



BBIN Initiatives: Options for Cross-Border Power Exchange

MAHENDRA LAMA

ABSTRACT International borders are key to any cooperation in the sub-region of Bangladesh, Bhutan, India and Nepal (BBIN). This sub-region—once integrated as a powerful geographic-economic entity and eventually disintegrating because of various politico-historical reasons—is now venturing to reintegrate. The challenge is to recognise borders as 'borderlands', where there exists an intrinsic interplay of natural resources, cultures, societies, trade and commerce, tourism, technology, roads, and communications. This demands a significant deviation from the orthodox treatment of borders as venues for military security. A critical area that shows potential is cross-border energy trading. Today there are fairly successful interconnection experiments in this area, as well as institutional linkages, buoyed by a considerable degree of political will. This paper describes the potentials of energy trading within BBIN.

INTRODUCTION

International borders are key to any cooperation dynamics in a sub-region deeply enmeshed in issues of national security. This sub-region, also known as the South Asia Growth Quadrangle¹ or Bangladesh, Bhutan, India and Nepal (BBIN) initiative in the eastern fringe of South Asia—consisting of Bangladesh, Bhutan, Nepal, and India's North East Region (NER) and West Bengal—has remained a symbol of vibrant social,

economic and cultural exchanges. This Eastern frontier has over 52 percent (7,917 km) of the total land borders of 15,106 of India, i.e., 4,096 km with Bangladesh; 633 km with Bhutan; 1,346 km with China; 1,643 km with Myanmar; and 199 km with Nepal. The varied nature of these borders (fenced, open, porous, barbed wire-based, and natural boundaries) and related orthodox national security-centric discourse and

Observer Research Foundation (ORF) is a public policy think-tank that aims to influence formulation of policies for building a strong and prosperous India. ORF pursues these goals by providing informed and productive inputs, in-depth research and stimulating discussions. The Foundation is supported in its mission by a cross-section of India's leading public figures, academics and business leaders.



To know more about
ORF scan this code

policies have, unfortunately, impeded the growth of any meaningful transboundary cooperation.²

In a place like the Daoki-Tamabil border crossing in Meghalaya, the *chanawalas* and *jhalmuriwalas* (hawkers) who sell their snacks in an area of Bangladesh considered as 'no man's land', are practically serving the purpose of India-Bangladesh borders. In Pashupati Nagar in Darjeeling, one's toes are in Nepal and heel and sole are in India as one stands on the borders. And in the Jaigaon-Phuntosoling in West Bengal and Assam and Samdrup Jongkhar border between India and Bhutan, one witnesses the free flow of goods, services, people, and natural resources. Why then do borders not inspire cooperation and integration? In such physically, socio-culturally and commercially attractive and productive borders, why have the instruments of cooperation and integration remained negligible?

This region was, after all, once integrated; it was a powerful geographic-economic entity. It eventually and abruptly disintegrated, however, because of various politico-historical reasons, and today it is venturing to reintegrate. The demarcation of these borders in the post-Partition period not only disconnected the entire spectrum of infrastructure but also dislocated huge communities. For instance, while Agartala to Calcutta before Partition was only 350 km away, now through the Siliguri corridor the distance has stretched to 1,645 km. Then East Pakistan (now Bangladesh) was left with the major portion of this region's transport network, but without the lucrative centres of trade and commerce that fed the freight and passenger traffic through their transport arteries. The entire Northeast got disconnected, with the remaining virtual bridge only the narrow 'chicken-neck' corridor in Darjeeling district in West Bengal.

At this juncture, therefore, reintegration is a cumbersome and daunting task and initiatives are confronted with resistance and virtual roadblocks emanating from a static paradigm. It is only in the last decade or so that 'security' has

assumed wider connotations going beyond these militarised borders.

The real challenge is to re-recognise and relocate borders as borderlands where there is intrinsic interplay of natural resources, cultures, societies, trade-commerce, tourism, migration, water towers, technology, roads, and communications. This also means moving away from the orthodox expression of 'border' as a straightforward geometric line, and increasingly hewing to much broader notions of 'borderlands'. This tends to make borders softer and more interactive, and economic integration and people-to-people contacts, much more prolific. If India's burgeoning economic growth is to be shared by its South Asian partners, it would happen primarily through borders and cross-border linkages. This is where borders become opportunities, ultimately transforming them into smart borders. The more the local integration there is, the softer becomes the border. As borderlands turn more vibrant, physical borders become secondary. A soft border creates its own interest groups, pressure agencies, an array of institutions and diverse stakeholders that promote multiple cooperation and development ventures.³

One can see strikingly similar approaches to borders taking place in other countries in the sub-region. For instance, a major driving force for China to open its borders for more trade and investment, has been the urgent need to bring to the national mainstream its own provinces in the periphery, mainly in the western region.⁴ These policies have emanated partly from China's realisation that its reforms and growth, key to halting and preventing domestic political turmoil, needed a larger playing field. Chinese leader Deng Xiaoping remained doubly convinced that economic modernisation needed a favourable international environment. For this, a sharp improvement and revitalisation of relations with *zhoubian guojia* (countries in the immediate periphery) emerged with the *mulin zhengce* (policy of congenial relations with neighbouring countries), thereby introducing

and ensuring another dimension to national security and foreign policy. Integrating China's own peripheral provinces, mainly those in the western region, into national development served as another impetus for opening border trade. This shift in thinking would bring about not only economic but also politico-military benefits.⁵ Three major instruments China used in this new venture were: first, to devise and implement a macro policy of “develop the west”; second, to make transforming interventions in the borderland infrastructure and development orientation; and third, to extend a sufficient degree of autonomy to the provinces in the periphery for cross-border engagement and cooperation.

These same patterns are likely to be witnessed in the BBIN sub-region. India, for one, is making substantive efforts to make its Northeast a bridgehead in its Act (Look) East Policy, where huge investments are being made in infrastructure and a reorientation of the Ministry of Development of North East Region (MDoNER) is being done. Further, a number of multilateral institutions including the United Nations (UN), Asian Development Bank (ADB), and World Bank, as well as bilateral institutions like the Japan International Cooperation Agency (JICA), are participating in the development process. Besides the wider interactions among agents and forces of globalisation, a new generation of policymakers is gradually taking over the helm—they who are more willing to widen the scope and nature of interactions and exchanges. Various institutions with more liberal principles and are engaged in substantive actions, are penetrating the sub-region: including national (private apex bodies, cultural agents), regional (SAARC, ASEAN) and global (WTO, World Bank, IMF, UN). Further, there is a certain degree of autonomy being accorded for the first time to the bordering states in engaging the neighbouring countries. This could be consolidated in the overall architecture of 'cooperative federalism' plan of the Indian government.

WHY CROSS-BORDER INTERCONNECTIONS?

The BBIN sub-region has historically had relatively low per capita electricity consumption. However, the persistent power shortage has been a major factor in keeping the region at low-growth equilibrium. These power shortages have serious social consequences, too.⁶ A significant proportion of society does not have access to modern sources of energy on grounds of both physical inaccessibility and affordability. These countries have been importing a significant portion of their commercial energy requirements, mainly hydrocarbon. In fact, the dependence on imports has gone up sharply as there has been a faster growth of demand for electricity in South Asia. This is attributed to the steady switching over from bio-fuels to more efficient and convenient modern fuels which, in turn, is the result of region-wide economic liberalisation-led industrial activities, and a rise in income levels.

There are eight reinforcing factors that are bound to promote energy exchanges—and, more specifically, power trading—in the BBIN sub-region in the near future.

- I A huge power crisis in most BBIN countries (except Bhutan) is leading to long hours of load-shedding and is clearly affecting social, economic and commercial activities. Such energy shortage threatens to lead to political instability, as tremendous public pressure is being exerted on the respective governments to find solutions to the crisis. Most people are willing to pay for electricity. However, as there is no short-term solution in sight, cooperation with immediate neighbouring countries has now emerged as a key instrument.
- II Nevertheless, massive power sector reforms have taken place in the BBIN countries. Open-access provisions and

cross-border power purchases have figured prominently in all these reforms. New actors including independent power producers (IPPs) are emerging while power exchanges are gradually being set up.⁷ Moreover, trans-border public and private investment has emerged as a new practice like in Nepal's Arun – III (900 MW) developed by SJVN, joint venture Group of Himachal Pradesh and Government of India, Upper Marsyangdi – 2 (600 MW) and Upper Karnali (900 MW) both being developed by India's Bangalore-based private sector GMR Energy group.⁸

III As indicated in declarations of various SAARC Summits, there is increasing realisation among the leadership of South Asian countries to expedite the process of energy exchange. It started with the Islamabad Declaration (2004) where the concept of Energy Ring was first discussed. The Dhaka Declaration (2005)—besides establishing the SAARC Energy Centre in Islamabad—underlined the need to constitute a South Asian Energy Dialogue process, involving officials, experts, academics, environmentalists and NGOs, to recommend measures to tap potentials of cooperation in energy sector. The Colombo Summit (2008)—while emphasising the tremendous potential for developing regional and sub-regional energy resources in an integrated manner—directed that the recommendations of the Energy Dialogue (held in 2007) be implemented through an appropriate work plan. For the first time, the SAARC Summit stressed the urgent need to develop the regional hydro potential, grid connectivity and gas pipelines and also evolving an appropriate regional inter-governmental framework.

The Thimphu Summit (2010) then authorised the SAARC Energy Centre in Islamabad to prepare an Action Plan on Energy Conservation. A year later in 2011,

The Male Summit directed to work on Inter-governmental Framework Agreement for Energy Cooperation and also conduct a Study on the Regional Power Exchange and Market for Electricity. And, most recently, the Kathmandu Summit (2014) signed the SAARC Framework Agreement for Energy Cooperation, whose Articles 12 and 13 provide for 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 and also set up a Joint Working Group for planning and identification of cross-border interconnection.⁹

IV There are various levels of preparation for energy trading that have been undertaken in the past decade or so which have now started bearing fruit. A number of organisations in the region and outside have been consistently working towards fostering cooperation in South Asia's energy sector. This includes the technical and professional public sector organisations such as Petrobangla, Power Grid and Power Trading Corporations of India, Electricity Authorities of Nepal, Sri Lanka, Bhutan and Pakistan. At the same time, international agencies like the World Bank, ESCAP, Asian Development Bank, USAID (SARI-E initiatives) and UNDP have also been fairly active in the arena of promoting power exchanges and trading.

V Various studies have been, and continue to be conducted on key issues of energy generation, transmission and distribution on a cross-border basis. Various academic and professional organisations have brought forward attractive and doable policy suggestions, too. Further, trans-border collaborative research is ongoing among organisations like the South Asia

Network of Economic Research Institutes (SANEI), Coalition for Action on South Asian Cooperation (CASAC-New Delhi), South Asian Centre of Policy Studies (SACEP-Kathmandu), Bangladesh Unnayan Parishad (Dhaka), Centre for Policy Dialogue (Dhaka), Institute for Integrated Development Studies (Kathmandu), Centre for Policy Research (New Delhi), and Tata Energy Research Institute (New Delhi). Premier universities are also involved, such as the Jawaharlal Nehru University (New Delhi), Sikkim Central University (Sikkim), BUET (Dhaka), Quad-i-Azam University (Islamabad), Lahore University of Management Sciences (Lahore), Tribhuvan University (Kathmandu), and Colombo University (Sri Lanka); these institutions have actively advocated cooperation in both water and energy.

VI Significant levels of transmission systems are already in place across BBIN and they are now being interconnected across borders. For instance, the 400-KV Muzaffarpur-Dhalkebar transmission line between India and Nepal has just been inaugurated. The Nepal segment is being implemented by the government of Nepal, under a line of credit of US\$ 13.5 million. Some 80 MW of power would flow immediately through this line, with an initial charge of 132 KV. Thereafter, it will be augmented to 200 MW in October 2016 at 220 KV, and then to 600 MW by December 2017 at 400 KV.¹⁰

VII Financial institutions, including multilateral and bilateral agencies, are keen to invest in energy-trading activities. China and Japan are emerging as new actors in the harnessing of trans-border energy in the region. For instance, in the \$ 46-billion China-Pakistan Economic Corridor Project launched in 2015, out of the 51 agreements

there are 20 that are related to energy. Groundbreaking activities have already been done for five projects worth 1,850 MW.¹¹ Japan has started constructing a 1,200-MW Matarbari Ultra Super Critical Coal-Fired Power Project in Chittagong Division in Bangladesh.¹² All these are likely to generate surplus power in both Pakistan and Bangladesh, thereby once again opening the possibility of cross-border exchanges.

VIII Extra-regional linkages are fast emerging. For instance, under the Central Asia South Asia (CASA) 1000 project, three to six terawatt hours of hydro electricity is likely to be transferred during the summer of 2016 from Kyrgyz Republic and Tajikistan to South Asia. Other initiatives like TUTAP (Turkmenistan-Uzbekistan-Tajikistan-Afghanistan-Pakistan) interconnection with Afghanistan and buy-back arrangement of 80 percent of India's 1,200-MW Tamnathi Dam (Chindwin river in western Sagaing region) in Myanmar initiated with NHPC of India in 2007 are going to make the power exchanges rather attractive.¹³

At the BBIN level, India and Bangladesh have four far-reaching projects underway, including: i) 250 MW (out of 500 MW) exports from India that started in 2013; ii) A grid inter-connection between Bheramara (Bangladesh) and Behrampur (West Bengal) in India is completed. In this, a loan from ADB has played a critical role;¹⁴ iii) 1,320-MW coal-based unit at Rampal in Bangladesh by National Thermal Power corporation (NTPC) of India costing \$1.5 billion is likely to be commissioned by 2017; and iv) 100 MW export to Bangladesh from Palatana Project in Tripura. These are landmark projects, taking BBIN initiatives far from being mere rhetoric. These path-breaking projects do manifest a more pragmatic and mature relationship

between India and Bangladesh, and a new trend of harmonised and coordinated approach among various ministries and technical agencies within a country and on a trans-border basis. Besides a generational shift in the bureaucratic attitude, these projects clearly sideline unnecessary national prejudices that have prevailed for decades. Further, by incorporating the strong commercial and professional elements in the exchanges, these projects provide the first national grid to national grid connection in South Asia.

The issues of orthodox variety of national security are for the first time overwhelmed by more serious concerns about non-traditional security threats such as energy and human insecurity. As borders are used as opportunities rather than sources of threats, the political dispensations have discarded their traditional positions and are showing some degree of political will. These projects carry contents of sub-regionalism based on physical contiguity and socio-cultural bonds and exchanges. They stand as prime examples of Track II diplomacy transforming to Track I in a full-fledged manner. While conversations and protracted dialogues on the needs and benefits of concrete projects remain the hallmark, bringing together new knowledge and experimentations from success stories of other regions by academics and private sectors has galvanised the clinching of these projects.

All these together have brought to the foreground a strong demand and willingness to undertake power trading in a commercial and sustainable manner. Cross-border power trading—besides building up mutual confidence among the partner countries—will increase the quality and reliability of power supply, lead to economy in operation and extend mutual support during contingencies.¹⁵

POWER EXCHANGES: EMERGING MODELS

Based on some successful interconnection experimentations in the past within and outside the region, changing institutional linkages, actions of private, bilateral and multilateral agencies and the willingness of the regional political regimes, broadly five models of power exchanges are now emerging in the BBIN sub-region. These models, which are essentially based on specific projects, include: i) exclusive bilateral exchanges such as those between India and Bhutan, and Bangladesh and Nepal; ii) sub-regional initiatives like among the countries in Greater Mekong Sub-region (GMS); iii) regional power pool like that in Southern African Power Pool (SAPP); iv) highly local integrative exchange like generation-load centre location based model between Palatana (Tripura) and Bangladesh; and v) wheeling facilitator like that done by India between the Eastern and Western Bhutan through the adjoining territories of Darjeeling and Jalpaiguri Districts in West Bengal and Assam.

i) Besides India-Nepal power exchange, India-Bhutan interconnection is a prime example of a promising bilateral exchange. Installed hydropower capacity of 1,615 MW in Bhutan constitutes less than six percent of its total hydropower potential of 30,000 MW. Most of these projects (mainly Chukha, Kurichu, Dagachu, Basochhu, Tala) have been built with Indian support—initially on an economic assistance basis which now has much higher soft loan content. Unlike in the past where Indian participation emanated wholly from public-sector organisations such as the National Hydro Power Corporation, private sector participation has steadily increased, and today corporations like Tata Power Company has entered the picture. As a result, all the surplus power (roughly 75 percent of total generation) is exported to India (5,179.26 million GWh in 2014)

earning over Nu 10690 million (1 Nu= 1 Indian Rupee) in 2014 and thereby contributing over one-third of government revenues and over nine percent of the country's GDP.¹⁶ With a forward-looking bilateral Power Purchase Agreement (PPA) in place, the transmission to India is handled by both public and private agencies. Bhutan, with the highest per capita consumption of 2,400 kWh in South Asia, has a target of generating 10,000 MW by 2020¹⁷ at a total cost of US\$ 10-12 billion. Bhutan is keen to diversify its market partners in South Asia and explore the possibilities of bringing in other South Asian countries and Myanmar, too, in its export trajectory.

- ii) The success story of Greater Mekong Sub-region (GMS) is another model where Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Vietnam and two provinces in China viz., Yunnan and Guangxi Zhuang Autonomous Region, have come together to generate and exchange power. With an area of 2.6 million sq. km. and a population of over 320 million, generation takes place mostly in Laos, Thailand and Viet Nam and transmission and distribution in Cambodia, Laos, PRC and Viet Nam. There are bilateral agreements on border power trade between countries (e.g. Malaysia-Thailand, Thailand-Laos, Laos-Viet Nam) and cross-border power interconnections like 500 kV DC Interconnection (PRC – Lao PDR – Thailand); 500 kV GMS Power Interconnection (Thailand – Lao PDR – Viet Nam) and GMS Power Transmission Project (Cambodia).

This model is replicable in BBIN countries where Bhutan and NE of India would be the generation hub and Bangladesh, the rest of India, and other South Asian countries (and even China and Myanmar) could be the export

destinations. For instance, NE alone has hydro power potential of over 58,000 MW (40 percent of the national potential). However, it has hardly harnessed 1,242 MW (2.1 percent of total potential) and 2,810 MW of hydro power is under-developed. Its Natural Gas reserves of 151.68 billion cu. ft. could generate 7500 MW for 10 years and coal reserves of 864.78 million tonnes could generate 240 MW/day for a period of 100 years. The recently released *Hydro Carbon Vision 2030* for North East India makes a comprehensive attempt in relocating the NE in the energy map of India where cross-border exchanges have become a core strategy.¹⁸

Besides the repositioning of NE in fulfilling the objectives of India's Act East Policy, this region has an exclusive Ministry of Development of North East Region and regional planning body like North Eastern Council and several specialised institutions like North East Development Finance Corporation Ltd. (NEDFi) and North Eastern Electric Power Corporation Limited (NEEPCO) and exclusive development and policy interventions like North East Industrial and Investment Promotion Policy, 2007 and Special Accelerated Road Development Programme for the North East. The NE has special funding provisions under Special Category States and 10 percent of Plan Budget(s) of the Central Ministries/Departments are allocated to this region since 1997-98 with a provision of Non-Lapsable Central Pool of Resources (NLCPR). All these clearly indicate that NE could be a key generating and distribution hub.

- iii) The Pool-based approach could be another major forward-looking venture for the BBIN sub-region. Interconnection of power systems of contiguously located countries and their coordinated operation would also provide immense technical and economic

benefits. These allow each electrical utility to make savings on power plant investment and operating costs as a result of the improved use of the interconnected system. It also contributes to the quality of electricity supplied to customers and reduces environmental damage. The Southern African Power Pool (SAPP) created in 1995—encompassing among others South Africa, Lesotho, Mozambique, Namibia, Malawi, Zimbabwe and Zambia under the regional cooperation organisation viz., Southern African Development Community (SADC)—is one example which matches well with the BBIN sub-region situation. They trade in power with a view to provide reliable and economical power supply. SAPP countries have a diverse mix of hydro and thermal generation plants, serving a population of over 200 million people. It has a coordination centre in Harare which carries out a number of functions including monitoring the operations of SAPP, collecting data, undertaking planning studies and training activities, and disseminating information to members. The Pool is working satisfactorily with immense gain to all the participating countries. There are examples of such regional power pools successfully operating in several parts of the world.¹⁹

There already exists considerable network of inter-connections among the South Asian countries. India's Power Grid Corporation has worked out the inter-connections required, their feasibility and the cost and benefits to the participating countries in the BBIN sub-region. Therefore, establishing a BBIN Sub-regional Power Trading Corporation (BBIN-SRPTC) would be highly beneficial to launch this type of market mechanism and can maintain and disseminate information on plant structures, avoidable cost of production, plant sales prices, sales volume,

rate of utilisation, profits generated, target utilisation and market conditions, consumer behaviour, and ongoing plant building and future investment in the sector. This in essence would be pooling of surplus power generated by individual plants in the participating countries and transporting into deficit ones by a coordinated exchange mechanism.

- iv) The power exchange between Tripura and Bangladesh triggered by 726 MW Combined Cycle Gas Turbine (CCGT) at Palatana (Udaipur, Tripura) provides a new direction for the NER in terms of local integrative exchange. This Tripura gas reserves-based project is an exclusive generation-load centre location-based model between contiguous cross-border geographies. The ONGC Tripura Power Company Ltd is sponsored by Oil and Natural Gas Corporation (ONGC), Infrastructure Leasing and Financial Services Limited (IL&FS) and Government of Tripura (GoT) for implementation of this project. Besides the power deficit areas of NER this project has started exporting 100 MW to Bangladesh in lieu of the services provided by it in transporting the project related equipments and goods and service through its waterways via Calcutta and through its roads to the project site. The development and operation of the transmission system is undertaken by North-East Transmission Company Limited (NETCL) a joint venture of OTPC, Power Grid Corporation of India Ltd (PGCIL) and the North Eastern Region beneficiary states. The level of confidence this project has generated is demonstrated by the fact that simultaneously a 10 gigabit per second (GBPS) bandwidth gateway of internet connectivity for the entire North Eastern states has been secured via Bangladesh. For the first time, India's Northeast region gets bandwidth through

the Bay of Bengal base far away from the traditional sources of southern and western India.

This Project can claim emission reduction credits under the CDM scheme established as part of the Kyoto Protocol under the United Nations Framework Convention to Climate Change (UNFCCC). The PGCIL erected 47-km-long, 400-KV double circuit transmission lines from Suryamani nagar Power Grid, in Tripura to Comilla in Bangladesh.²⁰ This model could be replicated across the BBIN sub-region, including between Sikkim and China through the Nathu la trade route which was reopened in 2006. This finds a fit with the “develop-the-west” campaign launched by China in 2000, which covers China's western region consisting of two-thirds of the nation's territory, and over 24 percent of its entire population. The nine crucial provinces that have huge power demand consist of Gansu, Guizhou, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang and Yunnan.²¹

- v) The physical boundaries in the BBIN sub-region are such that it is only India which shares common borders with almost all its neighbouring countries; no other two countries (except Afghanistan and Pakistan) have common borders. However, there are distinct advantages for a country like Bangladesh to import power from Bhutan both because of the lower tariff and supply reliability. Power generating countries would also like to diversify the markets. For instance, Bhutan is keen to expand the market for its power exports. At present, India is the only buyer for its power. This is more so as a number of hydro plants are under construction in the NER, which may lead to the diminution in the demand for Bhutanese power in India. There are expansive transmission lines that exist in all the bordering states of India.


Therefore, NER as a transit corridor for power transfer to neighbouring countries including Bangladesh and Myanmar could give a major boost to both the power trading activities and the process of regional cooperation and integration. India could also ensure full use of the transmission lines thereby fetching substantial revenue as wheeling charges.²²

CONCLUSION

There are many examples worldwide of grids of neighbouring countries being interconnected for exchange of power. One of the longest synchronous inter-connected system is inter-connection between the EHV networks of Hungary, Slovakia, Czech Republic and Poland. Similarly, Canada has several links with USA for export of power; in the Scandanavian region of Europe, the Finnish grid is connected to Sweden, Norway and Russia; and in South East Asia, Malaysia is interconnected with the electricity grids of Thailand and Singapore. ADB's recent study (2015) on the economic and reliability benefits of six cross-border transmission interconnections with elaborate power system load flow in South Asia stated that the Bhutan-India additional grid reinforcement and India-Nepal 400 kilovolt transmission link and Bangladesh-India high voltage director current transmission link (commissioned October 2013) could fetch benefits ranging from US\$ 105 million to \$ 1840 million. For instance, in the case of a grid reinforcement project between India and Bhutan which could cost US\$ 140-160 million, it would facilitate additional hydropower output of 15,193 GWh from Bhutan. This would fetch US\$1,840 million per annum in 2016-17 and achieve an estimated reduction of 15 million tonnes of CO₂ (need to be done in scientific expression) per year. Similarly, with upcoming projects like Upper Tamakoshi (456 MW) and Budhi Gandaki (600 MW) the India – Nepal 400 kV 400 kV Dhalkebar (N e p a l) - M u z a f f a r p u r (I n d i a)

interconnection—with an estimated investment of US\$ 63 million—could bring about an average benefit of US\$ 105 million for 2016-17 alone.²³

India can take the lead in forming a regional consortium of the members of the BBIN to help in attracting regional and sub-regional investment partners. This should in turn work towards creating a Regional Power Development Fund (RPDF) with the help of international financial institutions. It can also initiate a BBIN-wide information network to facilitate the regular exchange of data on demand-supply gaps

in various forms of energy, policy changes, price and market conditions, technological innovations and inputs, investors and investment opportunities, energy expertise, seismic and other geological and environmental data. India should reach an umbrella agreement with other countries which would spell out the procedural and legal aspects of sub-regional cooperation in this field. This should also include harmonisation of macro policies in the energy sector among the BBIN member countries and the strengthening of linkages with technical and professional institutions. 

ABOUT THE AUTHOR

Mahendra Lama is Professor of South Asian Economies at the Jawaharlal Nehru University, New Delhi. He is Founding Vice Chancellor of the Central University of Sikkim.

ENDNOTES:

1. Dubey, Muchkund, Lok Raj Baral and Rehman Sobhan (eds) (1999), *South Asian Growth Quadrangle*, Macmillan, Delhi; Lama, Mahendra P, “South Asia Growth Quadrangle: Opportunities, Policy Interventions and Growth Prospects” in Shaheen Afroze (ed) (2002) *Regional Cooperation in South Asia: New Dimensions and Perspectives*, Bangladesh Institute of International and Strategic Studies, Dhaka.
2. Lama, Mahendra P, (2012) “Geopolitics in Cross Border power Trading: Emerging New Paradigms”, *Energy Security Insights*, TERI, July-December, & “Geopolitics of Power Trading in South Asia : Opportunities and Challenges”, *Strategic Analysis*, Vol 31 No 2, March 2007, Routledge, New Delhi.
3. Lama, Mahendra P, (2016) “Borders as Opportunities: Changing Matrices in Northeast India and Southwest China” in Mahendra P Lama, LHM Ling et al (ed) *India China : Rethinking Borders and Security*, being published by Michigan University Press.
4. China's 27 provinces are divided into four regions : Northeast (3) : Liaoning, Jilin and Heilongjiang Middle (8) : Shanxi, Hebei, Henan, Hubei, Hunan, Guangdong, Guangxi and Hainan Eastern (6) : Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi and Shandong Western (10): Sichuan, Gansu, Guizhou, Ningxia, Qinghai, Shaanxi, Tibet, Xinjiang and Yunnan in addition to Chongqing Municipality.
5. Lama, Mahendra P. (2005), *Sikkim-Tibet Trade via Nathu la: A Policy Study on Prospects, Opportunities and Requisite Preparedness. Gangtok: Nathu la Trade Study Group for the Government of Sikkim., Gangtok, 2005*; Mahendra P Lama “Sino-India Borders: The Changing Perspectives”, Public Lecture, Sophia University, Tokyo, January 2005.
6. USAID (1999), *South Asia Regional Energy Forum Proceedings*, Kathmandu.
7. Lama, Mahendra P, Mohan Man Sainju & QK Ahmad (2005) “Reforms and Power Sector in South Asia : Scope and Challenges for Cross Border Trade” in Mohsin S Khan (ed) *Economic Development in South Asia*, Tata McGraw – Hill, New Delhi.
8. Paper presented by R K Agarwal, Executive Director, SJVN Ltd on “INDIA-NEPAL POWER TRADING Regulatory: Commercial & Investment Issues” and Harvinder Manocha, Chief Project Officer, GMR, on “India- Nepal Power Trading : Regulatory, Commercial and Investment Issues”, in the India-Nepal Energy conference organised by Confederation of Indian Industry, 4th September 2015, New Delhi.

9. Lama, Mahendra P (2014), "India-Pakistan Energy Cooperation : Rethinking Opportunities and Newer Approaches", in *India-Pakistan Trade : Strengthening Economic Relations* (Eds Nisha Taneja and Sanjib Pohit), Springer, New Delhi, 2014 ; "Energy Cooperation in South Asia : Integrating the Stakeholders for Robust Regionalism", *South Asia Journal, SAFMA, Lahore*, June 2005.
10. http://mea.gov.in/bilateral-documents.htm?dtl/26376 / List_of_Agreements_and_MOUs_exchanged_during_the_State_Visit_of_Prime_Minister_of_Nepal_to_India_February_20_2016.
11. Siddiqui, Hussain Ahmad Siddiqui, (2015) "CPEC projects: status, cost and benefits", *Dawn News*, Islamabad, 13 July, 2015.
12. See http://www.jica.go.jp/english/news/press/2014/c8h0vm00008t3n1n-att/20140616_01_01.pdf accessed on 23 February 2016.
13. Htun, K. W., N. N. Lwin, T. H. Naing and K. Tun (2011), 'ASEAN-India Connectivity: A Myanmar Perspective' in Kimura, F. and S. Umezaki (eds.), *ASEAN-India Connectivity: The Comprehensive Asia Development Plan, Phase II*, ERIA Research Project Report 2010-7, Jakarta: ERIA, pp.151-203.
14. Bangladesh-India Electrical Grid Interconnection Project, Project Number: 44203-012, Technical Assistance Number: 7542; August 2015 Asian Development Bank, Manila.
15. Lama, Mahendra P, (2000) "Designing Economic Confidence Building Measures : Role of India in South Asia" in *India's Pivotal Role in South Asia*, CASAC, New Delhi, September. and Mahendra P Lama, "Economic Reforms and Cross Border Power Trade in South Asia", *South Asian Survey*, Delhi, (January-June, 2000).
16. Ministry of Finance, *National Revenue Report 2014-15*, Royal Government of Bhutan, 2015; National Statistics Bureau, *National Accounts Statistics 2015*, Royal Government of Bhutan, 2015.
17. This includes 600 MW Kholongchhu HEP with SJVN; 180 MW Bunakha Reservoir Scheme with THDC; iii. 570 MW Wangchhu HEP with SJVN; and 770 MW Chamkharchhu-I HPP with NHPC. The two governments signed the Inter-government Agreement for development of the four JV hydropower projects in April 2014. The JV projects are to be financed through a debt equity ratio of 70:30 with a 50:50 equal shareholding for Druk Green and the GOI PSUs in the projects. The GOI will provide the RGOB/Druk Green equity in these projects in the form of grants. Source : Royal Government of Bhutan, *Annual Report 2014*, Druk Green Power Corporation Limited, 2014, pp 9-15.
18. *Hydro Carbon Vision 2030 for North East India*, Ministry of Petroleum and Natural gas, Government of India, New Delhi, 2016.
19. These include Union for the Coordination of Transmission of Electricity (UTCE) consisting of Spain, Portugal, France, Belgium, Italy, Netherlands, Luxemburg, Austria, Germany, Switzerland and now extended to Poland, Czech Republic, Slovak Republic, Hungary, Slovenia and Croatia; NORD Pool with Norway, Sweden, Finland and Denmark; North American Electric Reliability Council (NERC) with United States and Canada; Commission of Regional Power Integration (CIER) Jordan, Bahrain, Tunisia, Algeria, Saudi Arabia, Syria, Libya, Egypt, Morocco, Mauritania, Yemen, Iraq, Lebanon, Palestine, Dubai and Qatar and South America Power Trading with Argentina, Paraguay and Uruguay.
20. http://www.otpcindia.in/index.php?option=com_content &view=article &id=46&Itemid=27 accessed on 12 December 2015; http://www.telegraphindia.com/1160303/jsp/northeast /story_72482.jsp#.VteqQUARogo accessed on 4 March 2016.
21. Lama, Mahendra P Lama, (2005) *Ibid*.
22. CPD-CASAC, "Energy Cooperation in South Asia : Opportunities, Strategies and Modalities", Regional Synthesis prepared by Mahendra P Lama, Dhaka, 2004.
23. Wijayatunga, Priyantha, D. Chattopadhyay and P. N. Fernando , (2015) *Cross-Border Power Trading in South Asia: A Techno Economic Rationale* , ADB SOUTH Asian Working Paper Series, No. 38, August.



Ideas • Forums • Leadership • Impact

20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA
Ph. : +91-11-43520020, 30220020.
Fax : +91-11-43520003, 23210773
E-mail: contactus@orfonline.org
Website: www.orfonline.org



The Asia Foundation

114, Jor Bagh, (First Floor),
New Delhi-110003, INDIA
Tel.: +91-11-47363100
Fax: +91-11-47363111
Website: www.asiafoundation.org