited (SJVNL) has been awarded by the GoN to develop the Arun 3 project of 900 MW on a Build Own Operate Transfer (BOOT) basis at an estimated cost of INR 5,667 crore (approximately US$ 0.92 billion.). Similarly, the GoN has awarded the Upper Karnali project (300 MW) on a BOOT basis to a consortium consisting of the GMR group of companies and Thailand-based Italian-Thai Development Project Corporation.

For the evacuation of power from various generation projects, Nepal has also planned different transmission infrastructures networks (Tables 11a & b). It is estimated that the development of these transmission lines will require an investment of US$ 1,768.66 million.

Recently, India has announced US$ 1 billion line of credit for the development of Nepal's infrastructure, hydropower, space technology, and agriculture.

Table 11a Investment Requirements for Transmission Projects Under Construction, Planned, and Proposed

Transmission Projects Under Construction			
Project	**Km**	**Year**	**Cost, M$**
Kusum-Hapure 132 kV TL	20	2013/14	6.3
Singati-Lamasangu 132 kV TL	45	2013/14	19.5
Hetauda-Siuchatar 132kV Second Circuit	40	2013/14	2.8
Dumre-Damauli-Marsyangdii 132 kV TL	56	2014/15	18.62
Butwal-Kohalpur 132 kV Second Circuit	208	2013/14	17.3
Khimti-Dhalkebar 220 kV	75	2013/14	28
Hetauda-Bharatpur 220 kV	72	2014/15	28.5
Bharatpur-Bardghat 220 kV TL	73	2014/15	30
Kabeli 132 kV TC	70	2015/16	41
TCB 132 kV TL	28	2015/16	23
Kohalpur-Mahendranagar 132 kV 2nd Circuit	198	2015/16	20
Dhalke-Bhitta 400kV TL	40	2014/15	30
Hetauda-Dhalkebar-Duhabi 400kV TL	285	2015/16	139
Trishuli 3 B Hub-Matatirtha 220 kV TL	46	2015/16	22.7
Total	**1,256**		**426.72**

[14]Assuming 1.3 million US$ per MW at an exchange rate 60.97.

Table 11b **Investment Requirements for Transmission Projects Under Construction, Planned, and Proposed**

Transmission Projects: Planned and Proposed			
Project	**Km**	**Year**	**Cost, M$**
Ramechhap-Garjang-Khimti 132 kV TL	50	2015/16	13.5
Hapure-Tulsipur 132 kV TL	20	2015/16	4.5
Dordi 132 kV Corridor	20	2016/17	4.5
Gulmi-Lumbini 132 kV TL	30	2018/19	9.45
Dhalkebar-Loharpatti 132 kV TL	20	2018/19	9.72
Lekhnath-Damauli 220 kV TL	45	2015/16	16.88
Damauli-Bharatpur 220 kV TL	45	2016/17	22.5
Karnali132 kV Corridor	60	2015/16	20
Budhiganga-Pahalpur 132 kV TL	75	2017/18	20
Modi-Lekhnath 132 kV TL	45	2016/17	12.15
Samundratar-Trishuli 3B 132 kV TL	18	2015/16	7
Baneshwor-Bhakt 132 kV	12	2016/17	25.36
Chilime-Trishuli 220 kV TL	40	2015/16	35
Koshi 220 kV Trans Corridor	110	2016/17	90
Kali Gandaki 220 kV TC	150	2017/18	130
Marsyangdi 220 kV TC	115	2018/19	92
Marsyangdi-Kath 220 kV TL	85	2017/18	38
Tamakoshi-Kath 220 kV TL	100	2016/17	75
Solu 132 kV Trans Corridor	90	2016/17	15.75
Kohalpur-Surkhet 132 kV TL	55	2016/17	20
Gulmi-Chanauta 132 kV TL	60	2016/17	2 4
Bajhang-Attariya 132 kV TL	110	2016/17	40
Surkhet-Dail-Jumla 132 kV TL	110	2016/17	40
Kaligandaki-Jhimruk 132 kV TL	90	2016/17	36
Hetauda-Butwal 400 kV TL	190	2017/18	152.63
Lamki-Mahendra 400 kV TL	105	2021/22	84
Butwal-Lamki 400 kV TL	220	2021/22	176
Bardaghat-Gorakhpur 400 kV	40	2019/20	32
Duhabi-Jogbani 400 kV TL	20	2019/20	16
Dudhkosi 400 kV Corridor	100	2022/23	80
Total	**2,230**		**1,341.94**
Grand Total (Under Construction, Planned, and Proposed)			**1,768.66 (US$ 1.76 billion)**

Source: Nepal Electricity Authority (NEA), 2014.

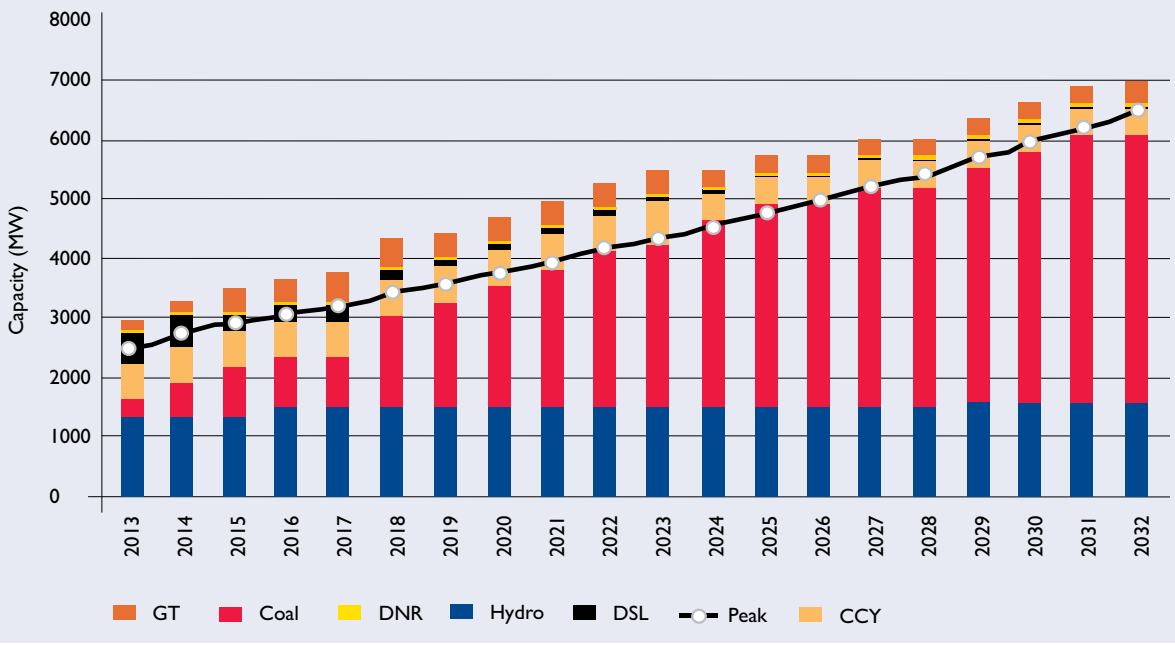
KEY OPPORTUNITIES FOR INVESTMENT

- Total investment of US$ 14.97 billion is required for developing generation and transmission infrastructure projects.
- There are plenty of opportunities for project developers and equipment manufacturers, EPC companies to invest in developing hydropower projects and associated transmission infrastructures in Nepal.
- Huge hydropower potential (83,000 MW) is available.
- The Government of Nepal plans to develop 10,000 MW in 10 years and 25,000 MW in 20 years.

5.3 SRI LANKA

Sri Lanka is one of the fastest growing economies in South Asia. During the period 2006–2010, the GDP growth in the country has been around eight percent. In 2011, Sri Lanka achieved a growth rate of 8.3 percent with a strong performance by the industry and services sectors. Sri Lanka's electricity requirement is growing at an average rate of six to eight percent annually[15] and this trend is expected to continue. In 2012, the total installed capacity of Sri Lanka was 3,334 MW and the peak demand was 2,146 MW. It is estimated that the total peak demand will be 6,461 MW by 2032.

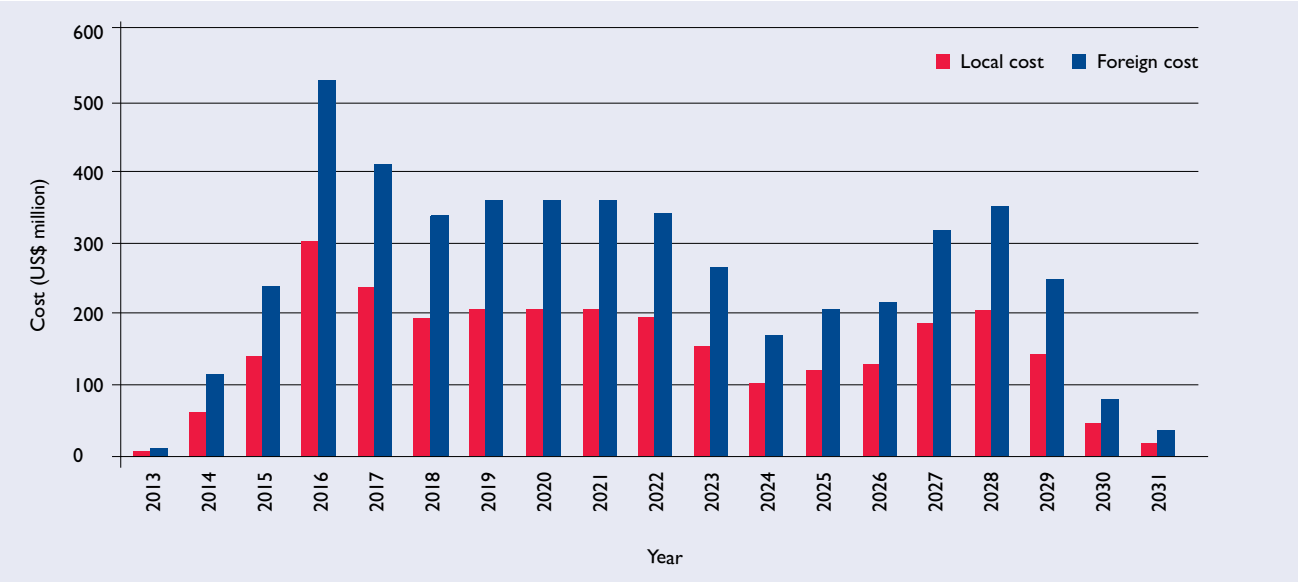
Figure 7 **Cumulative Capacity by Plant Type in the Base Case by 2032**



Source: LTGEP, Sri Lanka.

[15]http://www.pucsl.gov.lk/english/wp-content/uploads/2013/11/LTGEP%202013-2032.pdf

Figure 8 **Annual Investment Requirement for the 20-year Period from 2013 to 2032**



Source: LTGEP, Sri Lanka.

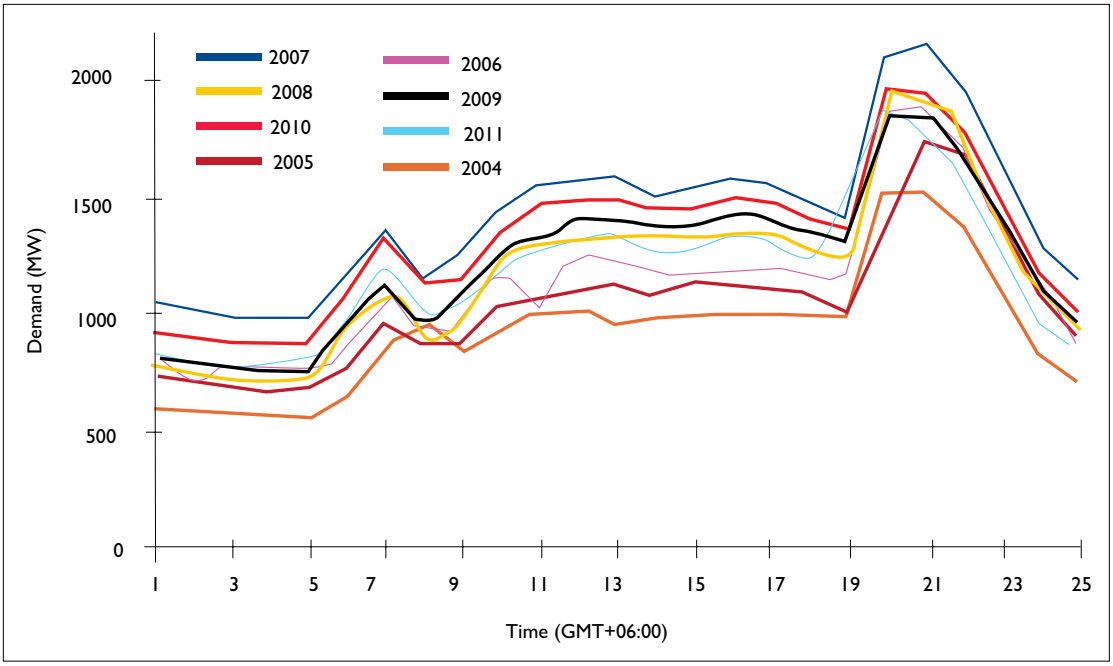
Sri Lanka is endowed with hydro resources and wind, biomass, and solar energy resources but has no proven oil, gas or coal resources. Most of the hydro resources have been tapped and over the years the share of thermal resources in the total energy mix is increasing. Though the country does not have any coal resources, it has planned to develop a 4,000 MW coal-based thermal plant by 2032 (Figure 7).

As per their Long-Term Generation Expansion Plan (LTGEP), the total investment required is approximately US$ 14.05 billion by 2032. The majority of the investment required in the next 20-year period from 2013 to 2032 is expected to come from foreign investments (Figure 8). Recognizing that most of the new capacity addition will be based on imported fossil fuel (coal), the key concerns of the country will be price volatility and environmental impacts.

Sri Lanka and India are in advance stages of discussion on a HVDC submarine link for CBET. A pre-feasibility study was conducted with the assistance of USAID under the SARI/E program by Nexant. An MoU on the feasibility study for the India-Sri Lanka Electricity Grid Interconnection was signed by the Government of Sri Lanka (GoSL), GoI, the Ceylon Electricity Board (CEB), and the Power Grid Corporation of India Limited (PGCIL) on 9th June, 2010. The estimated cost of this interconnection for 500 MW is approximately US$ 554 million.[16]

[16]Ceylon Electricity Board, Sri Lanka, 2014.

Figure 9 **Daily Load Curve of Sri Lanka**



Source: LTGEP 2013, Sri Lanka.

This interconnection will provide Sri Lanka the opportunity to enter the Indian power market for power trading and have access to electricity from relatively cheaper sources of generation in the South Asian region. Moreover, Sri Lanka has a significant evening peak, as high as 2,163 MW, whereas the off-peak demand is as low as 600 MW (Figure 9). Therefore, during the off-peak hours most of the power plants are backed down, which otherwise could be traded in SA countries if there was a physical interconnection between India and Sri Lanka.

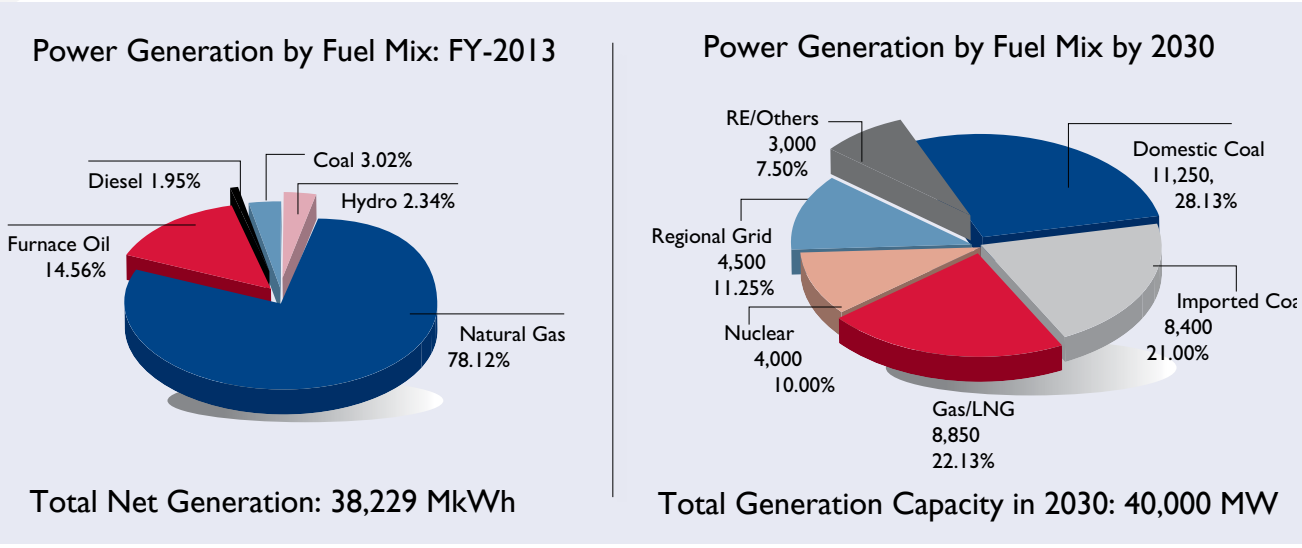
KEY OPPORTUNITIES FOR INVESTMENT

- As per the long-term generation and transmission expansion plans, a total investment of approximately US$ 14.05 billion is required by 2032.
- This expansion gives ample opportunities to investors, developers, power equipment manufacturers, cable manufacturers (particularly for the planned HVDC submarine cable between India and Sri Lanka), and so on in developing power projects and associated transmission infrastructure.

5.4 BANGLADESH

Bangladesh is rapidly growing at an average GDP growth rate of six percent in the last five years. Its current generation capacity is 8,537 MW, and most of the power generation (78 percent) is from natural gas (Figure 10). Bangladesh also faced peak shortages of around 28 percent in 2011. Bangladesh has targets for economic growth, energy security, and environmental protection as part of its vision for poverty reduction.

Figure 10 Power Generation Fuel Mix in 2013 and in 2030



Source: Power Sector Master Plan, 2010, Bangladesh.

As per the Power Sector Master Plan (PSMP), the country's demand will reach as high as 33 GW by 2030. For fulfilling this demand, it plans to add a 19,200 MW of coal-based power plant (including 8,400 MW from an imported coal-based plant) and 3,000 MW imported through CBET.

Bangladesh will require an aggregated investment of US$ 70.5 billion for developing its generation, transmission, and related infrastructure facilities over a period of 20 years (2010–2030). The annual average investment required is US$ 3.5 billion. To meet this requirement, Bangladesh has been encouraging private sector participation and it is expected that the private sector generation capacity will be more than 9,436 MW by 2030 (Table 12).

Table 12 Aggregated Investment

Executing Agency	Generation Capacity	Total Investment (Taka Billion)	Annual Average of Investment (Taka Billion)	Annual Average of Investment (US$ Million)
Generation and Transmission				
Public Sector	5,787 MW	947	47.4	681
Private Sector	9,436 MW	710	35.5	510
Public/Private Unclassified	17,600 MW	1,776	88.8	1,276
Renewable Energy and International Connection	3,611 MW	25	1.3	19
Sub-total	36,434 MW	3,456	172.8	2,483
Related Facilities		1,449	72.5	1,042
Total	**36,434 MW**	**4,905**	**245.3**	**3,525**

Source: Power Sector Master Plan, 2010, Bangladesh.

As domestic energy resources are limited and not enough to fulfill the rapid demand for electricity, it is imperative for Bangladesh to tap regional energy resources. Keeping this in mind, the country has been exploring various possibilities of building electrical interconnections with neighboring countries to import electricity.

Bangladesh has already included CBET into its power system planning and intends to import around 3,000 MW by 2030 through CBET. The 500 MW link between India and Bangladesh was commissioned on 5th October, 2013, which includes a 112 km of 400 kV double-circuit transmission line between the electrical substations at Baharampur in India and Bheramara in Bangladesh, a 400 kV switching station at Baharampur, and a 500 MW back-to-back High-Voltage Direct Current (HVDC) substation (400/230 kV) at Bheramara. An additional 500 MW is under negotiation between Bangladesh and India.

Bangladesh is in discussions with Nepal (Kishanganj-Bogra: 500 MW) and Bhutan (Alipurduar-Bogra: 500 MW) for power import. The total investment for building the above link is around US$ 200 million.[17]

Northeast India has significant hydropower potential and there are difficulties in evacuating power from this region. India and Bangladesh have agreed in principle to build transmission links to Bangladesh for the evacuation of hydropower from the northeastern part of India. For example, an 800 kV HVDC transmission line from Rangia/Rowta in Assam (NER-India) to Barapukuria/Jamalpur in Bangladesh is under consideration to transfer power from the northeastern states of India through Bangladesh. Bangladesh will draw about 500-1,000 MW from the link. This will be a win-win situation for both the countries.

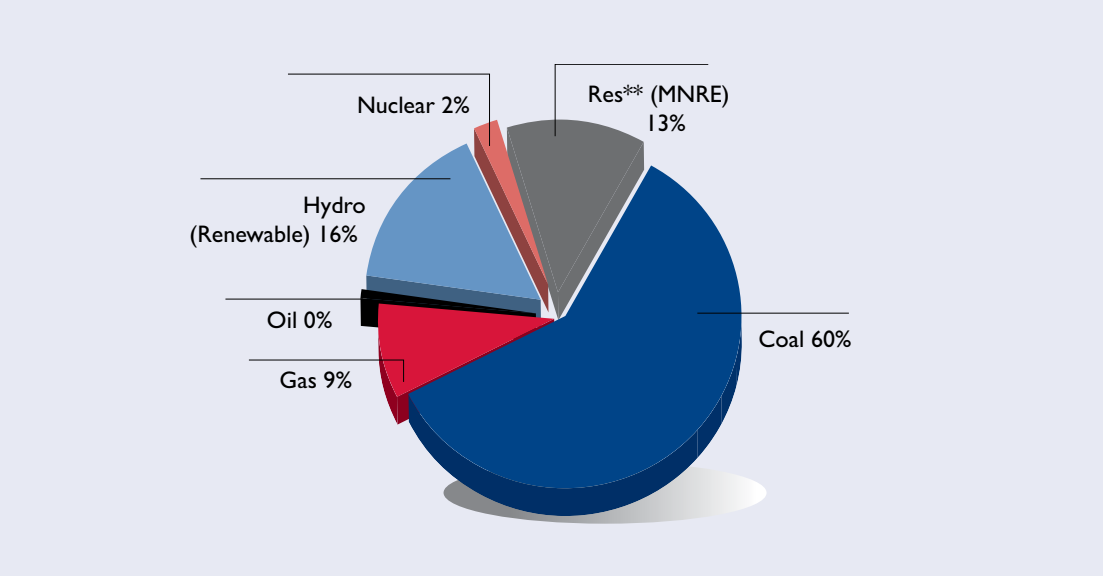
Bangladesh India Friendship Power Company Limited (BIFPCL), a Joint Venture of NTPC Limited of India and Bangladesh Power Development Board (BPDB) of Bangladesh, is developing a 1,320 MW coal-fired power station at Rampal Upazila of Bagerhat District in Khulna, Bangladesh. The BIFPCL is a 50:50 Joint Venture between NTPC and BPDB and was incorporated in Bangladesh in October 2011.

KEY OPPORTUNITIES FOR INVESTMENT

- Total US$ 70.5 billion investment is required for the development of the Bangladesh power sector by 2030.
- The Bangladesh government has already planned imports of 3,000 MW of electricity (nine percent of the total power requirement) through CBET by 2030.
- The country plans to diversify from gas-based generation and intends to build huge coal-based generation capacities (11,250 MW from domestic coal and 8,400 MW from imported coal) by 2030. This provides an immense opportunity to public and private players for investment in building thermal plants, coal-based power generation technology transfer, coal facilities such as ports, mining of domestic coal resources, and so on.

[17]Power Grid Company of Bangladesh Ltd. (PGCB), Bangladesh, 2013.

Figure 11 **India Installed Capacity: Fuel Mix**



Source: CEA.

5.5 INDIA

India is the largest economy in South Asia and is growing at seven percent GDP (2004–2013). India's power sector is also the largest power system among the South Asian countries with an installed capacity of 250 GW as of July 2014. Most of the generation comes from coal (60 percent) and is expected to continue dominating the fuel mix in the future (Figure 11).

During the 12th Plan period (2012–2017), India plans to add 88,537 MW capacity, out of which 69,280 MW will come from coal. Recognizing this concern, the GoI has planned additional renewable energy capacity addition of around 30,000 MW (5,000 MW wind, 10,000 MW solar, and 2,100 small hydro).

A total investment of INR 1,372,580 crore (US$ 253.6 billion) is required in development of the power system during the 12th Plan (Table 13).

India is facing difficulties in production of domestic coal due to various reasons. Coal demand in the country in 2011–12 was 640 million tons and there was a large demand–supply gap of 100 million tons, which was partially met by imports. It is estimated that around 25,000 MW of coal-based capacity are being sub-optimally utilized because of inadequate availability of domestic coal. The scenario is expected to remain the same and the coal shortfall could be around 200 MT by the end of the 12th Plan.

Due to a higher share of coal-based power generation, which has a high environmental impact owing to greenhouse gas emissions, India is emphasizing on clean energy development, which includes the use of its domestic source of clean energy, that is, hydro, solar, biomass, and so on, but also to explore the regional hydro resources available in Nepal and Bhutan.

Table 13 **Proposed Investment Requirements and Distribution of Funds During the 12th Plan (in INR Crore)**

Expenditure Area	Centre	State	Private	Total
Thermal	48,650	55,734	173,117	277,500
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	554,359 (in INR crore/Approx. *102.42 billion US$)			
Modernization of Plants	19,847	12,040	-	31,887
Transmission	100,000	55,000	25,000	180,000
Distribution	48,191	238,082	19,963	306,235
Energy Efficiency	7,482	-	-	7,482
Human Resources	4,108	-	-	4,108
R&D	4,168	-	-	4,168
Advance for 13th Plan	165,372	15,417	91,793	272,582
Total Investment	**INR 1,372,580 crore (US$ *253.6 billion)**			

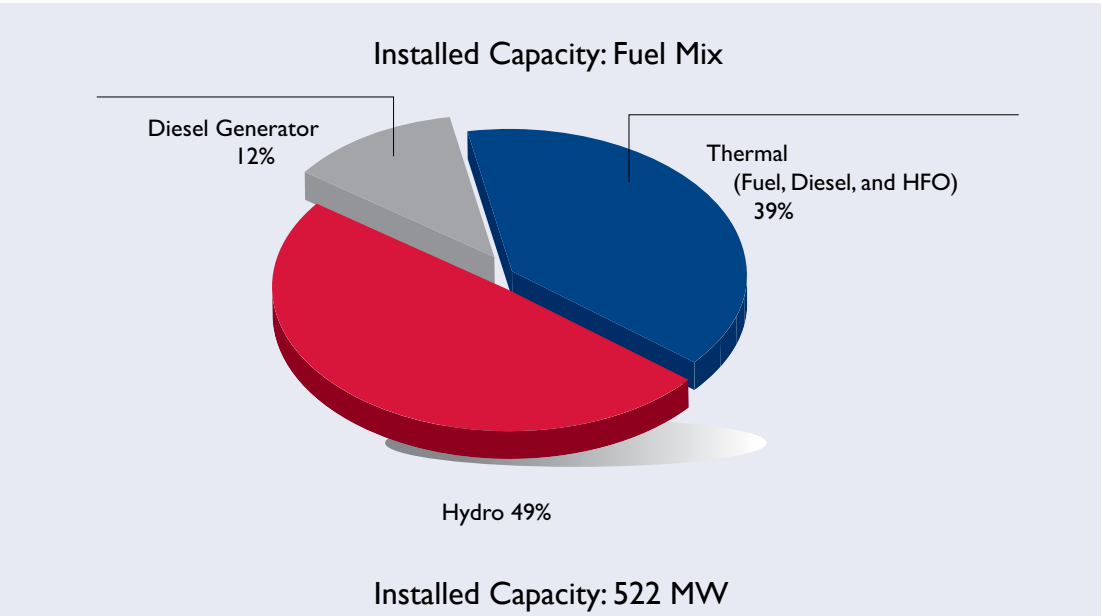
Source: Planning Commission—Report of the Working Committee on power, * At an exchange rate of 54.12 INR = 1 US$.

This will enhance hydro-thermal mix in generation, and reduce carbon emission and dependence on fossil fuels. India is already connected with the power systems of Bhutan, Nepal, and Bangladesh through various transmission links and efforts are on to have more transmission interconnections in the future.

KEY OPPORTUNITIES FOR INVESTMENT

- Total investment of INR 1,372,580 crore (US$ 253.6 billion) is required for development of the power system during the 12th Plan (Table 13).
- This will give an ample opportunitiy for investors, developers, power equipment manufacturers, and so on, in developing power projects and associated transmission infrastructure.
- The GoI, in cooperation with the GoN and RGoB, is working on developing the hydro resources in Nepal and Bhutan and associated cross-border transmission infrastructure.

Figure 12 **Installed Capacity**



Source: DABS, 2013.

5.6 AFGHANISTAN

Afghanistan is a landlocked and mountainous country that is usually designated the center or heart of Asia, connecting South and East Asia with Central and West Asia. Afghanistan has a hydropower potential of 23,000 MW. Its natural gas, petroleum, and coal reserves are estimated at around 60 billion cubic meter, 12 million tons, and 100 million tons, respectively.[18]

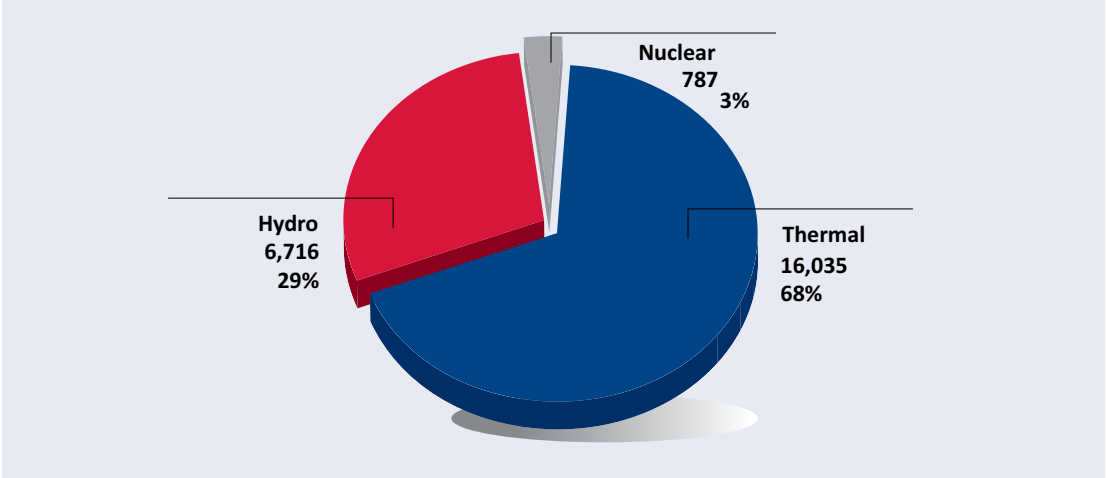
Afghanistan's current installed capacity is around 522 MW (Figure 12). Currently Afghanistan imports power from Uzbekistan, Tajikistan, Iran, and Turkmenistan. In 2011, Afghanistan imported 2,246 GWH electricity from these countries. Further, transmission links with Tajikistan and Turkmenistan are being upgraded to allow greater import of power. It is expected that the country will remain heavily dependent on imports in the short run till investments are made in domestic resource utilization.

KEY OPPORTUNITIES FOR INVESTMENT

- Opportunities for investments in the utilization of energy resources, such as 23 GW hydropower.
- Opportunities for investment in building transmission interconnections with Tajikistan, Uzbekistan, Iran, and Turkmenistan.

[18]http://www.sari-energy.org/PageFiles/What_We_Do/activities/Cross_Border_Energy_Trade_Feb_2013/Presentations/Afghanistan1.pdf

Figure 13 **Pakistan Current Installed Capacity: Fuel Mix**



Source: NEPRA, 2013.

5.7 PAKISTAN

Pakistan has vast energy resources, hydro: 59 GW, coal: 17 billion tons, natural gas: 33 TCF. Its installed capacity was around 23,538 MW[19] in 2012 (Figure 13).

According to a World Bank assessment, Pakistan needs an investment of US$ 96 billion to bridge the infrastructure gap in power sector by 2020. Pakistan currently imports about 25 MW from Iran. This is likely to increase to about 100 MW when the proposed 220 kV line is completed.

The idea of developing cross-border interconnection between India and Pakistan has been in dialogue for quite some time. This is expected to support a 500 MW electricity import from India to Pakistan via the Amritsar-Lahore interconnection.

KEY OPPORTUNITIES FOR INVESTMENT

- An investment of US$ 64-96 billion is required for developing the power sector.
- Pakistan has 59 GW of large hydro potential (only 11 per cent out of which is tapped) and 17 MT of coal resources available. There are vast untapped resources available that provide an opportunity for investment.

5.8 CENTRAL ASIA AND SOUTH ASIA COOPERATION: CASA 1000

CASA 1000 is a power transmission project to interconnect Tajikistan and the Kyrgyz Republic to Afghanistan and Pakistan. This project is providing the opportunity for the evacuation of electricity from Central Asian countries to South Asian countries and building a pan-Asian grid in the long term.

As per the ADB report, the Kyrgyz and Tajik demand-supply balance has a surplus 6,000 GWh in the near term during summer that could be extremely valuable for the summer deficit system in Afghanistan and Pakistan at first instance, and potentially to India if further interconnection between East Pakistan and India is established. The cost of the CASA project is currently calculated as US$ 893 million.[20]

[19]Source: NEPRA, 2013.
[20]Source: http://www.casa-1000.org/MainPages/CASAAbout.php, CASA-1000 presentation.

6 THE WAY FORWARD

The current SA experience in CBET in the region demonstrates the efficacy and effectiveness of the cross-border transmission interconnections and coordinated investment. Currently, most of the trade is happening on a bilateral mode and, therefore, the investments are largely being coordinated accordingly. While bilateral models are important and will continue to drive the majority of investment in the future, there is a growing realization and understanding among SA countries that a regional approach will yield more results in advancing regional CBET and bringing investment in cross-border generation and transmission system infrastructure.

International experience further strengthens the argument and in the long run supports a regional framework to promote regional investment in developing cross-border generation and transmission infrastructures and developing a competitive regional power market. These also suggest the need for a regional framework and an enabling regional institutional set-up for the long-term success of regional CBET mandated through an intergovernmental framework agreement, an intergovernmental treated, coordinated/harmonized regional policy, and regulatory and legal frameworks for promoting CBET and investments.

6.1 PROMOTING REGIONAL COOPERATION IN ELECTRICITY AND ENHANCING POLITICAL CONSENSUS IN SOUTH ASIA

SA countries have already embarked on regional cooperation in electricity for advancing CBET. This cooperation needs to be strengthened further for long-term energy security, improvement in per capita consumption of electricity & electricity access, sustaining economic growth and reducing poverty, and so on.

A comprehensive regional cooperation in electricity allows for sharing of best practices in the areas of legal, policy, regulatory, electricity infrastructure development, development of renewable energy resources, technology development, which will facilitate the faster and sustainable growth of the power sector in South Asia and advance CBET in the region.

The current level of electricity trade and cooperation is limited and bilateral in nature, though there is broad political consensus and understanding in favor of regional electricity cooperation and for promoting CBET. This can only be achieved and sustained if the governments and political representatives of the participating SA countries recognize the long-term benefits from such association and actually harness it.

In the long run, it is evident that in order to have regional electricity cooperation, there is a need to enhance political consensus for a comprehensive and integrated regional electricity cooperation in South Asia. This will help promote regional cross-border electricity trade.

6.2 SOUTH ASIA ELECTRCITY TREATY/SAARC INTERGOVERNMENTAL FRAMEWORK AGREEMENT FOR ENERGY COOPERATION (ELECTRICITY)

As the regional electricity cooperation takes formidable shape, there is a need to formalize the whole process through a South Asia electricity treaty/intergovernmental agreement that will help in minimizing the risks associated with regional investments in electricity and cross-border electricity trade. SAARC has prepared a draft intergovernmental framework agreement for energy cooperation (electricity),

which needs to be expedited. This draft agreement proposes to allow unrestricted cross-border trade of electricity on a voluntary basis, joint planning of the cross-border grid interconnections, and joint development of coordinated procedures for the secure and reliable operation of the interconnected grids of the Member States in order to prepare scheduling, dispatch, energy accounting, and settlement procedures for CBET, exempting the trade/exchange of electricity from the levy of any kind of export or import duty.

6.3 ESTABLISHING COORDINATED/HARMONIZED REGIONAL LEGAL, REGULATORY, AND POLICY FRAMEWORKS FOR PROMOTING CBET AND INVESTMENTS

Currently in South Asia, there is no coordinated/harmonized regional legal, regulatory, and policy framework for promoting CBET and investment. This poses significant challenges for financial institutions, developers, and banks for making investment in the regional utilization of energy resources (in particular, hydro resources) and developing CBET projects, as there are significant legal, regulatory, and policy risks.

In a South Asia regional context, the investment risks associated with forging an intra-regional, CBET project (generation and transmission) would be greatly minimized if each participating country adopts complementary investor-friendly, coordinated/harmonious legal, regulatory, policy framework with cross-border interconnection being an integral element. Currently, investment in cross-border generation and transmission is coordinated in a bilateral manner and project-wise, but in the future there is a need to have a regional framework to facilitate coordinated investment in generation, transmission, and regional utilization of energy resources. SA countries should hence prepare regional investment policies for promoting investment in CBET generation and transmission infrastructures.

Also, in the medium and long run, there is a need to evolve regional regulatory mechanisms and institutional arrangements to regulate CBET and promote investment. Globally many of the regional and other international electricity trade/cooperation have resulted in the formation of various regional regulatory forums/organizations such as Asia-Pacific Economic Cooperation (APEC) Energy Regulators Forum, Council of European Energy Regulators (CEER) in Europe, Energy Regulators Regional Association (ERRA) in countries of Central and Eastern Europe and the newly-independent states of Eurasia, Utility Regulators Forum (URF) in Australia and Regional Electricity Regulatory Authority (RERA) in South Africa. These regional institutional/forums have been helpful in coordinating/harmonizing regional legal, regulatory, and policy frameworks for promoting CBET and investments. In South Asia, a regional regulators association/forum needs to be formed, which will facilitates the coordination/harmonization of regional legal, regulatory, and policy frameworks in South Asia vis-à-vis CBET.

6.4 CREATION OF REGIONAL GRID MASTER PLAN FOR CBET

Currently the cross-border generation and transmission interconnections projects are being planned bilaterally between South Asian countries and there is need to have a long-term regional generation and transmission master plan to promote CBET and regional energy cooperation. SA countries need to prepare a regional grid master plan for CBET, which will also help in bringing investment in the region.

6.5 ESTABLISHING HARMONIZATION OF GRID CODES AND REGIONAL OPERATING MECHANISMS

For the smooth, optimal, secure, and reliable power system operation of CBET across the SA nations, the grid codes, power system operating procedures, protection code, metering code, connection code, planning code, system security, scheduling and dispatch, frameworks, open access, need to be coordinated and harmonized. This is presently being coordinated/harmonized bilaterally between

countries. However, there is need to evolve a regional operating mechanism/protocol/standard for the smooth, optimal, secure, and reliable power system operation of CBET across the region.

6.6 EXPLORE FINANCING MECHANISMS/OPTIONS TO PROMOTE INVESTMENT IN CBET

Mobilizing finances for capital-intensive cross-border generation and transmission interconnection projects is crucial for the success of CBET in South Asia. Although the bulk of financing comes from national governments who usually hold majority stakes in the projects, various financial institutions, multilateral development banks such as the World Bank Group (WBG) and the Asian Development Bank, and private players are investing and willing to invest more, given the right circumstances and incentives. Projects get a mix of credits and grants from multiparty consortiums, and the investors expect returns on their investments as profit, royalties, and consultation fees.

SAARC provides financing for regional projects via the SAARC Development Fund, which could be tapped to mobilize finance. Further, depending on the requirement, this fund may be strengthened with a higher amount of funding to support cross-border power projects. In July 2014, the SAARC nations have decided, in principle, to fast-track the establishment of a SAARC Development Bank for the expansion of infrastructure projects in the region.[21]

Newly-formed BRICS New Development Bank (NDB), initiated with a subscribed capital of US$ 50 billion, aimed to support infrastructure and development projects in Brazil, Russia, India, China, and South Africa. It can also be tapped to mobilize finance for CBET projects in South Asia.

6.7 PROMOTING PUBLIC/PRIVATE SECTOR INVESTMENTS

Given the massive financing requirements, public and private sector participation in CBET is essential. Most of SA countries have initiated reforms in their power sector, which has resulted in significant private sector investment. Private entities are perceived to be politically neutral, commercially motivated agencies focused on project delivery within specified timelines, which often endows them with greater credibility. However, enticing the private sector requires the establishment of clear and conducive policy regimes, including lucrative incentives, reasonable rate of re-runs, conducive taxation, and royalty regimes. Further, investments must be secured via Investor Protection Agreements, and Sovereign Guarantees should compensate investors if they incur losses due to local force majeure issues. SA countries should prepare regional investment-friendly policies for promoting public and private sector investment in CBET.

6.8 REGIONAL SETTLEMENT MECHANISM FOR CROSS-BORDER TRANSACTIONS AND DISPUTE SETTLEMENT FORUMS/MECHANISIMS

Imbalances in CBET transactions are presently being settled bilaterally between the participating countries. In the future, as the scale of trade increases, the SA countries will have to evolve a comprehensive regional mechanism for the settlement of imbalance. Similarly, the disputes in SA countries are being settled as per the arrangements mentioned in the power purchase agreements. Each SA country has its own dispute settlement mechanisms such as mutual settlement, through regulatory commission/ appellate tribunals and arbitration. However, for cross-border electricity trade projects, there is a need to have regional dispute settlement frameworks/mechanisms. In the absence of such mechanisms, investment in CBET projects will continue to remain extremely challenging. There is a need to evolve dispute settlement forums/mechanisms.

[21] http://economictimes.indiatimes.com/news/politics-and-nation/saarc-to-fast-track-development-of-regional-bank-nepal/articleshow/39535119.cms

6.9 ESTABLISHING A COMPETETIVE REGIONAL POWER MARKET IN SOUTH ASIA (SAARC MARKET FOR ELECTRICITY)

Presently CBET in South Asia is largely limited to bilateral trade, with tariffs based on cost plus, negotiated, or competitive market basis. But for long-term sustainability, there is need for a transparent and reliable regional power market, as well as domestic markets in each SA country. This requires the participation of marketing intermediaries, traders, and power exchanges to identify opportunities and coordinate with buyers, sellers, transmission system operators, and load dispatch centers. A vibrant regional power market will make the SA power sector competitive and streamline investments, making it lucrative for investors who seek fair, steady, and risk-mitigated short- and long-term returns on their capital.

Role of SARI/EI

USAID's South Asia Regional Initiative/Energy's (SARI/E) role over the past decade in advocating energy cooperation in South Asia has translated to the next phase (2012–2017) in advancing regional energy integration and cross-border electricity trade (CBET) in eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka). This current phase, titled South Asia Regional Initiative for Energy Integration (SARI/EI), is designed to build upon SARI/Energy's successful initiatives of the past to move South Asian countries towards increased regional energy security. During the five-year program, SARI/EI will promote the integration of energy systems and enhance CBET among the participating South Asian countries by focusing on the following three development outcomes through three task forces:

- Coordination of policy, legal, and regulatory frameworks (Task Force 1)
- Advancement of transmission systems interconnections (Task Force 2)
- South Asia regional electricity markets (Task Force 3)

The representatives of regional stakeholders such as national governments, power transmission utilities, electricity regulatory commissions, and power market institutions are members of the Task Forces. The Task Forces are the main drivers of the program to achieve the desired objectives of SARI/EI. They are being assisted in decision-making in order to make informed recommendations on the issues of CBET through need-based, demand-driven research and analysis. These Task Forces are working on various issues related to the harmonization and coordination of a regulatory framework, transmission systems interconnections for the import/export of power, and to establish sustainable regional electricity markets.

The Project Steering Committee (PSC) is the program's apex body and provides the overall strategic direction. The PSC comprises senior representation from the governments of South Asian countries, independent energy experts/diplomats, representatives from regional institutions such as the SAARC Energy Center, and multilateral donors such as the Asian Development Bank. The PSC provides vision, direction, and guidance for building political consensus for CBET, the creation of a South Asia Regional Electricity Market, and for strategic buy-in of the recommendations and successful implementation of the SARI/EI program.

The SARI/EI program will create the right enabling systemic conditions for a sustainable market for investment in CBET and regional utilization of energy resources in South Asian countries.

Acknowledgments

The preparation of this concept paper on 'Cross-Border Electricity Trade in South Asia: Challenges and Investment Opportunities' for the SARI/Energy Integration program would not have been possible without the valuable contribution of the multiple stakeholders involved.

We are grateful to the United States Agency for International Development (USAID) for its generous support. We would like to express our sincere thanks to Ms. Monali Zeya Hazra, Regional Program Manager, SARI/EI, for her valuable inputs and suggestions in finalizing this paper.

We express our sincere thanks to Dr. Bhupendra Kumar Singh, Director and Head, Energy Security, Confederation of Indian Industry (CII) and Ms. Shuva Raha, Deputy Director (Energy), Confederation of Indian Industry (CII), for their timely inputs and constant help.

We also acknowledge and express our appreciation for all those individuals whose names cannot be penned here but who offered invaluable insights and generous support throughout this exercise.

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For more information on the South Asia Regional Initiative for Energy Integration (SARI/EI) program, please visit the project website:

www.sari-energy.org