Journal of International Affairs
Vol. 3, 119-131, 2020
Doi: https://doi.org/10.3126/joia.v3i1.29088
Department of International Relations and Diplomacy
Tribhuvan University, Kathmandu, Nepal

Power Trading in South Asia: Some Aspects of Benefits

Mahendra P. Lama

Abstract

Of having immense regional capacity of 395,096 MW as of mid-2018, South Asia is gradually emerging as a fulcrum of electricity exchange and powers trading so, bilateral exchanges are occurring, as evident in the noteworthy Bhutan-India power flow of 1,410MW. India and Bangladesh have four historic power trading practices in place and the Power Purchase Agreement of 2014 between Nepal and India, these two countries exchange up to 350 MW of electricity. All these have triggered immense possibilities opening the scope for multilateral power flows. A huge jump from the present total cross-border trading of hardly 2500 MW is very possible. Nepal could potentially be the biggest beneficiary in this game. If harnessed steadily, its power could be sold across South and South East Asia, with wheeling facilities provided by Indian national grids. A Bangladesh–Bhutan–India trilateral hydroelectric power-generation agreement is likely to be signed soon. Energy secretaries of Bangladesh and Nepal have decided to develop hydropower projects in Nepal through government-to-government investment and then export the electricity thus produced to Bangladesh through the Indian transmission system Power trade would change the composition of the export baskets of power exporting countries and help them address their adverse balance of trade and balance of payment. Additional income from power export and an enhanced level of economic activity can be invested in social infrastructure.

Keywords: Power Trading, South Asia, Disparity, Green Economy, Growth Quadrangle

Introduction

With an installed regional capacity of 395,096 MW as of mid-2018, South Asia is gradually emerging as a fulcrum of electricity exchange and power trading.[1] Bilateral exchanges are occurring, as evident in the noteworthy Bhutan-India power flow of 1,410MW. India and Bangladesh have four historic power trading practices in place. These include i) 250 MW (out of 500 MW) export from India that started in 2013; ii) An inter- national grid- inter-connection between Bheramara (Bangladesh) and Behrampur (West Bengal) in India;[2] iii) A 1,320-MW coal-based unit at Rampal in Bangladesh constructed by NTPC of India, costing 1.5 billion dollars, to be commissioned by 2017; and iv) 100 MW export to Bangladesh (Comilla) from Palatana Project in Tripura through a 400KV transmission interconnection. Besides the Power Purchase Agreement of 2014 between Nepal and India, these two countries exchange up to 350 MW of electricity.

All these have triggered immense possibilities opening the scope for multilateral power flows. A huge jump from the present total cross-border trading of hardly 2500 MW is very possible. Nepal could potentially be the biggest beneficiary in this game. If harnessed steadily, its power could be sold across South and South East Asia, with wheeling facilities provided by Indian national grids. A Bangladesh–Bhutan–India trilateral hydroelectric power-generation agreement is likely to be signed soon. Energy secretaries of Bangladesh and Nepal have decided to develop hydropower projects in Nepal through government-to-government investment and then export the electricity thus produced to Bangladesh through the Indian transmission system. Bangladesh is likely to import 500 MW from the 900 MW Upper Karnali Hydropower Project in Nepal being built by an Indian joint venture company NTPC Vidyut Vyapar Nigam (NVVN).[3] There are studies showing Bangldesh-Bhutan-India and Nepal (BBIN), an emerging sub-regionalism project, as the most potential power trading hub in eastern South Asia. This can be well established as a part of India's Act East policy and also with a view to integrating with the power pools in Greater Mekong Region of South East Asia.[4]

Islamabad SAARC Summit Declaration (2004) floated the concept of an 'energy ring'. In Kathmandu Summit (2014), leaders signed SAARC Framework Agreement for Energy Cooperation. The framework provides non-discriminatory transmission access for cross-border electricity trading. Following this, Nepal and India signed an agreement on Electric Power Trade, Cross-border Transmission Interconnection and Grid Connectivity in 2014. They also set up a joint working group for the planning and identification of cross-border interconnections.
Cross-border energy trade could lead to effective utilisation of natural resources, increase in supply reliability and make savings in capital and operating costs. Besides the optimal use of generating capacity and mutual support during contingencies, the framework addresses seasonality issues both in terms of generation and daily usability. It could also bring about large scale transformation in various sectors. It could be the single most effective confidence-building measure through the participation of multiple stakeholders to consolidate the regional

---

1 South Asia's installed capacity is likely to steadily increase to 489 GW in 2020, 782 GW in 2030 and 1,067 GW in 2014 Source: https://openknowledge.worldbank.org/handle/10986/22224 as quoted in https://sari-energy.org/wp-content/uploads/2018/05/ppt.pdf

2 Bangladesh-India Electrical Grid Interconnection Project, Project Number: 44203-012, Technical Assistance Number: 7542; August 2015 Asian Development Bank, Manila.

3 http://kathmandupost.ekantipur.com/news/2018-12-05/nepal-bangladesh-agree-to-build-hydro-projects.html)

4 Lama, Mahendra P, Venkatachalam Anbumozhi and Ichiro Kutani *Energising Connectivity between Northeast India and its Neighbours*, Economic Research Institute for ASEAN and East Asia, Jakarta, 2019

cooperation and integration process. In all these arrangements, India, as a transit provider, will also be the pivot. This is a non-traditional role for India, which sharply deviates from the roles of a producer and exporter.

India's CBET Guidelines[5]: a major breakthrough

India's Central Electricity Regulatory Commission (CERC) has, for the first time, designed and floated its Guidelines for Import / Export (Cross Border) of Electricity- 2018. This emerged out of a protracted discussion on an earlier draft regulation- CBET Regulations 2017- at various stakeholder levels on a cross-border basis. All the three affected countries- Bangladesh, Bhutan and Nepal- had expressed their reservations and questioned the eligibility conditions imposed on participating entities, as mentioned in this draft. Certain conditions, such as the requirement for power projects in countries like Bangladesh, Bhutan and Nepal to be at least 51 per cent owned or funded by Indian investors in order to be eligible to export power to India, puts severe restrictions on Bhutan, Nepal and other power-generating countries that are trying to attract investment from multiple private, regional and global sources with the aim of exporting power to India and other neighbouring countries.

These were all taken into consideration and the 2018 document was issued. The very fact that such a framework is now in place inspires a range of stakeholders that are keen on power generation and its cross border transmission and distribution. Initiatives taken by the Bangladesh government in engaging with their counterpart in Bhutan and Nepal do indicate that there is a strong possibility, and acceptance on the part of India to permit the use of its grids, for multiple trans- border energy flows and exchanges. In fact, this essentially bilateral framework could be a stepping a stone to graduate to trilateral and multilateral frameworks for use in the BBIN subregion It could then be extended to other neighbouring countries in South Asia and beyond.

These guidelines mention four crucial objectives: i) to facilitate import/ export of electricity between India and neighbouring countries; ii) to develop a dynamic and robust infrastructure for import/ export of electricity; iii) to promote transparency, consistency and predictability in the regulatory mechanism pertaining to import/ export of electricity in India; and iv) to ensure reliable grid operation and transmission of electricity for import/ export.

The guidelines allow import of electricity by Indian entities from the generation projects located in neighbouring country(ies) directly or through Government or a Government Company or a licensed trader of that country after taking approval of the Designated Authority, provided that the generation project(s) has the permission to export power to India from the respective Government of the neighbouring country. In the case of import through a bilateral agreement between two countries, the Government of India may designate an Entity for such import of power. Similarly, on the export front, generating Companies/ Distribution Companies of India may export electricity generated by coal or renewable energy or hydropower, to Entities of neighbouring country(ies) directly or through trading licensee(s) of India, after taking approval of the Designated Authority. However, in the case of electricity generated from coal based plants, export from India by a generating company/ distribution licensee directly or through trading licensee shall be allowed only where such electricity is generated utilizing imported coal or spot e-auction coal or coal obtained from commercial mining. In the case of export through

5 https://powermin.nic.in/sites/default/files/uploads/Guidelines_for_ImportExport_Cross%20Border_of_Electricity_2018.pdf

bilateral agreement between two countries, the Government of India may designate an Entity for such export of power. Any Indian power trader may, after obtaining approval from the Designated Authority, trade in Indian Power Exchanges on behalf of any entity of neighbouring country, for a specified quantum as provided in the Approval and complying with CERC Regulations.

Electricity import/ export by Indian entities shall be governed by the rules/ regulations and policies framed and notified by Government of India / Central Electricity Authority (CEA)/ Central Electricity Regulatory Commission (CERC) and the appropriate State Electricity Regulatory Commission(s). Ministry of Power, Government of India shall appoint a Designated Authority for facilitating the process of approval and laying down the procedure for import/ export of electricity. This Authority shall coordinate with the respective authority of the neighbouring country for all purposes including planning, monitoring and commissioning of transmission lines for import/ export of electricity; grid security, safety and operation and any other function.

There have been protracted sensitisation and preparations at the regional level regarding multilateral power trading. The technical and professional organisations responsible for generation, transmission and distribution have met several times to work on both short- and long-term possibilities. Petrobangla, Bangladesh Power Development Board, Power Grid and Power Trading Corporations of India and the electricity and regulatory authorities of Nepal, Sri Lanka and Pakistan have become the key stakeholders. International agencies like World Bank, ESCAP, Asian Development Bank, USAID (SARI-E initiatives), ERIA in Jakarta, UNDP and think tanks and universities like Jawaharlal Nehru University in India, The Energy Research Institute in New Delhi, Centre for Policy Dialogue in Bangladesh, Institute of Integrated Development Studies in Nepal. Sustainable Development Policy Institute and Pakistan Institute of Development Economics and Quaid-i-Azam University in Pakistan have also been fairly active. Several training programmes and capacity-building projects have been conducted at various levels. Many forward-looking and comprehensive studies are in place.

Cross border power trade will:
i) make importing countries less vulnerable to volatile international energy prices and increase harnessing of renewables, contribute to CO2 reduction and protect environment;
(ii) lead to effective utilization of natural resources, optimisation of generation mix and economies of scale in energy production;
(iii) increase reliability of power supply and mitigate seasonality gaps and improve energy security;
iv) enhance access to cheaper and competitive sources of power and reduce load-shedding blackouts, enhance socio-economic efficiency including in health, education and livelihood;
v) lead to economy in operation and mutual support during contingencies;
(vi) inject modernisation and expansion of power infrastructure and build institutional capacity in the electricity sector;
vii) bring about large scale transformation in various sectors contributing to economic growth and macro level benefits;
viii) introduce a new item in the export basket thus adding a new source of foreign exchange;
ix) lead to less exposure to trans-border environmental injuries- including water insecurity and disasters like floods- if hydel power dam construction is regionally coordinated; and

(x) act as the single most effective confidence building measure through the participation of multiple stakeholders.[6]

South Asian countries that constitute one-fifth of the global population have targeted 'electricity for all' deadlines and have accordingly strategised the attainment of such goals that mostly focus on rural electrification, rural enterprises including agricultural activities and equitable renewable energy resource distribution.[7] Provisions of open access from both within and outside the country figure in their respective policies. This drives them to seek and engage with cross border sources. In the process, to deal with the logistical challenges and to provide decentralized energy solutions, these countries have devised other means including grid extension and even off-grid systems, like stand alone home systems for dispersed communities; pico-solar devices[8] and even mini-grids that provide great transformational potential.[9]

Farm Yield Gains

Electricity availability will provide added opportunities for countries to diversify the livelihood options of their vulnerable communities. With over 75 per cent of the population concentrated in rural areas in South Asia, where agriculture is the mainstay of livelihood, vulnerability to food security and poverty remain critical issues. At least one-fifth of South Asia's population continues to remain undernourished. India with its 190 million undernourished stands out prominently, ranking 100th among 117 countries in IFPRI's Global Hunger Index prepared.[10] A World Bank study[11] shows per capita growth in agriculture productivity- East Asia and Pacific (3.1 per cent), Latin America (2.8 per cent) and South Asia (2 per cent). In Bangladesh, by 2050, rice and wheat yield might drop by eight per cent and 32 per cent, respectively.[12] However, wherever (like in India's Punjab and Haryana) there is easy access to electricity, along with other critical inputs, the yield per hectare has been much higher. Here, the water-energy-food nexus is much obvious. Uttar Pradesh, Punjab and Haryana, constituting about 21 per cent total population and 10.13 per cent of total geographical area, account for 72.17 per

---

6 World Bank Study states that "trust building around electricity trading is possible even between countries with a history of conflict. In several of the case studies, there is a history of regional conflict. The nature of the trouble was not necessarily at the border but sometimes internal conflict (and hence a potential source of supply risk for international partners). In the case of SAPP and ECSEE there have been cross-border conflicts in the past. Broader free trade arrangements among countries also can support the establishment of the trust required to expand regional power cooperation." World Bank, *The Benefits of Expanding Cross-Border Electricity Cooperation and Trade in South Asia,* Final Report, World Bank Project Number P143029, 2016

7 Bangladesh- Electricity for all by 2020 ; Bhutan by 2013; India- by 2017; Nepal- by 2027 and Sri Lanka by 2015

8 This uses small compact and light-weight solar photovoltaic panels to generate a few watts of power for a wide range of small and portable applications.

9 UNCTAD, *The Least Developed Countries Report 2017 : Transformational Energy Access*, United Nations Conference on Trade and Development, New York and Geneva, 2017

10 The State of Food Security and Nutrition Report (UNICEF, 2017) and https://www.ifpri.org/publication/2017-global-hunger-index-inequalities-hunger

11 World Bank. 2009. South Asia: Shared views on development and climate change. Washington, D.C.: The World Bank

12 Faisal, I.M. and S. Parveen. 2004, "Food security in the face of climate change, population growth and resource constraints: Implications for Bangladesh." Environmental Management 34: 487-98.

cent of the total wheat production in the country. Electricity access could, therefore, help bridge the yield gap.[13]

On the other hand, in Nepal it is found that increasing non-farm activities, because of economic diversification and remittances induced income growth, have both triggered increase in employment and real wages in the non-farm sector.[14] This has had an impact on poverty reduction.[15] However, there is also a decline in the share of the manufacturing sector in its GDP, which could lead to a falling into the poverty trap for also those who have moved out of it. The stagnant manufacturing sector is largely attributed to unprecedented power shortage in the country in the last decade or so.

Access to electricity has multiple cascading effects, varying from productive employment and income generating enterprises to social implications like reduction in school drop-out rates of female students and lower consumption of biomass and fuel-wood. The time devoted to carrying water and fuel-wood and fodder by women, and the subsequent smoke-based pollution, could largely be mitigated with access to electricity. Rural farmers getting can then access information technology to acquire quicker and more reliable access to farm gates and the market mechanism. Construction of power generating projects could themselves lead to development of physical and social infrastructures like roads, transport, communication, schools, health care services including vaccine refrigeration, drinking water and other auxiliary benefits like increased market access and reduced commodity prices. For instance, a UNDP study found that in Nepal's Baglung and Kavre Districts, the benefits attributable to electricity access amounted to about 150 US dollars per year for a rural household.[16]

Disparity and Conflict

Accessibility to electricity will boost agricultural productivity triggering a range of off-farm activities. It slows down the process of rural to urban migration and the socio-political instability emanating from it. Economic development and its attendant spin-off benefits, like food security, better health and higher literacy rate, would be the other gains. Socio-political instability, tension and insurgencies that have plagued the region could mostly be attributed to resource disparity, poverty and economic inequalities. Regional inequalities and underdevelopment has been a major source of internal conflicts. Removal of regional disparity, mediated through electricity supply, reduces internal stress and promotes better governance, as it energizes the entire socio-economic process. Rural electrification accelerates economic development and creates markets, which in turn cause interactions among villagers and between villagers the urban population. New relationships develop among rural-urban and various ethnic groups indirectly, which contribute to the process of social integration.

Project Site Impact

---

13 Lama, Mahendra P, *Human Security in India : Discourse, Practices and Policy Implications,* University Press Limited, Dhaka, 2010

14 Tiwari, Sailesh, "Moving up the ladder : Poverty reduction and social mobility in Nepal" in Bishnu Dev Pant, Nayan Krishna Joshi and Pramod Rijal (eds) *Selected Essays on Nepali Economy*, Institute of Integrated Development Studies & Kathmandu University, Kathmandu, 2017

15 Its absolute poverty rate had steadily declined to 25.2 per cent by 2016.

16 Legros, Gwénaëlle, Kamal Rijal , and Bahareh Seyedi, Decentralized Energy Access and the Millennium Development Goals: An analysis of the development benefits of micro-hydropower in rural Nepal. Warwickshire, UK: Practical Action Publishing Ltd, 2011.

A recent study by CUTS (Consumer Unity and Trust Society) [17] found that in the surveyed districts around the hydel project sites of Tala in Bhutan and Rahughat in Nepal, approximately 61 per cent of households have access to mobile phones[18], 87 per cent in the villages of Myagdi District were free from open defecation practices, 95 per cent in the villages of Chukha District had access to improved sanitation and 81 per cent in Myagdi District had access to tap water. Literacy rate has also been recorded to be significantly high (66 per cent in Myagdi District and 63 per cent in Chukha District). With access to electricity, enrolment of girls was also seen to increase sharply, the burden of household chores reduced, including cooking as they could use electric rice cookers and other such appliances. In Chukha District, some were even seen to use electric fencing to guard their crops from wild animals. They shifted to farming commercial crops from traditional maize farming to ginger, cardamom and dairy products.

Access to electricity could blunt the impact of climate change on people's health conditions, at least some of its sharp edges of the impact on vulnerable communities. Khatun and Hossain,[19] while citing other studies, state that increase in the frequency and duration of heat waves due to climate change is likely to increase the risk of mortality and morbidity, especially among the aged and urban poor populations in tropical Asia (Hales et al. 2003).[20] For instance, in Bangladesh, studies show that a large number of heat-related deaths among vulnerable groups, such as the poor, the elderly and the labourers (rickshaw pullers and farmers), are already evident.[21] These risks of health hazards are expected to be more acute in South Asia by 2030.[22].

Green Economy

Many of these countries are also promoting bio fuels[23], as a new vehicle of energy security. However, there are questions on three counts, i) their impact on food security- production, prices, availability, ii) their sustainability in terms of cost effectiveness and fertile land availability, water use and biodiversity management and soil conditions and iii) their yet to be known impact on GHG emissions and climate change.[24]

On the other hand, South Asia's quest for a 'green economy' based on green strategies, including increasing dependence on renewable sources of energy and low carbon pathways, also

---

17 CUTS, *Cross Border Electricity Trade – Mapping Socio-Economic Impacts*; Consumer Unity & Trust Society, Jaipur, India, 2017

18 National Population and Housing Census 2011, reported on March 2014. Central Bureau Statistics 2016, Bhutan

19 Khatun, Fahmida and Samina Hossain, 2012, *Adapting to climate change: Issues for South Asia.* x+52. South Asia Watch on Trade, Economics and Environment (SAWTEE), Kathmandu

20 Hales, S., S. Edwards and R. S. Kovats. 2003. "Impacts on health of climate extremes." McMichael, A.J., D. Campbell-Lendrum, S. Kovats, S. Edwards, P. Wilkinson, T. Wilson, R. Nicholls and co-authors. 2004. "Global climate change". In M. Ezzati, A. Lopez, A. Rodgers and C. Murray (eds.), Comparative quantification of health risks: Global and regional burden of disease due to selected major risk factors. Geneva: World Health Organization.

21 Lal, M. 2003: "Global climate change: India's monsoon and its variability." Journal of Environmental Studies and Policy 6: 1-34

22 McMichael, A.J., et al 2004.

23 Mainly 'blending of bio fuels with liquid petroleum fuels like ethanol with petrol and biodiesel with petro-diesel for the transport sector'

24 Bandyopadhyay, Kaushik Ranjan and Kasturi Das. 2012. Biofuels in South Asia: Food security challenges and beyond; South Asia Watch on Trade, Economics, and Environment (SAWTEE), Kathmandu

provides ample space for power trading. India's predominance (91 per cent) in the commercial (coal and oil based) energy consumption in the region, and dependence of countries like Maldives (100 per cent), Sri Lanka (82 per cent), Nepal (70 per cent), and Pakistan (48 per cent) on these two fuel sources, in fact, could be a formidable a challenge to move towards renewables. Investment in renewables along the the line of 'climate investment', therefore, stands out to be a critical facilitator.[25] However, if the current trends continue, CO_2 emissions in South Asian countries are likely to more than triple by 2050. Given the current fossil-fuel intensive path they have taken, if no efforts to mitigate climate change continue, these countries will lose up to 1.8 per cent of their collective economy every year by 2050, and up to 8.8 per cent every year until 2100."[26]

South Asia Growth Quadrangle

A NEXANT-USAID study[27] had concluded that major technical, economic and social benefits would accrue to the South Asia Growth Quadrangle (SAGQ) countries (India, Nepal, Bangladesh and Bhutan) from power trading. Nepal's industrial sector lost 24.7 million US dollars annually due to poor power quality. This translates into 4.43 per cent of the industrial sector GDP or 0.47 per cent of the national GDP. The study findings indicate that in the industrial sector, losses attributable to unplanned interruptions averaged 0.49 dollars/kWh, while those from planned outages were 0.14 dollars/kWh. Power outages in Bangladesh cost about one billion dollars a year and reduce GDP growth by about 0.5 percentage point. It further found that interconnecting the four power grids would reduce the T&D losses by 90 MW thus resulting in a saving of 79.12 million US dollars in fresh investment for new capacity addition. Some of the border areas of these countries could be better served by interconnecting them with the grid substations of the neighboring country. Such interconnections would reduce the losses further. A loss reduction of an additional 50 MW by such interconnections would enhance the total saving to the level of 123.08 million US dollars.

Power trade would change the composition of the export baskets of power exporting countries and help them address their adverse balance of trade and balance of payment. Additional income from power export and an enhanced level of economic activity can be invested in social infrastructure.

It was found that land ownership in Bangladesh is less skewed in the electrified than in the non-electrified villages. The bottom 40 per cent of the electrified households owns 3.7 per cent of total cultivable land, whereas the bottom 40 per cent of the households in non-electrified villages owns only 1.6 per cent. Similar changes were evident in the ownership of other capital assets: dwelling/non-dwelling rooms, agricultural equipment and household durables. It further found that the population growth rate in the electrified households is less than that in the non-electrified ones. This is evident from the relatively low total fertility rate of electrified households as compared to the non-electrified segment. Migration to electrified villages is much pronounced due to the access to electricity and associated modern amenities of life.

---

25 Mishra, Arabinda, Shailly Kedia, and Madhumita Mishra. 2014. *Green Economy in South Asia: Challenges and Opportunities*. Kathmandu: South Asia Watch on Trade, Economics and Environment, (SAWTEE).

26 "Energy Outlook for Asia and the Pacific 2010-2035," ADB. October 14, 2014.

27 Study conducted by Mahendra P Lama (India), Abul Barkat (Bangladesh) and Suresh Chalise (Nepal) Economic and Social Benefits Analysis of Power Trade in the South Asia Growth Quadrangle Region September 2004, Nexant-USAID SARI/Energy Program

An addition of 150 MW power to the system in Nepal could generate considerable additional employment, particularly in rural areas. It is estimated that 55,000 persons will be involved in farmlands using electrified irrigation equipment. Some 49,191 persons will be employed in rural industries and 42,431 persons will be employed in shops. Electricity is the basic infrastructure requirement for promoting tourism. A survey of mountaineers conducted in Nepal during 1978-1993 revealed that each mountaineer gives employment to more than 10 local persons. Over 106,638 tourists visited Nepal in 2,000 for mountaineering and trekking purposes. This provided direct and indirect employment to 1,066,380 persons. As compared to 1978, when 42 mountaineering expedition teams fetched Nepal Rs 0.614 million as royalty, 1995 recorded the visit of 91 expeditions contributing Rs 37.30 million as royalty to the Nepalese exchequer. Almost all the tourists, numbering 7,162, who visited Bhutan in 1999 for trekking and mountaineering, would have provided employment to over 70,000 local people.

Socio-Economic Gains from India-Pakistan interconnections

A comprehensive study[28] conducted by professionals from India and Pakistan for USAID in 2005 on "Assessment of Economic and Social Benefits of Power Trade Between India and Pakistan" revealed a huge chain of benefits cutting across various sectors and issues. If Pakistan were to sell 3,000 MW of power to India it concluded that:

"i) it could earn an annual net profit of 160 million US dollars at a selling price of 2.86 Indian rupees per unit after deducting fixed and transmission costs. It would gain an additional 300 million dollars through a parallel 10 per cent decrease in defense expenditure, due to improved relations with India. Thus, the direct savings to Pakistan would be 460 million dollars a year. India would also benefit from gaining access to lower cost power and improved system reliability.

ii) Even if Pakistan were to spend only half of the aforementioned 460 million dollars on education, it could radically transform its educational sector. By spending these funds on primary education, an estimated 27,600 new schools could be built. With 200 students in each school, 5.52 million more children could be enrolled annually. Assigning five teachers to each school would employ 138,000 new teachers and constructing new buildings would employ thousands of skilled and unskilled workers from economically depressed rural areas.

iii) Using its savings to install basic infrastructure would also improve teacher attendance in rural schools and colleges and end the local "ghost school" phenomenon. As a result, the current school dropout rate of about 40 per cent would likely decline significantly.

iv) As an alternative option, assuming that 230 million US dollars (half of the US$ 460 million) were allocated to the health sector, Pakistan would cover the entire cost of the health ministry's immunization and development budgets. Pakistan currently spends 32 million dollars on immunizations, covering about 70 per cent of the child population, and 142 million dollars on development. An addition of only 14 million US dollars, i.e a total of 46 million, would provide 100 per cent child immunization. The remaining 184 million dollars could be used to expand health care services, improve delivery of services and add more beds and hospitals.

[28] Lama, Mahendra P, Rasul Bakhs Rais et al, "South Asia Regional Initiative for Energy Cooperation And Development : Assessment of Economic and Social Benefits of Power Trade Between India and Pakistan"; USAID-Nexant, Inc. October 2005. Also see, *Transforming India-Pakistan Relations : A Catalogue of Catalytic Projects*, Friedrich Ebert Stiftung, New Delhi 2018

Given Pakistan's 2003-04 federal health budget of 533 million dollars; this 230 million contribution would constitute 43 per cent of the national health budget.

v) Electrification of rural areas along the border would bring about significant changes in poverty and related regional social profiles. Removing regional disparities through electrification helps reduce social stress and energizes the entire socioeconomic process. Rural electrification helps create cottage industries and product markets. It also stimulates the growth of better communications and transport services to cater to these markets, leading to more interaction between villagers and urban dwellers. New relationships develop indirectly within rural-urban and ethnic groups, contributing to the process of social integration.

vi) Most of India's state electricity boards incur huge losses every year. The total deficit of all state electricity boards in 2001-02 was 2,483.70 billion Indian rupees [US$ 55.19 billion] with subsidy and 3,317.70 billion rupees [US$ 73.72 billion] without subsidy. Power purchases from other countries would put pressure on the government to devise mechanisms to reduce across-the-board subsidies, enabling it to provide subsidies only to the most deserving segments of society. For India, reduction and eventual elimination of such subsidies would be one of the greatest benefits from cross-border power trade. Given India's higher electricity tariffs, Pakistani utilities would benefit from substantial mark ups (30% to 80%) by exporting power to nearby cities such as Delhi, where tariffs are 23 per cent to 80 per cent higher than in Pakistan. This higher tariff revenue could be used by Pakistan to fund many of its sector reallocations.

vii) The official, or documented, trade volume between India and Pakistan is 476 million rupees [US$ 10.57 million], well below one per cent of Pakistan's total international trade. It is estimated that Indo-Pak trade routed through third countries ranges between one billion and 1.5 billion US dollars, although no authentic sources for verification exist. Shifting this informal trade to formal channels would reduce negative stake holding and bring substantial customs revenue to the two governments.

Cross border trade in electricity could help promote Indo-Pakistan and other intra-regional trade that now goes to extra-regional countries. For example, South Asian tea exports to Pakistan, the largest tea importer in the world (150 million kg), have been exceedingly low; only 13 per cent in 1998. South Asia is the largest and geographically the nearest possible tea producer for Pakistan. Kenya, despite its high tea prices, has emerged as the most vital source of Pakistan's tea imports, securing over 60 per cent of its market share in 1998. If Pakistan had imported all its tea from South Asian countries, it could have easily forestalled the transfer of about 110 million US dollars outside the region over a three-year period. Moreover, from a commodity like tea alone, Pakistan could save 40-50 million dollars a year.

viii) Increasing the availability of reliable electricity to the industrial sector would encourage greater productive consumption of power and help speed the pace of economic development and prosperity. Ensuring higher availability of supply through cross-border power exchanges would help consumers in both countries meet their basic electricity needs and create an atmosphere of economic interdependence – which, in turn, would help create a friendly and congenial social and political environment. In essence, it would help resolve key issues such as the lack of confidence between the people of the two countries.

ix) Electricity is a critical input for intensive agricultural production. Farmers in Indian states bordering Pakistan would benefit immensely from cross-border power trade. If power imports generate only a one per cent increase in the output of goods and produce in these states, this increase could have a positive impact on both state and national gross domestic product (GDP).

Even at below current market prices, a one per cent increase in certain agricultural items could generate over 17,904.46 million rupees [US$ 397.87 million] (about 0.01% of the national GDP). If this produce were exported at only a 30 per cent mark-up over the domestic price, it would equal to almost eight per cent of the 2002-03 agricultural exports, which would have a significant impact on rural employment. With higher incomes, and access to electricity, the rural population would have greater purchasing power, thus increasing the demand for other manufactured products.

x) Cross-border energy sector investment and trading by India and Pakistan would send a very positive signal to multinational corporations and other investors. Pakistan would likely gain more than India in foreign direct investment percentages if their bilateral relations improved. There are two reasons for optimism. First, the current rate of foreign investment in Pakistan is very small and remains far below its potential due to domestic political and regional security factors that have discouraged investment. In the 1990s, Pakistan received two billion to three billion US dollars a year. Once it is internally stable and has better relations with India, this investment flow will likely increase substantially. Second, Pakistan's oil and gas sector has already received relatively large investments and is likely to attract even more investors. Poor-quality energy infrastructure has been a major obstacle to its economic development.

xi) Power trading between the two countries would open up opportunities for trade in other forms of energy, such as natural gas through a regional pipeline."

Mahendra Lama, PhD *(mahendra_lama1961@yahoo.co.in) and Professor at School of International Studies, Jawaharlal University, Delhi, a former VC of Sikkim University and a Member of Eminent Person Group on Nepal-Indian Relations.*

References

South Asia's installed capacity is like to steadily increase to 489 GW in 2020, 782 GW in 2030 and 1067 GW in 2014 Source: https://openknowledge.worldbank.org/handle/10986/22224 as quoted in https://sari-energy.org/wp-content/uploads/2018/05/ppt.pdf

Bangladesh-India Electrical Grid Interconnection Project, Project Number: 44203-012, Technical Assistance Number: 7542; August 2015 Asian Development Bank, Manila.
http://kathmandupost.ekantipur.com/news/2018-12-05/nepal-bangladesh-agree-to-build-hydro-projects.html)

Lama, Mahendra P, Venkatachalam Anbumozhi and Ichiro Kutani Energising Connectivity between Northeast India and its Neighbours, Economic Research Institute for ASEAN and East Asia, Jakarta, 2019

https://powermin.nic.in/sites/default/files/uploads/Guidelines_for_ImportExport_Cross%20Border_of_Electricity_2018.pdf

World Bank Study states that "trust building around electricity trading is possible even between countries with a history of conflict. In several of the case studies there is a history of regional conflict.
The nature of the trouble was not necessarily at the border but sometimes internal conflict (and hence a potential source of supply risk for international partners).

In the case of SAPP and ECSEE there have been cross-border conflicts in the past. Broader free trade arrangements among countries also can support the establishment of the trust required to expand regional power cooperation." World Bank, The Benefits of Expanding Cross-Border Electricity Cooperation and Trade in South Asia, Final Report, World Bank Project Number P143029, 2016

Bangladesh- Electricity for all by 2020; Bhutan by 2013; India- by 2017; Nepal- by 2027 and Sri Lanka by 2015

This uses small compact and light-weight solar photovoltaic panels to generate few watts of power in a wide range of small and portable applications.

UNCTAD, The Least Developed Countries Report 2017: Transformational Energy Access, United Nations Conference on Trade and Development, New York and Geneva, 2017 The State of Food Security and Nutrition Report (UNICEF, 2017) and https://www.ifpri.org/publication/2017-global-hunger-index-inequalities-hunger\

World Bank. 2009. South Asia: Shared views on development and climate chane. Washington, D.C.: The World Bank

Faisal, I.M. and S. Parveen. 2004. "Food security in the face of climate change, population growth and resource constraints: Implications for Bangladesh." Environmental Management 34: 487-98.

Lama, Mahendra P, Human Security in India: Discourse, Practices and Policy Implications, University Press Limited, Dhaka, 2010

Tiwari, Sailesh, "Moving up the ladder: Poverty reduction and social mobility in Nepal" in Bishnu Dev Pant, Nayan Krishna Joshi and Pramod Rijal (eds) Selected Essays on Nepali Economy, Institute of Integrated Development Studies & Kathmandu University, Kathmandu, 2017

Its absolute poverty rate steadily declined to 25.2 percent by 2016.

Legros, Gwénaëlle, Kamal Rijal , and Bahareh Seyedi. Decentralized Energy Access and the Millennium Development Goals: An analysis of the development benefits of micro-hydropower in rural Nepal. Warwickshire, UK: Practical Action Publishing Ltd, 2011.

CUTS, Cross Border Electricity Trade – Mapping Socio-Economic Impacts; Consumer Unity & Trust Society, Jaipur, India, 2017

National Population and Housing Census 2011, reported on March 2014. Central Bureau Statistics 2016, Bhutan

Khatun, Fahmida and Samina Hossain, 2012, Adapting to climate change: Issues for South Asia. x+52. South Asia Watch on Trade, Economics and Environment (SAWTEE), Kathmandu

Hales, S., S. Edwards and R. S. Kovats. 2003. "Impacts on health of climate extremes." McMichael, A.J., D. Campbell-Lendrum, S. Kovats, S. Edwards, P. Wilkinson, T. Wilson, R. Nicholls and co-authors. 2004.

"Global climate change". In M. Ezzati, A. Lopez, A. Rodgers and C. Murray (eds.), Comparative quantification of health risks: Global and regional burden of disease due to selected major risk factors. Geneva: World Health Organization

Lal, M. 2003: "Global climate change: India's monsoon and its variability." Journal of Environmental Studies and Policy 6: 1-34 McMichael, A.J., et al 2004.

Mainly 'blending of bio fuels with liquid petroleum fuels like ethanol with petrol and biodiesel with petro-diesel for the transport sector'

Bandyopadhyay, Kaushik Ranjan and Kasturi Das. 2012. Biofuels in South Asia: Food security challenges and beyond; South Asia Watch on Trade, Economics, and Environment (SAWTEE), Kathmandu

Mishra, Arabinda, Shailly Kedia, and Madhumita Mishra. 2014. Green Economy in South Asia: Challenges and Opportunities. Kathmandu: South Asia Watch on Trade, Economics and Environment, (SAWTEE).

"Energy Outlook for Asia and the Pacific 2010-2035," ADB. October 14, 2014. Study conducted by Mahendra P Lama (India), Abul Barkat (Bangladesh) and Suresh Chalise (Nepal) Economic and Social Benefits Analysis of Power Trade in the South Asia Growth Quadrangle Region September 2004, Nexant-USAID SARI/Energy Program

Lama, Mahendra P, Rasul Bakhs Rais et al, "South Asia Regional Initiative for Energy Cooperation And Development : Assessment of Economic and Social Benefits of Power Trade Between India and Pakistan"; USAID-Nexant, Inc. October 2005. Also see, Transforming India-Pakistan Relations : A Catalogue of Catalytic Projects, Friedrich Ebert Stiftung, New Delhi 2018