

Cross Border Energy Trade in South Asia: A Potential for Greater Regional Cooperation or an Impediment?

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Abstract: *South Asia as a region shows great potential toward energy safety. Demand for electricity originating from the area is continuously increasing and the countries are producing electricity from fossil fuel based plant including other available resources posing threat to the environment. Countries like Bhutan, Nepal has huge hydropower potential. Through an assimilated market it is possible to capitalize those potential and produce electricity at lower cost by incurring lower impact on environment as well. So, if there is an integrated market for electricity trade within the region it can at least contribute to solve this issue to some extent. This paper focuses on the potential that how the cross border energy trade can allow countries to reduce their cost of production and help in plummeting the surging regional demand for it.*

Keywords: South Asia, Regional Cooperation, Energy, Bangladesh

1. Introduction

On production side, economists since Adam Smith have talked about land, labor and capital as major inputs for economic activity. However, in 19th century, the growth of industrial nations has observed a fourth major input that is energy. Again, on consumption side, in the Keynesian framework where consumption and income are significantly correlated, energy consumption in all forms drives economic productivity. It is evident worldwide that the generous use of energy especially electricity leads to economic growth and affluence which ensures expansion of the economy in terms of higher GDP. The global energy crisis in 1970s and high-level energy prices that slowed down the progress, supports the assertion that, energy consumption has a high positive correlation with economic progression. There is a wide variation in energy resource endowments and energy demand among the South Asian Countries. In this paper the author has tried to focus on the possibilities of cross border energy trade among South Asian countries which might lead to more optimal energy supply solutions for the entire region.

2. Energy Status of South Asia

It is said at present, South Asia is one of the most dynamic regions in the world but yet one of the least economically integrated area as well. Regional integration in South Asia got momentum in 2004, when the SAARC¹ countries agreed to form SAFTA², which has become a parallel initiative to

the multilateral trade liberalization commitments of the countries. However, SAARC is one of the prime institutions dealing with regional cooperation in the area on a multifaceted level. Following the Dhaka Declaration in 2004, SAARC established its own energy center SEC³ in 2006 to enhance energy cooperation among the nations but presence of several dynamic glitches ultimately made this procedure a stagnant one. Particularly, when this region is going through a phase of economic transformation from lower to higher growth, one of the biggest challenge South Asia faces is the growing demand for energy which is predicted to be doubled by the next 30 years.

The region comprising of Afghanistan, Bangladesh, Bhutan, India, Maldives, Pakistan, Nepal, and Sri Lanka, despite having an extensive variation in energy mix, accounts for low per capita electricity consumption. With the exception of Bhutan, all of them faces an electricity supply deficit due to poor distribution system. Large demand-supply gaps (Table 1) creates recurrent power interruptions inflicting a significant cost to the economy leading to a substantial loss of economic output. Per capita consumption in this region is below than world average which is about 3040 KWh per day. To meet the shortages, industrial, commercial, as well as domestic users of electricity are forced to invest in costly alternate sources of generation or storage. An increasing proportion of oil import is also being used to run diesel-based agricultural pumps and back-up electricity support due to an unreliable grid supply, passing on the oil cost to the consumers.

¹ The South Asian Association for Regional Cooperation (SAARC) established in 1985, is an economic geopolitical organization of eight countries that are primarily located in South Asia. It aims to promote welfare economics, collective self-reliance among the countries and to accelerate socio-cultural development in the region.

² South Asian Free Trade Agreement (SAFTA) has come into force since 1st July 2006 with the aim of boosting intraregional trade and welfare gains among the SAARC members though many of the clauses of the agreement are still to be implemented. There are aspirations among the policy makers about the positive impacts of SAFTA that it will enhance the existing trade which may be referred to as static gains. The dynamic gains could be even

higher than the static ones due to the possible expansion in the scale of operation by getting access to the markets of the relatively larger member countries.

³ Much needed energy cooperation in the SAARC region got formal recognition through 12th SAARC Summit when the leaders directed to conduct a study by Working Group of Energy on the concept of a South Asian Energy Ring and constituted Ministerial level Energy Forum. The Working Group in its first meeting proposed establishment of a SAARC Energy Centre to realize the concept of the regional energy ring

Table 1: Installed capacity and peak load demand of electricity in South Asian countries

Country	Installed Capacity (MW)	Demand (MW)	Per Capital Electricity Consumption (KWh/capita/year)
Afghanistan	634	No data available	140
Bangladesh	19630	9675	375
Bhutan	1632	313.94	2895
India	356100	177022	1181
Nepal	1518	1160	245
Pakistan	35,924	25,000	971
Sri Lanka	4,046	2,616	650

Sources: DABS Annual Report 2019, BPDB Annual Report 2019, BEA Annual Report 2019, NEA Annual Report 2019, NEPRA Annual Report 2019, CEB Annual Report 2018

Till recently the region followed inward looking import substitution strategies which regarded energy trade as reducing energy security by creating import dependency. As a consequence, import dependent countries faces macroeconomic stress to balance of payment ultimately leading to lower export quotient. Problems of electricity generation and distribution due to inadequate technical resources and huge financial implications points to an ideal gateway for a greater regional power cooperation in South Asia. It is high time that the policy makers realize, multilateral electricity trade can emerge as a viable long-term solution to increase the supply of energy and is critical in ensuring regional stability.

3. Hydro Energy Potential in the Region

Since electricity generation largely depends on available domestic resources, South Asia has got limited fossil fuels but ample hydro-resource potential. The production of electricity from hydropower is considered to be much more cost effective than generating from coal based power plant. Given the significant potential of hydro-electricity generation in South Asia, it is expected that this would play a major role in any future strategy for regional power sector cooperation. This region shares diversity not only in its resource endowment but also in the seasonal characteristics of supply and demand of electricity associated with the geographical proximity of the demand centers. The surplus generated by the hydro plants in Bhutan and Nepal coincides with seasonal peak demands in the supply-short countries of India and Bangladesh. Thus, it is vital to create a harmonized complementarity in energy economy based on the statement "surplus supporting scarcity". This can result in a win-win situation for both the parties if successfully carried out, as the surplus countries consider their hydroelectric resources as the major resource for meeting their energy needs and carry out the socioeconomic development programs using the export earnings. Whereas, other parties would get ample scope to increase access to energy, especially electricity to unreached localities and minimize system loss occurring from frequent power failure. There is a pure economic benefit as the trade in energy sector will not only fetch these countries revenue but could change the export composition without disturbing the traditional baskets.

Once Bhutan used to import electricity from India but the case is reverse now. In fact, electricity is currently the

principal export commodity of Bhutan. At present Bhutan's production is around 1.48 billion KW and its consumption is around 184 million KW. Being one of the smallest economies in the world it has limited options to explore for expanding the base of prosperity. But export of energy to India has helped the Bhutanese economy to grow over time. Imported electricity from Bhutan is meeting the demand of West Bengal and Assam in India and in the long run this project can be extended to the Northern power deficit areas of Bangladesh as well.

4. State of Energy Cooperation among South Asian Countries

Focusing into BBIN (Bangladesh, Bhutan, India and Nepal) electricity trade, an integrated trade will be able to support their increasing demand at a lower cost and export of unutilized surplus electricity. This will help Bhutan and Nepal to earn revenue. Moreover, India and Bangladesh will be able to meet their demand at lower cost. It will also help in reducing carbon-di-oxide emission, as countries like Bangladesh and India won't have to increase their fossil fuel based power plant. According to the study conducted by South Asia Regional Initiative for Energy Integration (SARI/EI), Bangladesh continues to import electricity from India, whereas, Bhutan and Nepal export power to India. India's exports to Bangladesh are expected to increase by 12% from 2015 to 2045 considering Bangladesh import restriction of 30% under TRADE30 scenario. Bhutan and Nepal's electricity exports to India is anticipated to increase by 11% and 43% respectively from 2015 to 2045 as both the countries plan to add significant hydro capacities in the coming decades. Bhutan is already a power surplus country (except for dry season) and Nepal is expected to be power surplus by 2025 and thereafter will be exporting significant volumes of electricity to India. A study titled "Cross-Border Electricity Trade between India and Sri Lanka: Impact on Power System Operations" was conducted by National Renewable Energy Laboratory to explore the potential of electricity trade between India and Sri Lanka. According to that, rapid expansions of wind and solar generation have the potential to increase the incentives for cross-border energy trade (CBET) between India and Sri Lanka. The study builds on several prior analyses of a potential high-voltage direct current transmission link between India and Sri Lanka.

Nepal and Bhutan already agreed to export 2000 MW of electricity to Bangladesh, 1000 MW each from Saptokoshi project in Nepal and Sankosh project in Bhutan. The grids of Nepal and Bhutan are already connected with the Indian grids and India also took initiative to place an undersea power cable to link its grid with Sri Lanka. In April 2017, Bangladesh had signed a Memorandum of Understanding with India's NTPC Vidyut Vyapar Nigam to import 500 MW of electricity from the 900 MW Upper Karnali Scheme being built by Indian developer GMR in Western Nepal. However, the parties are yet to finalize a power purchase agreement on trading electricity generated by Upper Karnali through the Indian grid. Also, energy authorities of Bangladesh and Nepal have agreed to form a committee to study the prospect of transferring solar power technologies available in Bangladesh to Nepal. So, bilateral trade

arrangements can easily graduate to efficacious multilateral trade arrangements within a regional framework.

5. Scope and Possibility of a Multilateral Framework: Lesson from the World

Bilateral trade, while very significant and a fundamental prerequisite for developing regional cooperation, sometimes might not allow for exploiting full regional potential. For this, a multilateral framework is preferred and there are many cases in the world where such multifaceted framework of interconnecting grid has developed. But a prolific model that is worth mentioning and, in some way, resembles the South Asian situation is the SAPP created in 1995. SAPP countries have a diverse mix of hydro and thermal generation plants serving a population of over 200 million, exactly like that of South Asia. It has a coordination center located in Harare, Zimbabwe, which carries out a number of functions including monitoring the operations, collecting data, undertaking planning studies and dissemination of information to members. In 2009, The World Bank and the government of Norway together formulated the SAPP Power Master Plan and subsequently assisted in capacity building. This pool has been working very satisfactorily with immense economic gain to all participating countries. It allowed each electrical utility to make savings on power plant investments and operating costs as a result of the improved use of the inter-connected system. Because reducing losses in the power system can be sometimes expensive than constructing more generation capacities.

On the same note, there has been lack of seriousness on the part of SAARC countries in initiating energy cooperation at the regional level despite of realizing the prominence. A number of useful and purposeful studies have been carried out and thought-provoking concepts have been flashed but till date nothing has been done on practical fronts. Though, in South Asia, a new dimension in the area of cooperation has been introduced as the Power Ministers of SAARC countries agreed for a "South Asian Power Grid" (SAPG) in 2014. It had been estimated that the SAARC power grid linking Bangladesh, India, Nepal, Pakistan and Sri Lanka has the potential to install at least 100,000 MW in the region for common use among its member countries. The hydroelectric power generated in North East India could be transported via Bangladesh, India to Pakistan and Afghanistan also. In this regard, a regional transmission master plan for cross-border interconnections and power trading in respective countries would assist in creating an enabling environment. Given the level of investment required, private sector participation is essential with possible public participation (under PPP set up). Again sharing of cost by the involved countries according to respective GDP proportions can also provide momentum to the funding mechanism. For interconnection projects, some cases are already present; as these projects are benefiting to various countries in the SAPP, their funding could be developed through providing proper wheeling charges and the concerned utilities could subsidize the assets if required. But for generation projects, the arrangement must be different. SAPG can be settled concentrating on huge hydroelectric potential of the region rather than general sources of power generation which would protect the nations

from both the unstable international price and import burdens. Over the years, the provision of low-cost electricity through subsidized prices played a critical role in fiscal provisions of the economies of this region. As the selling price has fallen behind the rising cost of electricity supply, government support provided to the producers in order to sustain its operation, increased the bulk electricity tariff rate. This further result to an increased electricity price.

6. Role of India

Basically, there are two broad geographic clusters, one in the western side with export needs whereas the eastern cluster with excess supply. This creates a good foundation for an integrated electricity trading, which could further link with Sri Lanka and Myanmar especially for gas imports. The western cluster may also expand the line for electricity imports to Central Asia beyond Afghanistan, Pakistan and subsequently to India. Thus the roles of India is very critical here and are expected to bridge the two clusters into a single, unified energy market with integrated electricity networks. All trade except that between Afghanistan and Pakistan, involves India as the channel for electricity transmission. The Indian experience of linking various regional grids to move to a national grid, may be emulated for building the proposed SAPG. Interested power producers and buyers in this region by connecting to the Indian electricity grid can participate in enhanced regional electricity trade and then can proceed to transfer power to third parties where feasible. In the interconnected power grid, provisions must be created to market the power available for export in excess of bilateral commitments through the regional power exchange, given proposed hourly power injection quantities and the points of injection and a normalized price. Harmonized supervisory provisions, to ensure reliable interconnected operation together with control and communication mechanisms among the non-load dispatch center of the participating countries is an important precondition for the modes of power exchange.

Apart from carrying out the usual due diligence, some issues must be thoroughly scrutinized to inform decision makers on the available options and their trade-offs which may include: selection of transmission technology, institutional, financial and regulatory issues; intergovernmental agreements. Connecting a number of disparate power systems over difficult terrain would present technical challenges. The options involving High Voltage Direct Current (HVDC) technology may minimize initial problems but these are costlier and less flexible for further expansion in comparison with the High Voltage Alternate Current (HVAC) technologies. Thus, the trade-off would need to be carefully considered and evaluated. The trade volume would increase over time and there may be a need to expand the transmission capacity. Laws may be enacted in such cases and rules under them must be issued in the relevant countries to enable the construction and operation of the project by transnational entities or their subsidiaries.

7. Spill-over Effects of the Electricity Trade

The tangible benefits of the cross-regional electricity trade

project could be significant, but the intangible ones – the multiplier effects on the non-energy sectors for further cooperation could be much larger. The possibility of substantial electricity exports may strengthen internal incentives to solve water issues among the countries and achieve the so far elusive-sustainable water sharing agreements, necessary for the completion of many large hydroelectric projects. Countries with small electricity requirement cannot develop scale-efficient power plants unless a regional approach to share such capacities brings the desired economies of scale and hence lowers the cost of electricity generation. Which is the same in case of Nepal, as we see, despite having such hydroelectricity potential only 45% of the population has access to electricity. According to Nepal Electricity Authority (NEA), Nepal is not trying to follow the Bhutan's path. Rather due to sheer size of Nepali economy, it has opened up investment for foreign investors also. An interconnected power system can also address situations arising out of natural calamities that partly or fully handicap the specific generation plants. Since energy and environment are closely related, the presence of a large coal-based generation capacity imposes increasing burden on the environment.

This region has huge amount of untapped renewable energy sources which can add dimensions in the energy trade context. Cross border electricity trade can provide market and resources to develop infrastructures to produce electricity from the potential sources. Table: 2 shows the potential sources of electricity generation in the South Asian region and amount that is economically feasible (A.K. Shukla, K. Sudhakar, P. Baredar). Although South Asian countries are not obligated to reduce the emissions of greenhouse gases but are exposed to the noxious impacts of climate change. The experience with the development of renewable energy sources like solar energy, wind energy particularly in off-grid application for remote areas and sharing of such best practices can economically benefit the region as a whole. Countries like Sri Lanka, Maldives and Bangladesh can make the best use of their vast coastal areas for generation of power and can reduce the local demand supply gap. These indirect benefits to society further push the argument for improving electricity access in this region through a pooled power grid.

Table: 2 Electricity Generation Potential

Country	Hydropower Potential (MW)	Solar Power Potential (KWh/m ² /day)	Wind Power Potential (MW)
Afghanistan	23000	6.5	67,000
Bangladesh	125	5	4614
Bhutan	22,419	5.5	761
India	1,50,000	5	102,778
Nepal	42,000	4	3000
Pakistan	59,000	5.3	131,800
Sri-Lanka	2000	5	24,000

Source: Renewable energy resources in South Asian countries: Challenges, policy and recommendations by A.K. Shukla, K. Sudhakar, P. Baredar

8. Barriers to Cross Border Energy Trade

The massive blackout which hit Bangladesh after the

collapse of the national grid on 1st November 2014 intensified that the groundwork is still inadequate for power sharing and distribution despite the fact that power generation has doubled in the last few years. The whole country plunged into darkness for the entire day. Though the authorities blamed the incident as the technical failure of internal transmission line in Bheramara, through which Bangladesh imports power from India, which led to power plants and substations shutting down but to me it was a serious failure to gauge the aftermath of the 'import' the way it was done. A question may automatically arise that, is the country equipped with enough capacities to tap the additional, imported power? Hence, without any second thought, poor regional and technical infrastructure can be considered as the major holdup for an operative SAPG. But again, these structural barriers can work as incentives towards high investment in substructure and the international agencies can play a significant role here alongside the public sector, as we see The World Bank is giving legal assistance to NEA and carrying out feasibility studies on the consequences of electricity trade. That is, in the areas of capacity building, research support, the expertise of international donors and organizations can be very useful for SAPG. Further cases include high level of non-technical losses arising from corruptions and poor monitoring. These problems can be avoided through strong inspection of the stakeholders. By setting remunerative tariffs ensuring that tariffs are cost-reflective and then denationalizing distribution companies to provide incentives to collect the due bills may be another solution. As this strategy worked well in Chile, there is no harm in trying out from South Asian perspective. Power transfer capacities between the North and the South of Pakistan and among the five electrical regions of India till recently was inadequate to enable the best utilization of the domestic generation capacities, let alone handling the transport of imported power from one part of the country to another.

Historical hostility has always frustrated the process of regional cooperation in South Asia. In addition, the government-to-government model for cross-border trade typically involves prolonged political as well as technical negotiations inducing diminishing economic gains. Recent conflicts between Nepal-India, India-Bhutan, India-Pakistan are such glaring examples. Like other commodities and services, trade in electricity is hindered by export tax, import duty and transit tax. SAFTA did not give special treatment to energy, particularly electricity trade although the signing in 2014 of the SAARC Framework Agreement for Energy Cooperation (Electricity) during 18th SAARC Summit in Kathmandu has given impetus to expanded regional power trade.

9. Conclusion

It would be fairly inappropriate to draw similarities between other parts of the world and South Asia to predict that energy will be the binding factor here for a greater cooperation. There can be a question as to why is it only energy? The simple answer is, because there is a deficit in this sector and the deficit will only multiply in the future and cooperation in the power sector presents a win-win situation for the South

Asian region as a whole as well as for the participating countries. Since possibilities are limitless and economic incentives are strong, projects are bound to takeoff. But to succeed in this initiative the countries need strong sustained political commitment and support. Because in South Asia, we often see the political economy acts as an important factor in setting policy priorities and institutional frameworks. Since access to electricity improves the quality of life in general through better quality health, education, amplified productivity and income, through fostering such mutual interests across borders, regional integration could enhance stability to 23% of the world's population and pave the way for countries to unite on urgent challenges which may aggravate the risks to sustainable growth.

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