



Cross Border Electricity Trading in SAARC Countries

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ABSTRACT

While energy remains a key issue to socio-economic progress of any region especially in developing countries. Over the last two decades South Asia has been one of the fastest growing regions in the world with an average annual growth of 6 percent. The region has a variety of energy resources with major potential for hydropower. While India, Pakistan and Bangladesh account for major natural gas and coal resources, Bhutan and Nepal have huge hydropower resources. In spite of this there exists a wide variation in commercial energy endowments and commercial energy demand in the south Asian countries. One of the main reasons behind all these is the lack of regional cooperation in producing power from available resources. This paper examines the benefits of regional electricity cooperation in south Asia, providing a major opportunity for individual countries to address barriers to sustainable inclusive economic growth by Cross Border Electricity Trading (CBET).

KEYWORDS

Power, trade, CBET, cost, sustainable

INTRODUCTION

Almost all the countries are adopting deregulated industry structure [1,2] for better utilization of the resources and for providing choice and quality service to the consumers at economical prices [3] resulting in transparent price discovery. South Asian countries, facing challenges in efficiently meeting growing electricity demand, can benefit from increased cross-border electricity cooperation and trade by harnessing complementarities in electricity demand patterns, diversity in resource endowments for power generation, and gains from larger market access [4]. Each country in this region has different peak load timings. They may gain by better demand/supply side management by integration of power system assets. These countries continue to be characterized by low per capita consumption of energy, poor quality of energy infrastructure, skewed distribution and inaccessible and costly energy availability [5]. Today, with the opening of the electricity market, the need for bulk energy trade crossing several borders is growing year by year [6].

SAARC COUNTRIES POWER SECTOR OVERVIEW

The countries of South Asian Association for Regional Cooperation comprise of Afghanistan, Bangladesh, Bhutan, India, The Maldives, Nepal, Pakistan, and Sri Lanka are the home of 23 percent of the world population. These countries continue to be characterized by low per capita consumption of energy, poor quality of energy infrastructure, skewed distribution and inaccessible and costly energy availability[7]. Interconnection of power systems of contiguously located countries and their coordinated operation provide immense technical and economic benefits. South Asia has experienced a long period of robust economic growth and it has been among the fastest-growing in the world. Growth is projected to steadily increase from 7 percent in 2015 to 7.6 percent by 2017 through maintaining strong consumption and increasing investment. To sustain this high level of economic growth in the long run, it is imperative that the electricity sector should grow in a sustainable manner as the power is one of the fundamental input to the economic enhancement. However, despite this impressive growth in these regions more than 200 million people live in slums, and half a billion people go without electricity. Each of the country facing power shortage and poor quality of power supply due a number of factors such as

Sub-optimal utilization of both domestic as well as imported energy resources and

Inadequate investments in power sector.

This leads to high energy insecurity in these regions, thereby 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 SAARC Countries. Lack of investment in electricity generation, transmission, and distribution also inhibits development in manufacturing/industrial and other economic activities, thus limiting the GDP growth of the region. Shortage of electricity also impedes other development pursuits in the region. With the exception of Bhutan and The Maldives most other South Asian countries faces electricity deficit. Nepal faces a peak deficit of 44 % during 2011-12 whereas India, Bangladesh, and Pakistan having peak deficit of 11%, 26% and 25% during the same year. 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.

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

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

With inclusive growth, South Asia has the potential to change global poverty. But for that meeting the demand of electricity is one of the important criteria. Table 1 gives the projected demand of electricity which is expected to grow at 7.4 % 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 utili-

zation and the development of its associated electricity generation, Transmission and Distribution (T&D) infrastructures.

Per capita energy consumption of South Asian Countries is very low (563 kWh) comparing with USA (13,246 kWh) and World (2,977 kWh) Table2. Only 70% of South Asian population having access to electricity on the other hand USA and China having almost 100% access. Indicating the vast importance of development of electricity sector in the south Asian regions.

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

	Installed capacity MW	Electricity Consumption kWh Per Capita	Access to Electricity % of Population
Afghanistan	1,453 (2015)	49	30
Bangladesh	11,683 (2015)	274	46.5
Bhutan	1,614 (2015)	2,420	60
India	2,74,817 (2015)	879	75.3
Maldives	106.20 (2015)	2,283	100
Nepal	800 (2015)	103	76.3
Pakistan	22,797 (2014)	458	67.4
Sri Lanka	3,963 (2014)	449	76.6
South Asia	3,17,233	563	70.7
Compared			
China	12,90,000 approx (2015)	2,944	99.7
USA	7,90,000 approx (2014)	13,246	100
World	55,30,000 approx (2014)	2,977	78

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), that is largely untapped due to inadequate investment and development of associated transmission infrastructure for evacuation of power to the load centers. 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, is rapidly consuming its reserves and is already facing electricity shortages, with demand expected to almost triple in the next decade. Countries with large potential for hydropower generation can seize large benefits by connecting their hydropower stations to transboundary power grids and trading electricity with other nations. Possible shortcomings in terms of regional and domestic uncertainty should be addressed in designing and implementing transboundary power grids so that these impacts are prevented or mitigated[8].

Table 3 Energy Resource Endowments in South Asia

Country	Coal (million tons)	Oil (million barrels)	Natural Gas (trillion cubic feet)	Biomass (million tons)	Hydro power (GW)
Afghanistan	440	NA	15	18–27	25
Bhutan	2	0	0	26.6	30
Bangladesh	884	12	8	0.08	0.33
India	90,085	5,700	39	139	150

Maldives	0	0	0	0.06	0
Nepal	NA	0	0	27.04	83
Pakistan	17,550	324	33	NA	59
Sri Lanka	NA	150	0	12	2
Total	108,961	5,906	95	223	349.33

Source: ADB (2012).

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 Cross Border Electricity Trading (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 although the total potential for CBET is immense.

- Bangladesh and India (500 MW),
- Bhutan and India (1,416 MW), and
- Nepal and India (150 MW)

To develop the interregional power sector 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. Trans-boundary power grids in South Asia is technically feasible but the implications for domestic security may be either avoided or effectively mitigated and the issue of regional security issues should be dealt with carefully

CONCLUSIONS

The growth of power demand in South Asia is very high. Over the last two decades South Asia has been one of the fastest growing regions in the world with an average annual growth of 6 percent. While India, Pakistan and Bangladesh account for major natural gas and coal resources, Bhutan and Nepal have huge hydropower resources. In spite of this there exists a wide variation in commercial energy endowments and commercial energy demand in the south Asian countries. One of the main reasons behind all these is the lack of regional cooperation in producing power from available resources. This paper examines the benefits of regional electricity cooperation in south Asia, providing a major opportunity for individual countries to address barriers to sustainable inclusive economic growth by Cross Border Electricity Trading (CBET). CBET model will try to meet the South Asian power demand by promoting competition into the South Asian region and result in better demand and supply side management in the region.

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