Chapter 3

Centrality of Northeast India as an Emerging Electricity Trading Hub

February 2019

This chapter should be cited as
Study Team (2019), 'Centrality of Northeast India as an Emerging Electricity Trading Hub', in Anbumozhi, V., I. Kutani and M. P. Lama (eds.), *Energising Connectivity between Northeast India and its Neighbours*, Jakarta: ERIA, pp.41-78.

CHAPTER 3

Centrality of Northeast India as an Emerging Electricity Trading Hub

International borders are key to any cooperation dynamics in the subregion consisting of Bangladesh, Bhutan, the North Eastern Region (NER) of India, and Nepal (BBIN); as well as the contiguous Southeast Asian region and Myanmar. This tightly integrated subregion – where 10 Indian provinces including Bihar and West Bengal form the core interface and provide points of connection to other neighbouring countries – is one of the most attractive and challenging geographies in Asia in terms of energy security dynamics, both from the viewpoint of sustainable development complexities and national interest security perspectives (Lama, 2017a). The BBIN subregion, also known as the South Asia Growth Quadrangle (Dubey, Baral, and Sobhan, 1999; Lama, 2002), constitutes a critical segment of the four crucial border energy junctions that have emerged very distinctly in four corners of South and Southwest Asia, where project-based subregionalism is quickly becoming an instrument of effective energy trading. These junctions are the India–Nepal–China junction to the north, the India–Pakistan–Afghanistan–Iran junction to the west, the India–Sri Lanka–Maldives junction to the south, and the India–Bhutan–Bangladesh–Myanmar and Southeast Asia junction to the east. Although India is the central actor, each member country in these four energy junctions plays a critical role in their respective political economy. Each junction has its own unique characteristics and, if interconnected both within and outside their respective junctions, could trigger durable gains of unprecedented variety (Lama, 2017b).

The cascading and spiralling impact of this trans-border junction approach on energy exchanges, regional investment, trade, connectivity, and people-

to-people contacts, as well as and other social and economic development parameters could eliminate national prejudices that hamper regionalism (Lama, 2017c).

This could trigger huge energy exchanges and transform the orientation and content of existing regionalism initiatives (including the South Asian Association for Regional Cooperation [SAARC], Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), Bangladesh–China–India–Myanmar Forum for Regional Cooperation, BBIN, and Indian Ocean Rim Association), which remain shallow and lacklustre in terms of their progress. Under this junction framework, a large number of national and international companies will participate in various types of energy production on a regional basis.

This subregion, which was once integrated as a powerful geographic-economic entity, abruptly disintegrated in 1947 and again in 1971 for various politico-historical reasons. It is now trying to reintegrate – a rather cumbersome and daunting task. In the process of reintegration, a major challenge is to re-recognise and relocate borders as borderlands, with a political economy characterised by an intrinsic interplay of natural resources, culture, societies, trade-commerce, tourism, water towers, technology, roads and communications, security, migration, federalism, politics, and international relations. Cross-border energy trading (CBET) is emerging as the most practical, potentially beneficial, and socio-politically acceptable project in this new reintegration initiative.

1. Centrality of the North Eastern Region of India

Severe geographical constraints, topographical variations, and scarce physical infrastructure have constrained the growth and development of the NER. Even in the high-potential energy sector, the power system remains relatively undeveloped with an annual per capita power consumption (257.98 kilowatt-hours [kWh]) almost one-third the national average (778.71 kWh), and aggregate technical and commercial losses of more than 30%, compared to the national average of less than 20%. This has undermined the optimal use of resources (both human and natural), alienated the people both within the region and vis-à-vis the rest of the country, and created an acute sense of deprivation and alienation in the region. This has had far-reaching implications for the

region's development trajectory, societal values, political orientations, and, more seriously, conflictual dynamics. Inaccessibility and physical constraints have not only severely constrained the growth of institutions and social infrastructure in the region, but have also inhibited and discouraged a variety of development actors, including the private sector and multilateral institutions.

Conscious efforts are being made to highlight the development lag caused by poor connectivity, from very local to national levels and throughout the entire subregion. In its North Eastern Region Vision Document 2020, the Ministry of Development of North Eastern Region (MDONER) states the following:

> 'The infrastructure deficit is a major deficit in the region, and acceleration in economic growth and the region's emergence as a powerhouse depend on how fast this deficit is overcome. The lack of connectivity has virtually segregated and isolated the region not only from the rest of the country and the world, but also within itself. Poor density of road and rail transportation within the region has not only hampered mobility but also hindered the development of markets.... The blocking of access to the Chittagong port and the land route through Bangladesh, has closed the sea transportation routes for the region altogether....Critical to improving connectivity are issues of diplomacy and an improvement in border infrastructure and trade facilitation with neighbouring countries, particularly China and Bangladesh. Diplomatic initiatives and an extension of the rail network to Chittagong could help open up India's access to the Chittagong port and significantly reduce transportation time and cost.' (MDONER, 2008)

Two major types of physical infrastructure essential for the development of this region are those related to transport and communication, and energy infrastructure. Multiple committees and expert groups (Planning Commission, 1997; 2006; Lama, 2001; Ministry of Panchayati Raj, 2006; Reserve Bank of India, 2006; World Bank, 2007; Ministry of Finance, 2013) have highlighted the urgent need to devote time and allocate resources to infrastructure, and have suggested bold and substantive interventions. Several vital infrastructure initiatives have been launched to integrate the NER's economy with that of neighbouring countries, including the Asian Highway Link, the Asian Railway Network, and a natural gas pipeline grid. These projects, which are being actively considered by the BIMSTEC, have tremendous implications for lifting

the communication isolation of the NER. Many of these projects come directly under the broader purview and promotion of the India Look East (Act) policy. The NER will have access to the Asian Highway via the Imphal–Tamu feeder road, and to the Asian Railway Network via the planned linkage of the railway systems of India and Myanmar at the Dibrugarh railhead. In 2001, India constructed a road in Myanmar linking the township of Tamu with the railhead at Kalemyo that connects to Mandalay, Myanmar's commercial hub. To increase trade between the two countries, India and Myanmar have also agreed to open four checkpoints: the Pangsau Pass, Paletwa, Lungwaanyong, and Pangsha–Pangnyo.

The NER vision document stresses this as follows:

> 'Infrastructure and connectivity could support the Look East policy and provide [an] impetus to trade with [the] Eastern part of the globe. Although the policy has been in place for a decade and a half and has benefitted the rest of the country appreciably, the NER has gained very little. It is important to note that the NER shares 98 percent of its borders with the neighboring countries of Bhutan, Nepal, China, Bangladesh and Myanmar and the Look East policy focus on the region can help it to access the markets in East Asia and South East Asia. Indeed, there is a considerable potential for the policy to benefit the region but that would call for a qualitative change in the relationship with the neighboring countries, particularly the larger countries of Bangladesh, China and Myanmar. Given that the fortunes of 38 million people depend on good neighborliness, the bureaucratic and defence dominated approach to relationships must give way to the one based on mutual economic gains.' (MDONER, 2008)

Recently, the Government of India has further consolidated its infrastructure development projects by pumping a huge amount of funds into the projects, redeploying and making the central government agencies more accountable and completing several long-pending projects. While addressing the 65th meeting of North Eastern Council in Shillong in May 2016, the Prime Minister and Chairman of the North Eastern Council stated specifically:

'The government has been focussing on the development of the North East region through its pro-active 'Act East Policy'. As part of this policy, we are focussing on reducing the isolation of the region by improving all round connectivity through road, rail, telecom, power and waterways sectors.

If the western region of the country can develop, if other regions of the country can develop, I see no reason why the North East region of the country cannot develop. I am also convinced that India can move forward if all the regions develop including the North East region. The North East region is also very important to us for strategic reasons. And it is my conviction that we have to bring this region at par with the other developed regions of the country.

In the current Budget, more than Rs.30,000 crores have been earmarked for the North East region. It should be our endeavour to ensure that this money is spent well for the development of the region...However, it has taken us many years to complete these projects. We have to ensure that we are able to complete our projects in time and without cost over-runs. Only then can we realise the true benefits of these projects. The North East is the gateway to South East Asia and we need to take advantage of this. We are opening up both road and rail routes to our neighbouring countries. This should give a boost to the economic development of the region.

We have created a specialised highways construction agency for the North East—the 'National Highways and Infrastructure Development Corporation'—that was incorporated on 18th July 2014. Since then it has set up its Branch Offices, one each in every North Eastern State. As of today, it is implementing 34 projects in the North Eastern States covering a length of 1001 kilometres at a total cost of over Rs. 10,000 crore...We have recently implemented an improved internet connectivity project for the North East region in collaboration with Bangladesh. This will make available 10 GB of seamless alternate bandwidth for the region. This integration will benefit the North East region tremendously.

The Government is also making a heavy investment in power transmission projects covering all the eight North Eastern states at a cost of around

> Rs 10,000 crore. This would ensure power to more areas. The recent commissioning of [the] Bishwanath-Chariyali-Agra transmission line has also brought 500 MegaWatt additional capacity to the region…In the North East, the Indian Railways has commissioned about 900 kilometres of Broad Gauge in the last two years, leaving only about 50 kilometres Meter Gauge lines to be converted in 2016-17.' (Prime Minister, 2016)

These sentiments clearly show that, unlike in the past, the urge to link domestic infrastructure to spread and strengthen cross-border connectivity and willingness to harness the high potential of cross-border cooperation is remarkably high amongst political leaders at both the national level and amongst the NER states. This also means that, given the proper institutional and governance framework, it is only a matter of time before the NER will have connectivity-related infrastructure to realise at least some of the primary goals of subregional cooperation. This was well summed up by the then-Finance Minister of India.

> 'Finally what I would like to say is if you look at the list of projects that are being implemented, clearly what strikes (i) is the lack of capacity to implement the projects in time and the cost. Unless governance structures improve, unless you have good implementing agencies or persons placed in these agencies who have the drive and commitment to implement these projects on time. I am afraid it will be more of the same in the years to come. There is money, there is good will, there is good response from [the] World Bank and Asian Development Bank. We can bring in more projects but [it] ultimately lies in your hands to fund the agencies that it [sic] will implement it in time or fund the men who will head the existing agencies to implement it in time. All the States have revenue surplus in the North East.' (Finance Minister, 2007)

2. Emerging Subregional Contexts

While the signing of the BBIN Motor Vehicle Agreement in 2015 laid the groundwork for far-reaching subregionalism initiatives, the essential and central nature of energy trading in the eastern junction is driven by the following eight politico-economic factors:

'i) the gradual emergence of energy as a core and sensitive politico-economic-commercial entity in the larger context of development reforms and foreign policy matrices;

ii) increasing recognition of the importance of power-generating hubs and their commercial harnessing in Bhutan, Nepal, the NER, and the Myanmar–Lao People's Democratic (PDR) axis, both in the context of the huge unharnessed potential of hydropower and the distinct trend toward green and renewable energy-oriented policies and intended nationally determined contribution (INDC) commitments;

iii) India's Act East Policy that positions the NER and neighbouring Myanmar as the bridgehead to connect with the Mekong Ganga Cooperation (MGC) and other Southeast Asian countries, and uses subregionalism (a new genre of regionalism) as an instrument to enlarge the strategic scope for Bangladesh, Bhutan, and Nepal to approach Southeast Asia through this corridor;

iv) burgeoning domestic pressures on the NER to integrate with neighbouring countries (with which it shares over 98% of its physical borders), and conscious initiatives by the Government of India under 'cooperative federalism' to reposition the NER on the development map;

v) the seasonal demand for and supply of power throughout the rest of South and Southeast Asia, and the demonstration effect of ongoing power trading between India and Bangladesh, Bhutan, and amongst the Greater Mekong Subregion (GMS) through cross-border projects and successfully attractive trading models;

vi) strong emerging possibilities of investment in the power sector by diverse players, including the World Bank, Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB), Japan International Cooperation Agency, independent power producers (IPPs), and other investors; and further integrative attraction under the following frameworks: India–Association of Southeast Asian Nations (ASEAN), MGC, BIMSTEC, Bangladesh–

> China–India–Myanmar Forum for Regional Cooperation, SAARC, and Regional Comprehensive Economic Partnership;
>
> vii) a highly developed transmission network in the borderlands and growing partnership in cost-effective generation sources and reliable supply sources; and
>
> viii) discourse changes triggered by a gradual shift to democratic regimes in the whole subregion, including Myanmar, and major regional connectivity that is expanding rapidly through energy projects like the Central Asia–South Asia project, Bangladesh–China–India–Myanmar Forum for Regional Cooperation Economic Corridor, China-Led Growth Quadrangle in the eGMS, China–Pakistan Economic Corridor, and One Belt One Road initiatives in Asia.'

The challenges of integrating Myanmar into this framework are complicated by many decades of economic neglect, a lack of management and market reforms in the energy sector, unexplored interconnections with the NER, and a general lack of information. Myanmar's goal of national electrification (45% by 2020–2021, 60% by 2025–2026, and 80% by 2030 [Government of Myanmar, 2015]) will require substantial increases in capital, public–private cooperation, effective grid expansion, and off-grid and cross-border development with both South Asian and ASEAN countries.

Five broad power-exchange models are now emerging in the BBIN subregion and its inter-linkages with Myanmar and Southeast Asian countries. These models, which are essentially based on specific projects, draw from successful past experimentation with interconnection (both within and outside the region): India's gradual policy of openness in the NER and conscious engaging of the MGC (Cambodia, Lao PDR, Myanmar, Viet Nam, and Thailand); Myanmar and Thailand's core role in BIMSTEC and GMS energy dynamics; changing institutional linkages; the actions of private, bilateral, and multilateral agencies; unfolding policy regimes; and commitments made under the 2015 Paris Agreement. These models include the following:

> '(i) exclusive bilateral exchanges such as those between India and Bhutan, and Bangladesh and Nepal;

(ii) integration with subregional initiatives like amongst the GMS countries;

(iii) the regional power pool located in the NER–Myanmar junction;

(iv) a highly local integrative exchange, like the Palatana (Tripura)–Comilla (Bangladesh) model based on the location of generation-load centres; and

(v) wheeling facilitators in the form of a 'virtual energy grid', like that implemented by India between eastern and western Bhutan, and amongst the NER, Bangladesh, and Southeast Asia.'

Similar to the India–Nepal power exchange, the India–Bhutan interconnection is a prime example of bilateral exchange. Bhutan's installed hydropower capacity (1,615 megawatts [MW]) constitutes less than 6% of its total hydropower potential (30,000 MW). Most hydropower projects in the country were built with Indian support on an initial basis of economic assistance, which now has much higher soft loan content. Unlike in the past when Indian participation came wholly from public-sector organisations such as the National Hydro Power Corporation, participation by private sector companies such as Tata Power has steadily increased. All bilateral CBET transactions between Bhutan and India are carried out by the Bhutan Power System Operator and the National Load Dispatch Centre–New Delhi under the Power System Operation Corporation. All surplus power (75% of the generated total) is exported to India (5,179.26 million gigawatt-hours in 2014), and accounted for more than 34% of the country's total exports in 2015–2016. During this period, the exported power generated more than Nu12.124 billion (1 ngultrum = 1 Indian rupee), over one-third of government revenues and more than 13% of the country's gross domestic product (GDP) (Ministry of Finance, 2016; National Statistics Bureau, 2016). The transmission to India is handled by both public and private agencies under a forward-looking bilateral power purchase agreement.

Bhutan, which has the highest per capita energy consumption in South Asia (2,800 kWh), aims to generate 10,000 MW by 2020 at a total cost of $10 billion–$12 billion, via several power projects. These include the Kholongchhu Hydroelectric Project (HEP) with Satluj Jal Vikas Nigam (SJVN) (600 MW); the Bunakha Reservoir Scheme with THDC (180 MW); the Wangchhu HEP with

SJVN (570 MW); and the Chamkharchhu-I HEP with NHPC (770 MW). In April 2014, the governments of Bhutan and India signed an intergovernmental agreement to develop these four joint venture projects. The projects are to be financed through a 70:30 debt–equity ratio, with a 50:50 equal shareholding for Druk Green and the Government of India's public sector undertakings (PSUs). The Government of India will provide the Druk Green equity in these projects in the form of grants (Government of Bhutan, 2014). India is keen to diversify its export market partners in South Asia, and has been exploring the possibilities of bringing other South Asian countries and Myanmar into its generation and export trajectory.

With over 2,330 MW exchanged amongst Bangladesh, Bhutan, India, and Nepal; and with Myanmar exporting roughly 520 MW to China, CBET is in a fairly nascent stage. However, the very fact that the process has begun significantly widens the scope for CBET. For instance, Bangladesh plans to import 6,000 MW by 2034 (Japan International Cooperation Agency, 2014). The South Asia Regional Initiative for Energy Integration has developed four scenarios for Indian electricity imports and exports (Table 1). This shows that India will emerge as a major market for electricity generated in neighbouring countries.

3. India-Bangladesh Power Exchange

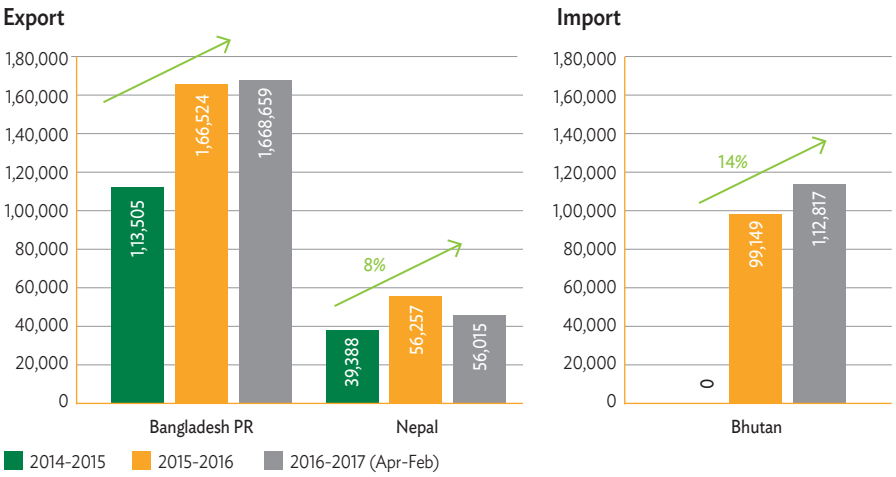
During 2010–2011, India and Bangladesh agreed on several crucial areas of energy cooperation, including a renewable energy interconnection study (covering Ishurdi, Bangladesh–Baharampur, India); imports of at least 500 MW from the western interconnection (Bangladesh–West Bengal) and 300 MW–500 MW from the eastern interconnection (Bangladesh–Tripura); the construction of regional power-trade grids; human resource development for utility professionals; and joint venture power-generation projects (especially large coal-power projects). In 2015, India demonstrated its readiness for Indian companies to enter Bangladesh's power-generation, transmission, and distribution sector to help the country achieve its goal of 24,000 MW of installed capacity by 2021.

Table 3.1 Electricity Import/Export by India from/ to Neighbouring Countries (GW)

Scenarios	2017	2022	2032	2042
Import				
Least effort	3	3.5	4	7
Aggressive effort				
Determined effort				
Heroic effort	15	25	35	50
Export				
Least effort	1	1	1.5	2
Aggressive effort				
Determined effort				
Heroic effort	1	2	3.5	7

Source: Kharbanda, V.K. and R.R. Panda (2016), 'Institutionalize Cross Border Electricity Trade', *Energy & Power* (1 June). Dhaka.

Figure 3.1 India's Power Trade with Neighbouring Countries (₹'000,000)



Source: North Eastern Development Finance Corporation (2017), Guwahati (March).

The two countries also agreed to evacuate power from the NER (Rangia and Rowta) to Muzaffarnagar in India through Bangladesh through a ±800 kilovolt (kV), 7,000 MW, high-voltage direct-current (HVDC), multi-terminal, bipolar grid line with suitable power-tapping points at Barapukuria in Bangladesh (Joint Declaration, 2015). As a result, three very far-reaching projects have been launched: (i) 500 MW of power exported from India, (ii) a grid interconnecting Bheramara in Bangladesh and Baharampur (West Bengal) in India, and (iii) a 1,320 MW coal-based unit at Rampal (350 kilometres [km] southwest of

Dhaka) under the Bangladesh–India Friendship Power Company consisting of the Bangladesh Power Development Board and NTPC. This project is expected to begin commercial generation by December 2018.

These ground-breaking projects (Lama, 2013) have widened the scope for Bangladesh to import power from Bhutan and Nepal using Indian grids. Bhutan has overcome its landlocked status by using Indian territories and facilities as permitted by India's agreement with Bangladesh on land customs stations (namely Tamabil–Dawki, Nakuagaon–Dalu, Gobrakura, Koroitoli–Gasuapara, and on the India–Bangladesh border), and the use of inland waterways and access to the ports of Chittagong and Mongla in Bangladesh. In fact, the Bangladesh–Bhutan–India trilateral hydroelectric power-generation agreement is likely to be signed soon, as mentioned in the Joint Statement by the prime ministers of Bangladesh and Bhutan on April 2017.

> 'The two Prime Ministers emphasized the advantages of sub-regional cooperation in the areas of power, water resources, and connectivity for mutual benefit. Recognizing the importance of enhancing regional connectivity, both sides agreed to work bilaterally and sub-regionally towards that end. They also welcomed the proposed Trilateral Memorandum of Understanding [MOU] between Bangladesh, Bhutan and India for cooperation in the field of Hydroelectric Power on the principles of agreed regional framework. They expressed the hope that this MOU could be signed at an occasion when leaders of all three countries would meet next.' (Joint Statement, 2017)

Similarly, Article I of the MOU signed between Bangladesh and Nepal in 2016 states that it 'will act as a framework for trading power between Bangladesh and Nepal at a mutually agreed upon price and procedure. Both the countries agree to exchange power as and when it is possible and feasible.' Further, under this MOU the two countries decided to facilitate joint cooperation to develop power-generation projects, especially hydropower development, transmission, efficiency, and the development of various types of renewable energy; and to support cooperation between the public- and private-sector entities of the two countries in the areas of power generation, transmission, distribution, energy efficiency, the development of hydropower projects, investment, design,

construction, installation, commissioning, operation, and production in both countries.

In a recent energy-secretary level talk between Bangladesh and Nepal, the two countries decided to develop hydropower projects in Nepal with government-to-government investment, and to export the electricity produced by these schemes to Bangladesh through the Indian transmission system. Bangladesh will likely import 500 MW of electricity from the 900-MW Upper Karnali Hydropower Project in Nepal being built by an Indian joint venture company, the National Thermal Power Corporation Vidyut Vyapar Nigam (Subedi, 2018).

This is a prime example of Track II diplomacy transforming into Track I wherein discussions on projects, cooperation potentials, and constant deliberations on various other contentious issues and constraints discussed primarily by the civil society, academics, the private sector, and other professionals find their way into policy making circles and institutions, who in turn adopt and internalise them as policies and government projects. It also shows that India–Bangladesh relations have become more realistic and mature, and are characterised by unprecedented 'political will'. There now exist harmonised and coordinated approaches amongst various ministries within the countries and vis-a-vis the partner countries. These exchanges contain strong commercial and professional elements. This paves the way for related institutions to come together in a much more comprehensive and sustainable manner, builds confidence in cross-border investments amongst private-sector players, and widens the scope for their participation in the energy sector.

Traditional national security issues have for the first time been overtaken by more serious concerns about non-traditional threats such as energy and human insecurity. Borders are now being viewed as sources of opportunities rather than threats. Although these are essentially bilateral projects, they contain strong threads of subregionalism based on physical contiguity and socio-cultural exchanges. This subregional arrangement recognises the role of international agencies like ADB, the World Bank, the United Nations Development Programme, the United States Agency for International Development, and other private conglomerates that have invested in various energy sector projects across Asia and Africa.

These projects will be landmark starting projects. At a large number of points along the India–Bangladesh border the distance of interconnections between the two sides may be well within 20–60 kms. For instance, there are 21 grid substations with combined levels of 230/132 kV where the distance from the border is less than 20 kms. Some of these substations are so close that they could be interconnected at a very nominal cost and within a very brief timespan to facilitate power exchange and trade. Grid interconnections on both sides would permit larger power flows and would integrate the two grid systems to bring them to the same frequencies.

4. Intended Nationally Determined Contribution Commintments

The INDCs of the BBIN countries are another major factor likely to trigger tangible changes in the future energy mix. INDCs outline the measures countries intend to undertake mainly to (i) reduce greenhouse gas (GHG) emissions; (ii) adapt to climate change; and (iii) provide financial, technological, and capacity-building support (from developed to developing countries). The INDC commitments will likely be renegotiated to include renewables in the near future (Table 3.2). In the BBIN countries, renewable energy is growing massively, with India projected to reach 175 GW by 2022, Bangladesh 3,168 MW by 2021, and Myanmar 2,000 MW by 2030. This output could be integrated as a second line of CBET. Three border junctions (east, west, and north) could even plan for hydropower regional balancing. These are definite new paths to green and sustainable growth.

India is aiming to cut GHG emissions for each unit of GDP by 33%–35% (from 2005 levels), and to produce 40% of its electricity from non-fossil-fuel sources by 2030. Bhutan, a relatively smaller mountainous country, plans to remain carbon-neutral as targeted in 2009, and to keep 60% of its territory forested. Similarly, Nepal is aiming to reduce its dependency on fossil fuels by 50%, and achieve 80% electrification through renewable energy sources with an appropriate energy mix by 2050. Bangladesh is aiming to reduce GHG emissions by 5% (or 15% with international support) from business-as-usual levels by 2030.

Table 3.2 Intended National Development Contribution Commitments of Bangladesh, Bhutan, India, Nepal, and Myanmar

Countries	Commitments
Bangladesh	Cut GHG emissions by 5% (15% with international support) by 2030 compared with business-as-usual levels in the power, transport, and industry sectors.
Bhutan	Remain carbon-neutral as set out in 2009, and keep 60% of its territory forested.
India	Cut GHG emissions for each unit of GDP by 33%–35% from 2005 levels by 2030.
	Source 40% of electricity from non-fossil fuels by 2030.
Nepal	Reduce dependency on fossil fuels by 50% by 2050, and achieve 80% electrification through renewable energy sources with an appropriate energy mix.
	Maintain 40% of its territory forested.
Myanmar	With the largest expanse of tropical forest in mainland Southeast Asia, Myanmar is already a net GHG sink.
	Myanmar's permanent forest estate target by 2030 is to increase forest land as a share of the total national land area as follows: • Reserved forest and protected public forest = 30% of total national land area • Protected area systems = 10% of total national land area
	Increase the share of hydroelectric generation within the limits of technical hydroelectric potential (indicative goal = 9.4 GW by 2030)
	Boost rural electrification with at least 30% of supplies generated from renewable sources.
	Realise an electricity savings potential of 20% of the total forecast electricity consumption by 2030.

GDP = gross domestic product, GHG = greenhouse gas, GW = gigawatt.

Source: Intended National Development Contribution Commitment documents of Bangladesh, Bhutan, India, Nepal, and Myanmar.

To achieve these goals, these countries require three critical instruments related to finance, technology transfer, and capacity building. For example, in its Climate Change Strategy and Action Plan, Bangladesh estimated that it will need to invest $40 billion from 2015 to 2030 to implement measures addressing the adverse impacts of climate change. These ambitious commitments by BBIN countries are formidably challenging to achieve and sustain, and will require an extensive exchange of information at the cross-regional level, policy harmonisation at the sectoral level, and strategy coordination at the global level.

5. The North Eastern Region of India: An Emerging Electricity Trading Hub

The Pasighat Declaration estimates the NER's total power potential at about 50,000 MW, against the projection of the North Eastern Electric Power Corporation (NEEPCO) of roughly 58,900 MW (40% of the estimated national potential). In terms of other energy sources, it is estimated that the NER has 151.68 billion cubic feet of natural gas reserves, which could generate 7,500 MW for 10 years, and 864.78 million tonnes of coal reserves (against the total national reserve of 186 billion tonnes), which could generate 240 MW per day for a period of 100 years. However, so far only 1,242 MW (2.1% of the total potential) has been harnessed, and about 2,810 MW of hydropower is under development (Table 3.3). NEEPCO is expected to generate 2,060 MW by 2018–2019 with the commissioning of two plants (with capacities of 600 MW [at Kameng] and 110 MW [at Pare in Arunachal Pradesh]), as well as a 60-MW plant in Mizoram.

By the end of the Eleventh Five-Year Plan in 2011, the NER's installed capacity was 2,530 MW, of which hydroelectric power constituted 47%, thermal (coal, gas, and diesel) 42.25%, and renewable sources 10.67%. Assam contributed the highest share (38%) and Nagaland the lowest (4%) of the total installed capacity. (Planning Commission, 2012). Although five states (other than Mizoram, Sikkim, and Tripura) maintain a power deficit, ambitious plans have been drawn up to make the NER not only self-sufficient for power but also the 'powerhouse' of the rest of the country. By the end of the Twelfth Five-Year Plan in 2017, the total capacity addition was expected to be 5,353 MW (78% from hydroelectric) from 13 ongoing projects across the region. Of this, projects supported by the central government were expected to contribute 71.8%, followed by private-sector projects (25.53%), and state projects (2.6%). Since the availability of hydropower in the region declines drastically during winter, including off-peak hours, it is essential for the region to meet its base-load generation capacity from thermal power and centrally allocated thermal power from the eastern regional stations.

Table 3.3 Development Status of Potential Hydroelectricity (June 2014)
(installed capacity of more than 25 MW)

Region/State	ICRS (Total)	ICRS (above 25 MW)	CUO (MW)	(%)	CUC (MW)	(%)	CUOUC (MW)	(%)
Meghalaya	2,394	2,298	282.0	12.27	40.0	1.74	322.0	14.01
Assam	680	650	375.0	57.69	0.0	0.00	375.0	57.69
Nagaland	1,574	1,452	75.0	5.17	0.0	0.00	75.0	5.17
Arunachal	50,328	50,064	405.0	0.81	2,710.0	5.41	3,115.0	6.22
Mizoram	2,196	2,131	0.0	0.00	60.0	2.82	60.0	2.82
Sikkim	4,286	4,248	669.0	15.75	26,22.0	61.72	3,291.0	77.47
Manipur	1,784	1,761	105.0	5.96	0.0	0.00	105.0	5.96
Tripura	150	0	0.0	0.0	0.0			0.0
Subtotal (NER)	63,392	62,604	1,911	3.05	54,32.0	8.67	7,343	11.72
ALL INDIA	**148,701**	**145,320**	**35,944.5**	**24.73**	**13,131.3**	**9.04**	**49,075.8**	**33.77**

CUC = capacity under construction, CUO = capacity under operation, CUOUC capacity under operations + under construction, ICRS = identified capacity as per reassessment study, MW = megawatt, NER = North Eastern Region of India.

Source: North Eastern Electric Power Corporation, http://neepco.co.in (accessed 18 December 2018).

Other renewable sources in the NER include solar, with 'average solar insulation in the range of 5 kWh/m2 for more than 300 sunshine days' (Indian Chamber of Commerce, 2017). India aims to increase its renewable energy capacity by 175 GW by 2022, including 100 GW from solar, 60 GW from wind, 10 GW from bio-power, and 5 GW from small hydropower plants (with capacities of no more than 25 MW). Tripura already has a 5-MW solar plant, and various state governments have allocated land for solar parks to bring the regional capacity up to 250 MW (Bhattacharjee, 2015). NEEPCO alone under the Clean Development Mechanism (CDM) plans to generate 1,500 MW of power from non-conventional sources of energy by 2020.

Significant emphasis has been placed on the transmission network within states, amongst the NER states, and with other Indian states. This is bound to facilitate far-reaching interconnections with neighbouring countries. Arunachal Pradesh, Sikkim, and Tripura currently have interstate power sale arrangements. In 2015–2016, a comprehensive scheme of transmission, sub-transmission, distribution, and interstate transmission was implemented by the Powergrid Corporation of India (POWERGRID) at the cost of ₹113.48 billion. To evacuate the power from the Lower Subansiri and Kameng HEPs in Arunachal Pradesh, and the Punatsangchu-1 HEP (1,200 MW) in Bhutan to northern and western

India, POWERGRID has erected an 800-kV, 6,000 MW HVDC bipolar line from Biswanath Chariyalli in Assam to Agra in Uttar Pradesh (1,728 km) at the cost of ₹12 billion ($179.1 million). The North East Transmission Company (NETC) has also completed two 400-kV, direct-current lines (Palatana, Tripura–Silchar, Assam, and Silchar–Bongaigaon) as a means of interstate transmission, at a cost of more than ₹17.7 billion.[1] In addition, several interstate and regional transmission networks with a large number of substations have been completed or are in the pipeline.

A large number of IPPs developing projects that are scheduled to launch during the Thirteenth Five-Year Plan (2017–2022)[2] in Lohit, Siang, Tawang, and Kameng Basin in Arunachal Pradesh have applied to the Central Transmission Utility (CTU) for grid connectivity and long-term access in Arunachal Pradesh. These include Athena Demwe Power, Jayprakash Power, Siyom Hydro Power, Tato II Hydro Power Project, Naying DSC Power, Bhilwara Energy; Energy Development Company, KSK Dibbin Hydro Power, Patel Hydro Power, Adishankar Power, SEW Nafra Power Corporation, and GMR Londa Hydropower.

The Planning Commission envisages the establishment of 'basin wise pooling stations for pooling of power from generation projects in individual basins, which may further be pooled at a bigger pooling station for onward transfer to load centres in various regions through high capacity HVDC/EHVAC [extra-high voltage alternating current] transmission lines' (Planning Commission, 2013). This plan has three components: (i) an immediate evacuation system for the transfer of power from individual generating stations to the nearest basin-pooling station/s, (ii) a common transmission system from basin-pooling stations to bigger pooling stations, and (iii) a transmission system from the large pooling stations to load centres in other regions via HVDC or extra-high voltage alternating current lines.

[1] The NETC is a joint venture of the Oil and Natural Gas Corporation (ONGC) Tripura Power Company; POWERGRID; Assam Electricity Grid Corporation; and the governments of Manipur, Meghalaya, Mizoram, and Tripura.

[2] Niti Aayog (the National Institution for Transforming India), which replaced the Planning Commission, has discontinued the Five-Year Plan. The new plan, which is essentially a vision document, is a 7-year strategy for 2017–2024, and a 3-year 'Action Agenda' from 2017–2018 to 2019–2020.

Some of the project developers encountered major setbacks in the form of civil society protests related to serious environmental and livelihood concerns; land acquisition, rehabilitation, and resettlement concerns; unexpected geological incidents; inaccessible project sites; inadequate survey and investigation; environment and forest clearances; corruption in the award of projects; and, more critically, the technical and financial capacity, capability, and soundness of some of the IPPs to carry out and sustain projects that are mostly located in difficult terrains. A lack of available construction materials like cement and steel, poor carrying capacities of roads and bridges, and law and order issues continue to constrain project development. Furthermore, many project developers are undertaking projects in hilly and mountainous regions for the first time. At the same time, the NER states (except Assam, Meghalaya, and Tripura) have made very slow progress in unbundling utilities, and continue to suffer from protracted losses.

Given the proper institutional and governance framework, it is only a matter of time before the NER will have connectivity-related infrastructure directly related to the goals of subregional cooperation.

6. Prospects

The BBIN countries could adopt the successful practices of the GMS, which covers an area of 2.6 million square km and has a population of more than 320 million. Generation takes place mostly in Lao PDR, Thailand, and Viet Nam; and transmission and distribution in Cambodia, the Lao PDR, Viet Nam, and Yunnan province and the Guangxi Zhuang Autonomous Region in China. There are bilateral agreements on cross-border power trade between countries (e.g., Malaysia–Thailand, Thailand–Lao PDR, and Lao PDR–Viet Nam), and cross-border power interconnections like the 500-kV direct-current China–Lao PDR–Thailand interconnection, the 500-kV GMS Power Interconnection Project (Thailand–Lao PDR–Viet Nam), and the GMS Power Transmission Project (Cambodia). In the BBIN region, Bhutan, Nepal, and the NER would be generation hubs, and Bangladesh, the rest of India, and other neighbouring countries (including China, Pakistan, Sri Lanka, and Myanmar) would be export destinations. Besides hydroelectric power, the NER's 151.68 billion cubic feet of natural gas reserves alone could generate 7,500 MW for 10 years, and its 864.78

million tonnes of coal reserves could generate 240 MW per day for a period of 100 years (Government of India, Ministry of Petroleum and Natural Gas, 2016). Figure 3.2 shows what the power exchanges between the NER and neighbouring countries could look like by 2021–2022. This will reposition Bhutan, Nepal, and the NER as generating and distribution hubs under India's Act East Policy. The region has an exclusive Ministry of Development (the MDONER), regional planning body (the North Eastern Council), several specialised institutions (including the North East Development Finance Corporation and NEEPCO), and multiple exclusive development and policy interventions (such as the North East Industrial and Investment Promotion Policy, 2007; North East Industrial Development Scheme 2018; and the Special Accelerated Road Development Programme for the North East). The NER receives specific funding provisions as Special Category States, and 10% of the plan budgets of the central ministries and departments has been allocated to this region since 1997–1998 via a provision of the Non-Lapsable Central Pool of Resources.

7. Central Electricity Authority Projection: Surplus in the North Eastern Region

In 2016, the Central Electricity Authority (CEA) projected that the NER would be a surplus power region by 2021–2022, provided that the projected capacity additions meet the targeted date of commissioning. This, along with the fact that Bangladesh and Nepal will likely have deficits, could trigger exports from the NER and Bhutan to Bangladesh (1,100 MW) and within the country, and imports from Bhutan (5,082 MW) (Table 3.4 and Figure 3.2).

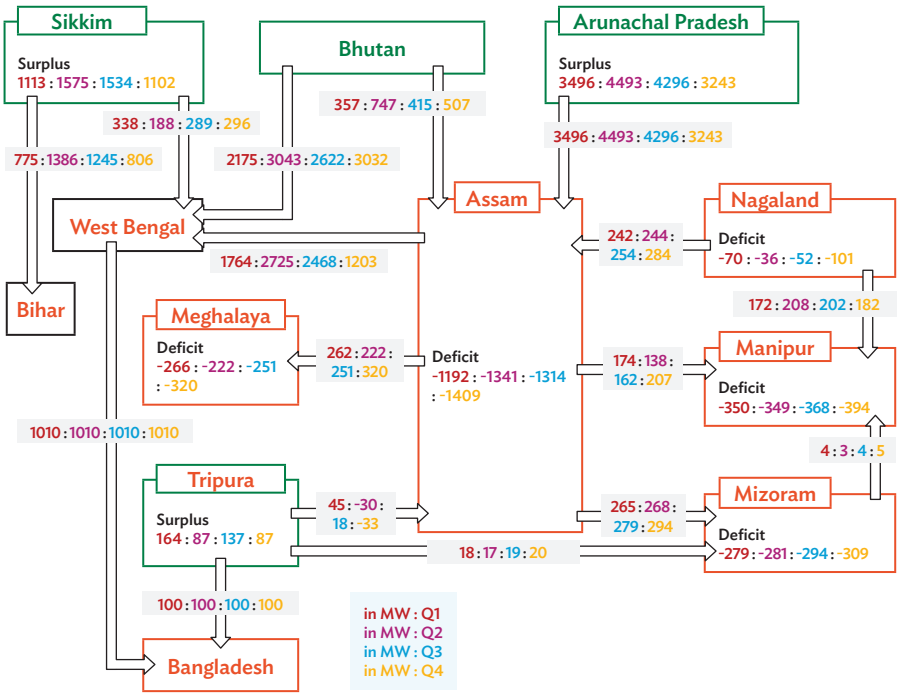
Table 3.4 Demand for and Supply of Power in Bangladesh, Bhutan, the North Eastern Region of India, and Nepal (2021–2022) (MW)

Quarter	Power availability	Power demand	Surplus/ deficit	Surplus/ deficit in Bhutan	Surplus/ deficit in Bangladesh	Surplus/ deficit in Nepal
1st	6,396	4,182	2,214	2,541	-1,100	-600
2nd	8,409	4,420	3,990	3,557	-1,100	-600
3rd	7,643	4,529	3,113	3,049	-1,100	-600
4th	6,459	4,582	1,877	3,557	-1,100	-600

MW = megawatt.

Source: Government of India, Ministry of Power, Central Electricity Authority (2016), Draft National Electricity Plan (Volume 1), New Delhi.

Figure 3.2 Interstate Power Supply Scenario (2021–2022)



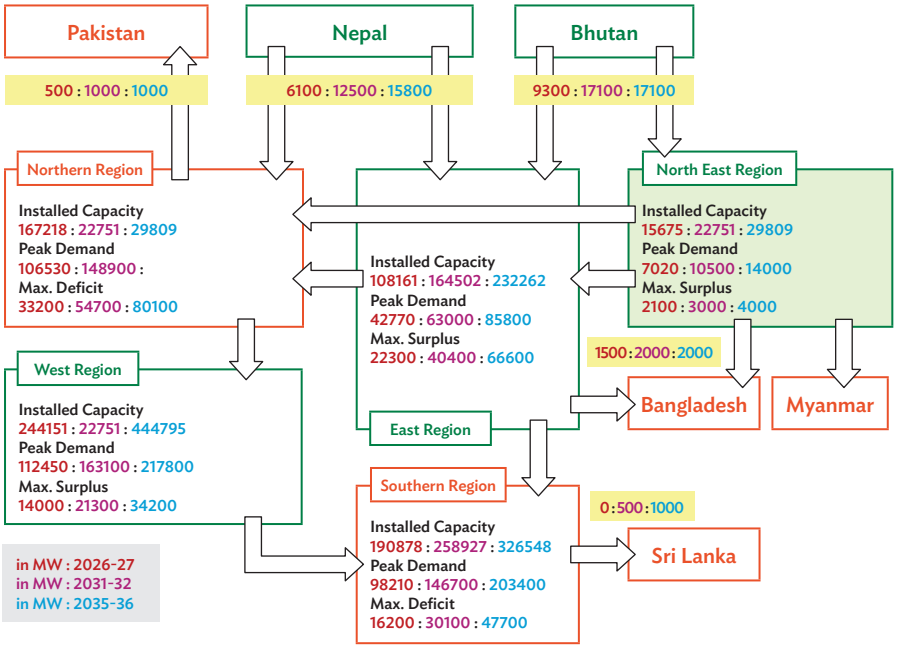
MW = megawatt, Q = quarter.

Note: Power-surplus regions are indicated in green, power-deficit regions in red.

Source: Macdonald, M. (2018), Draft Report on Study of Infrastructure Based on Act East Policy: Connectivity, Marketing Shed, Electrification etc. for NER States. October. Delhi. Prepared for the North East Development Finance Corporation, Guwahati.

The inter-regional and cross-border power supply at the end of the periods 2026–2027, 2031–2032, and 2035–2036 as estimated by the CEA for the Draft National Electricity Plan 2016 is illustrated in Figure 3.3.

Figure 3.3 Inter-Regional and Cross-Border Power Demand–Supply Scenario (2026–2027, 2031–2032, 2035–2036)



Max. = maximum, MW = megawatts, Q = quarter.

Note: The Eastern Region includes Sikkim; power-surplus regions are indicated in green, power-deficit regions in red.

Source: Macdonald, M. (2018), *Draft Report on Study of Infrastructure Based on Act East Policy: Connectivity, Marketing Shed, Electrification etc. for NER States*. October. Delhi. Prepared for the North East Development Finance Corporation, Guwahati.

The power exchange between Tripura in the NER and Bangladesh triggered by the new 726-MW combined-cycle gas turbine at Palatana (Tripura) offers a new direction for local integrative exchange. This gas reserve-based project is an exclusive generation-load centre location-based model between contiguous cross-border geographies. The Oil and Natural Gas Corporation (ONGC) Tripura Power Company is sponsored by the ONGC, Infrastructure Leasing and Financial Services, and Government of Tripura in the implementation of this project. The development and operation of the transmission system is being undertaken by the NETC, a joint venture of the ONGC Tripura Power Company, POWERGRID, and the NER beneficiary states.

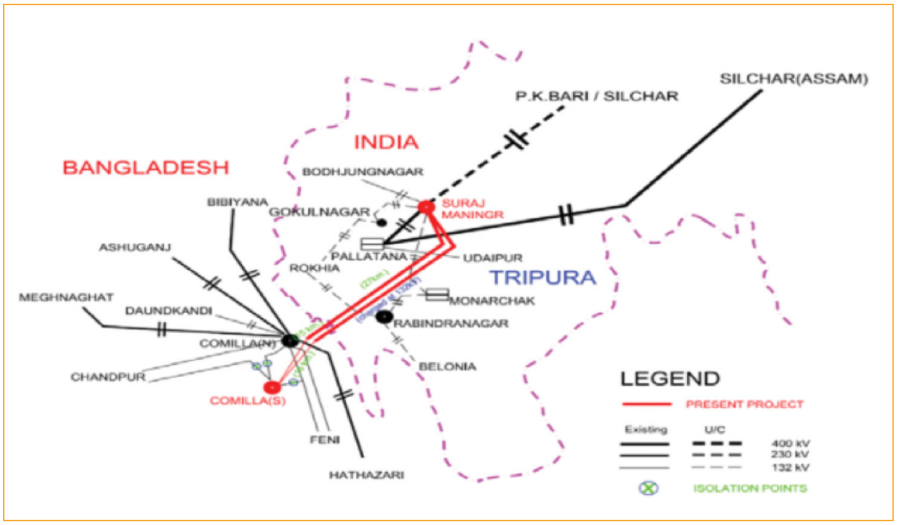
In addition to catering to power-deficit areas of the NER, this project exports 100 MW to Bangladesh (the Government of Tripura is discussing exporting another 100 MW), mainly in lieu of services provided in transporting the project-related equipment and goods and services through Bangladesh's waterways via Calcutta (Figure 3.4). About 2–3 MW is exported to the town of Tamu in Myanmar via a 11-kV transmission line from Moreh in Manipur. POWERGRID erected a 47-km, 400-kV, double-circuit transmission line from Suryamaninagar Power Grid in Tripura to Comilla in Bangladesh (OGNC Tripura Power Company; Telegraph India).

This project can claim emission reduction credits under the CDM scheme established as part of the Kyoto Protocol. This model could be replicated in the Sikkim–Tibet Autonomous Region of China trade route through the Nathu La pass (reopened in 2006), the Arunachal Pradesh–Myanmar route through the Pangsau Pass, and the Manipur, Mizoram, and Myanmar trade corridors. India's Central Electricity Regulatory Commission (CERC) has recently for the first time circulated its draft Cross Border Trade of Electricity Regulations, 2017, which states the following:

> 'The Government of India has also initiated measures in the direction of strengthening the cross border cooperation in electricity with its neighbouring countries. In order to facilitate and promote Cross Border Trade of Electricity with greater transparency, consistency and predictability in regulatory approaches across jurisdictions and minimise perception of regulatory risks, the Ministry of Power in consultation with the Ministry of External Affairs has issued Guidelines on Cross Border Trade of Electricity (herein after referred as 'Guidelines') vide OM No. 14/1/2016-Trans dated 5th December, 2016.' (CERC, 2016)

These guidelines are intended to (i) facilitate CBET between India and neighbouring countries; (ii) promote transparency, consistency, and predictability in regulatory approaches across jurisdictions; (iii) minimise perceptions of regulatory risks; (iv) meet the demand of the participating countries by utilising the resources available in the region; (v) ensure reliable grid operation and transmission of electricity across borders; and (vi) evolve a dynamic and robust electricity infrastructure for cross-border transactions.

Figure 3.4 India–Bangladesh Interconnection for Power Transfer (100 Megawatts)



kV = kilovolt, U/C = under construction.

Source: Central Energy Authority of India, 2017 as referred to in Macdonald, M. (2018), *Draft Report on Study of Infrastructure Based on Act East Policy: Connectivity, Marketing Shed, Electrification etc. for NER States.* October. Delhi. Prepared for the North East Development Finance Corporation, Guwahati.

The CEA of India, which also designed the conduct of business rule, will be the designated authority for CBET. Other agencies will be assigned specific tasks: the Transmission Planning Agency will plan transmission systems in neighbouring countries to facilitate CBET with India; the Settlement Nodal Agency will settle all charges pertaining to grid operations, including operating charges, charges for deviation, and other charges related to transactions with a particular neighbouring country; the CTU will grant and facilitate long- and medium-term open access with respect to cross-border trade and be responsible for billing, collecting, and disbursing the transmission charges; and the National Load Dispatch Centre will grant short-term open access to the Indian grid. The National Load Dispatch Centre will also be responsible for billing, collecting, and disbursing the related transmission charges; act as the system operator for India; be responsible for scheduling and dispatching electricity related to cross-border transactions; and carry out other monitoring and supervision activities required to maintain the security and stability of the international transmission links.

This comprehensive power-trade document has attracted both welcome and widespread comment from trading partners and various agencies. However, as the regulations focus on bilateral trade and 'shall be binding on all the participating entities undertaking such cross border transactions' (CERC, 2016), power-generating countries like Bhutan and Nepal have shown reservations and raised questions as to the eligibility conditions for participating entities as mentioned in this draft. These conditions include the following:

(i) import of electricity by Indian entities from generation projects located outside India and owned or funded by the Government of India, Indian public-sector units, or private companies with 51% or more ownership by an Indian entity or entities;
(ii) import of electricity by Indian entities from projects having 100% equity held by an Indian entity or entities and/or the Government of India, or government-owned or -controlled companies in a neighbouring country;
(iii) import of electricity by Indian entities from licensed traders of neighbouring countries with more than 51% ownership by an Indian entity or entities; and
(iv) export of electricity by distribution licensees or PSUs, if surplus capacity is available and certified by the concerned distribution licensee or PSU, as the case may be.

In particular, the condition that projects must be 51% owned or funded by Indian investors puts severe restrictions on Bhutan, Nepal, and other generating countries that are trying to attract investment from multiple sources with the aim of exporting power to India and other neighbouring countries. Bhutan also has concerns regarding the adverse impact of this draft policy on its ongoing and recently completed projects like the concession agreement for the Kholongchhu project, which was built on a joint venture modality between Druk Green Power Corporation and SJVN, who each held 50% equity shares. This project's financing modality consists of a 70% loan (to be raised by the two partners) and 30% equity shared equally between the joint venture partners). Similarly, in the first public–private partnership, Dagachhu (commissioned in 2015), the Druk Green Power Corporation holds 59% equity, India's Tata Power Company holds 26%, and the National Pension and Provident Fund holds 15%. However, the provisions of the draft guidelines will not give market access to India (Dorji, 2018).

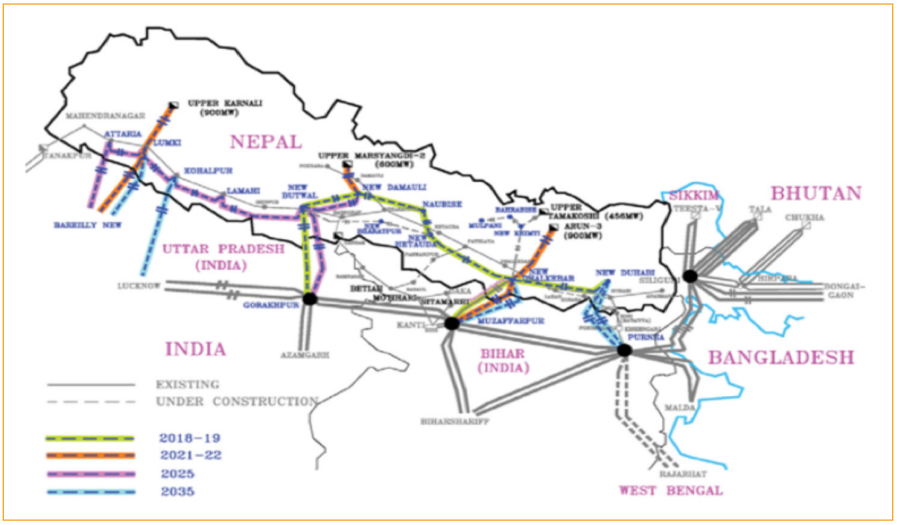
With regard to transmission issues, this draft framework provides the following useful hints as to the direction of power trading triggered by India's participation:

i) Transmission systems developed for cross-border trade will normally form part of the integrated transmission system on the Indian side of the border.
ii) The transmission interconnection between India and the neighbouring country shall be planned jointly by transmission planning agencies from the two countries with the approval of the respective governments. The generators located outside the country may, if required in light of technical and strategic considerations, develop transmission lines to supply electricity to the pooling station at their own cost. However, the associated transmission system in India shall be planned by the CEA and CTU with the approval of the Ministry of Power.
iii) Cross-border transmission lines may be constructed between a pooling station in one country to a second station in another country to ensure the secure, safe, and controlled operation of the grid. Interconnections between pooling substations in different countries shall be monitored and controlled by the respective system operators of the two countries, with proper coordination.
iv) The CTU will determine transmission access priority as per the CERC regulation on CBET.
v) The Ministry of Power shall notify the Indian nodal agency for each neighbouring country that shall be responsible for setting grid operation-related charges as per the CERC regulations. Indian generating stations supplying electricity exclusively to neighbouring countries may be allowed to build independent transmission systems to connect to the neighbouring country's transmission system keeping technical and strategic considerations in view and with the approval of the competent authority at the cost specified in the contract agreement signed by the Indian entity and neighbouring country.

This essentially bilateral framework could be a stepping stone to trilateral and multilateral frameworks that can be used in the BBIN subregion and extended to other neighbouring countries, both on the western borderlands (like those

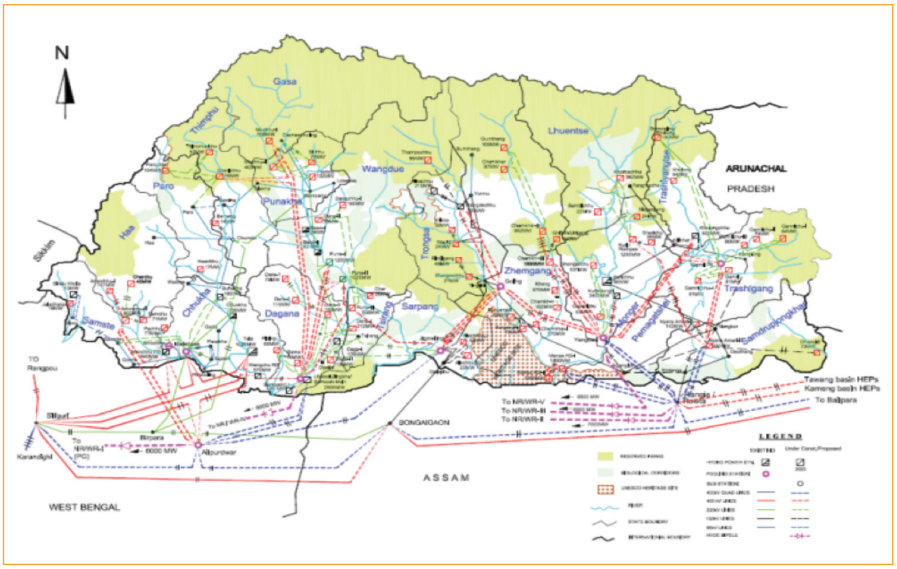
with Afghanistan, Pakistan, and beyond) and on the eastern borderlands with Myanmar and other Southeast Asian countries.

Figure 3.5 India–Nepal Cross-Border Transmission Line Intersections



Source: Central Electricity Authority, New Delhi.

Figure 3.6 India–Bhutan Cross-Border Transmission Line Intersections



Source: Namgay, K. (2015), 'Energy Security in South Asia—Perspective from Bhutan,' Executive Director. Thimpu: Druk Green Power Corporation.

8. Investment Models

The Twelfth Five-Year Plan projected that ₹542.15 billion in funding would be required to add the proposed 5,353 MW of new capacity (78% hydroelectric and 22% thermal) by 2017. In addition to this, strengthening and erecting new transmission and distribution lines would cost ₹263.92 billion. The plan also recommended prioritising lending to NER power projects to encourage financing for such projects, and financing power generation and transmission projects in the NER through a dedicated fund.

> 'Since the benefits of optimal utilization of mineral and water resources of NE North East would accrue to the whole country, establishing such a fund could channelize the funds collected from the country as a whole and release capital resources of banks/ GoI [Government of India] grants for community level developmental work in [the] NE region. Project developers could be further incentivised to set up projects in the NER through fiscal incentives like [a] waiver on Minimum Alternate Tax (MAT). It may be emphasised that MAT credits are utilized by a project developer between [the] 5th and 10th year of the project cycle. Hence, [a] MAT waiver would not impact the total tax payments but would only increase upfront equity returns to the project developer.' (Planning Commission, 2012: 430)

Three investment models have been practiced in the NER: public-sector triggered investment, private-sector investment, and multilateral agency-led investment. Thus far, the power sector in this region has been dominated by public-sector investment.

8.1. Public Sector-Triggered Investments

The 2008 Hydro Power Policy sets a low threshold of 350 MW for hydropower plants set up in the NER with mega power status (compared to the 500 MW threshold for the rest of the country) to qualify for the following fiscal concessions and benefits:

(i) Zero customs duty: Capital equipment imported for these projects would be exempt from customs duty.

(ii) Deemed export benefits: Deemed export benefits are available to domestic bidders (in both the public and private sectors) for projects following the stipulations in the Foreign Trade Policy.
(iii) Income tax waiver: A 10-year income tax waiver can be claimed by the promoter of a mega power project in any block of 10 years within 10 to 15 years. State governments have been asked to exempt supplies to mega power plants from sales tax and local levies. These measures and economies of scale in mega projects would substantially bring down tariffs.
(iv) Pre-conditions for accessing benefits: A regulatory commission must be formed with full power to fix tariffs and the state power purchase undertaking, in principle, for private distribution in all cities with a population of more than 1 million within a prescribed period by the Ministry of Power to access the benefits.
(v) Price preference for domestic PSU bidders: To ensure that domestic bidders are not adversely affected, a 15% price preference will be given to projects in the public sector.

In the case of private hydropower projects:

(i) The project will be exempt from tariff-based competitive bidding (as of 2008 this was only available to PSUs through January 2011).
(ii) The developer will have the facility of merchant sale of up to 40% of saleable energy in hydropower projects.
(ii) An additional 1% of free power over and above 12%, as the state's royalty, will be earmarked for local development funds to provide a regular stream of revenue for income generation, infrastructure creation, and welfare schemes in the affected areas.
(iii) Each project-affected family will receive 100 kWh of electricity per month free of charge for 10 years.
(iv) The project authority will construct homes at resettled sites for project-affected families, and an industrial training institute will be set up at every project site 6 months before project completion to train affected people for skilled and semi-skilled jobs.
(v) Project-affected families will be given jobs in the project (Ministry of Power, 2008).

With regard to public-sector investments, the Ministry of Power established NEEPCO in 1976 as an exclusive institution 'to plan, investigate, design, construct, generate, operate & maintain power stations' (NEEPCO). It operates one solar, three thermal, and five hydropower stations with a combined installed capacity of 1,251 MW, and has five power projects under development (NEEPCO). The national budget for 2017–2018 includes ₹15.612 billion in investment from NEEPCO (Energy World, 2017).

The Ministry of Power had announced a hydropower fund to provide ₹167.090 billion in support for 40 stalled hydroelectric projects with a capacity of 11,639 MW, and to classify all such ventures as renewable energy. This included a hydropower purchase obligation by the distribution companies from hydropower projects with a capacity of more than 25 MW. The Ministry is now revisiting this proposed policy to avoid financial implications (Athrady, 2018).

8.2. Private-Sector Participation

Private-sector participation has been occurring through two channels: (i) NER-specific national policies like the North East Industrial and Investment Promotion Policy, 2007 (NEIIPP) and North East Industrial Development Scheme, 2018 (NEIDS); and (ii) various state government policies that have attracted private investment.

To accelerate industrial development, the Ministry of Commerce and Industry (Department of Industrial Policy and Promotion) included a specific policy intervention in the NEIIPP known as the Central Capital Investment Subsidy Scheme, 2007 for industrial units in the NER. This scheme came into effect on 1 April 2007 and was to remain in force through 31 March 2017 (discontinued in 2014). Its provisions were applicable to all new industrial units in the NER set up after 1 April 2007 (no effective steps toward establishment must have occurred prior to this date). 'Industrial unit' refers to any industrial undertaking, suitable servicing unit (other than that run departmentally by the government), and existing unit being substantially expanded. It covered crucial areas like the bio-technology and power-generating industries. A crucial provision of this scheme was a 30% subsidy of an industrial unit's capital investment (or additional investments) in plants and machinery. This subsidy was applicable to units in the private, joint, and cooperative sectors, as well as to units set up by NER state governments. The limit for the automatic approval of the subsidy at this rate

was ₹15 million. An empowered committee decided on the granting of capital investment subsidies higher than ₹15 million, up to a maximum of ₹300 million.

Under the NEIIPP 2007, power-generating plants continued to receive incentives as governed by the provisions of Section 81A of the Income Tax Act. In addition, power-generating plants with capacities up to 10 MW (from both conventional and non-conventional sources) were eligible for a capital investment subsidy, interest subsidy, and comprehensive insurance.

The NEIIPP 2007 was replaced by the NEIDS 2018 for the period 2017–2022 which has a financial outlay of ₹30 billion up to March 2020. The new scheme includes power generating units with capacities up to 10 MW, and seven categories of incentives for investors. Table 3.5 outlines the nature and depth of the subsidies and incentives under various categories that are extended to all eligible industries, including power-generating units.

Table 3.5 The North East Industrial Development Scheme – Subsidies and Incentives Extended to Eligible Industrial Units by Category

Central Capital Investment Incentive for Access to Credit	30% of the investment in plant and machinery with an upper limit of ₹50 million on the incentive amount per unit
Central Interest Incentive	3% on working capital credit advanced by eligible banks or financial institutions for first 5 years from the date of commencement of commercial production by the unit.
Central Comprehensive Insurance Incentive	Reimbursement of 100% of the insurance premium on building and plant and machinery insurance for 5 years from the date of commencement of commercial production by the unit.
Goods and Service Tax Reimbursement	Reimbursement up to the extent of the central government's share of the central and integrated goods and service tax for 5 years from the date of commencement of commercial production by the unit.
Income Tax Reimbursement	Reimbursement of the centre's share of income tax for the first 5 years, including the year of commencement of commercial production by the unit.
Transport Incentive	• 20% of the cost of transportation, including the subsidy currently provided by railways and the railway public sector undertaking for the movement of finished goods by rail. • 20% of the cost of transportation for finished goods, for movement through the Inland Waterways Authority of India. • 33% of the cost of transportation by air freight of perishable goods (as defined by the International Air Transport Association) from the airport nearest to the place of production to any airport within the country.
Employment Incentive	The Government of India shall pay 3.67% of the employer's contribution to the Employees Provident Fund, and shall bear 8.33% of the employer' Employee Pension Scheme contribution in the Pradhan Mantri Rojgar Protsahan Yojana.

Source: Department of Industrial Policy and Promotion (2018), The Gazette of India, Extraordinary, Part I, New Delhi (13 April) https://www.narendramodi.in/cabinet-approves-north-east-industrial-development-scheme-neids-2017-539397 (accessed 18 December 2018).

Significant private-sector interventions also followed the introduction of the Hydro Policy 2008. This policy aims to provide ₹167.09 billion ($2,493.8 million) in support of 40 stalled hydroelectric projects (with a total capacity of 11,639 MW), and to classify all such ventures as renewable energy. It also aims to erase the distinction between large and small hydropower plants. By doing so, it hopes to create a capacity of 225 GW of clean power by 2022 (Times of India, 2017). The Foreign Direct Investment (FDI) Policy of India 2017 (Department of Industrial Policy and Promotion, 2017) does not refer to the power sector directly. It mentions mining, petroleum, and natural gas projects. A provision for power exchanges registered under the Central Electricity Regulatory Commission (Power Market) Regulations, 2010 caps the percentage of equity participation or FDI at 49%, and categorises them as automatic route.

At the national level, after the de-licensing of the electrical machinery industry and permission of 100% FDI, inflows in the power sector reached $9.7 billion from April 2000 to May 2015. Many of the states in the NER have designed their own polices for attracting investment in the power sector in line with national government policies. For instance, since 2007 Assam and Arunachal Pradesh have had a policy encouraging the development of small hydropower projects, under which these projects receive a 50% share of carbon credit as a CDM benefit, and indigenous tribal developers of projects with a capacity of up to 5 MW are exempted from supplying free power to the state government. Similarly, since 2006, Manipur has had a policy promoting the generation of additional power from renewable and non-conventional energy sources under which it exempts producers from electricity duty for 5 years from commercial operation date for captive use or sale to a third party. The producers are treated as industrial units, and receive incentives, including infrastructure, similar to those provided to undeveloped areas.

On the other hand, Meghalaya has a policy promoting power generation from non-conventional energy sources under which developers are provided with infrastructure facilities in industrial estates, are exempted from electricity duty for 5 years, and are eligible to defer or remit sales and value-added tax. Tripura's policy promoting the generation of electricity from new and renewable energy sources provides the same benefits as the NEIIPP 2007, and exempts developers from sales and value-added tax on renewable energy equipment and materials

(or reimburses these charges). It also provides developers with a 100% CDM benefit in the first year.

Both the NEIDS and India–ASEAN Free Trade Agreement present significant opportunities. Although the NEIDS does not specifically mention the participation of foreign investors, if investment participation is extended to the countries that neighbour South Asia and ASEAN (including in the power sector), this could substantively change the pattern of investment in power and other sectors in the NER. In fact, this would pave the way for both generation and trading between the BBIN and ASEAN countries. Similarly, if electricity or power is included as a commodity in the South Asian Free Trade Area of SAARC and the India–ASEAN Free Trade basket, the investment–trade linkage will flourish and market expansion and integration could be consolidated.

8.3 Multilateral Agency-Led Investment

Multilateral agencies are increasingly showing interest in investing in CBET. The Japan Bank for International Cooperation, the World Bank, AIIB, ADB, and the New Development Bank of Brazil, Russia, India, China, and South Africa (BRICS) are likely to play vital roles in future projects.

The Hydro Policy 2008 identified foreign assistance as a source of financing for central and state-sector hydroelectric projects in the NER. NEEPCO utilised this provision to finance the Pare Hydro Electric Project and the Meghalaya State Electricity Board project for the renovation and modernisation of Umiam II HEP. The World Bank is supporting six states in the NER with a $470 million loan (implemented by POWERGRID) to augment intra-state transmission, sub-transmission, and distribution networks by upgrading old lines, and constructing new lines, associated substations, and transmission and distribution networks. The project also includes capacity building and institutional strengthening of power utilities and departments of participating states. This will enhance the capacity of state-level institutions to extend last-mile electricity connections to households. This project will reduce technical and non-technical losses, frequent interruptions, and outages (World Bank, 2016).

AIIB, which has 87 approved members and a fund of $100 billion (India is the second largest shareholder with 7.50% against China's 26.06%) commenced

operations in January 2016. It will complement and cooperate with the existing multilateral development banks. It offers sovereign and non-sovereign financing for sound and sustainable projects in energy and power, transportation and telecommunications, rural infrastructure and agriculture development, water supply and sanitation, environmental protection, and urban development and logistics. Six of SAARC's eight members are signatory to AIIB. In the strategic document AIIB Energy Strategy: Sustainable Energy for Asia, it is stated that: AIIB's founding members stressed the need to increase regional connectivity of energy systems in Asia, especially power and gas, with a view to strengthening systems, improving the security and efficiency of energy supply, optimizing the use of resources, allowing for greater flexibility in their operation, reducing local, regional and global adverse environmental impacts, and fostering greater use of renewable energy resources (AIIB, 2016).

The NER and the BBIN countries now have another major source of investment in the power sector. AIIB has already approved investment in a series of energy-related projects in South and Southeast Asia including India. These projects include the Tarbela 5 Hydropower Extension Project (Pakistan) (co-financed with the World Bank); the Distribution System Upgrade and Expansion Project and Natural Gas Infrastructure and Efficiency Improvement Project (Bangladesh); and the Myingyan Power Plant Project (Myanmar) (AIIB, 2017). Approved projects in India include the Transmission System Strengthening Project, a subset of the HVDC Bipole Link between Western Region (Raigarh, Chhattisgarh) and Southern Region (Pugalur, Tamil Nadu)–North Trichur (Kerala); the India Infrastructure Fund to invest in infrastructure platforms and service companies covering sectors like energy and utilities (e.g., renewable energy, electric transmission and distribution networks, water and wastewater systems, and smart cities); and the Andhra Pradesh 24x7 Power For All Project.

References

Asian Infrastructure Investment Bank (AIIB) (n.d.), https://www.aiib.org/en/about-aiib/index.html (accessed 6 December 2018).

AIIB (2016), *AIIB Energy Strategy: Sustainable Energy for Asia*. Beijing: AIIB.

AIIB (2017), India: India Infrastructure Fund. https://www.aiib.org/en/projects/approved/2017/india-infrastructure-fund.html (accessed 6 December 2018).

Athrady, A. (2018), 'Incentives to Stuck Hydro Power Projects Unlikely', Deccan Herald. https://www.deccanherald.com/national/financial-incentives-stuck-683094.html (accessed 18 December 2018).

Bhattacharjee, B. (2015), 'Biggest Solar Plant in Northeast Begins Power Generation', Down to Earth. http://www.downtoearth.org.in/news/biggest-solar-plant-in-northeast-begins-power-generation-48537 (accessed 6 January 2018).

Daily Star (2017), Bangladesh–Bhutan Joint Statement (20 April) http://www.thedailystar.net/country/bangladesh-bhutan-joint-statement-1393816 (accessed 14 June 2018).

Dorji, T. (2018), 'Cross Border Electricity Trade Issues Under Review', Kuensel. http://www.kuenselonline.com/cross-border-electricity-trade-issues-under-review/ (accessed 19 December 2018).

Dubey, M., L.R. Baral, and R. Sobhan (1999) (eds). *South Asian Growth Quadrangle*. Delhi: Macmillan.

Energy World (2017), 'Investment by Power Min PSUs Down 8.3 Per Cent at Rs 62,000 cr in 2017–18' (2 February) https://energy.economictimes.indiatimes.com/news/power/investment-by-power-min-psus-down-8-3-per-cent-at-rs-62000-cr-in-2017-18/56938121 (accessed 23 May 2018).

Finance Minister of India (2007), Speech in the Meeting on Look East Policy. Delhi: Ministry of External Affairs.

Government of Bhutan (2014), *Annual Report 2014*. Thimphu: Druk Green Power Corporation.

Government of Bhutan, Ministry of Finance (2016), National Revenue Report 2015–16. Thimphu.

Government of Bhutan, National Statistics Bureau (2016), National Accounts Statistics 2016. Thimphu.

Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion (2017), Consolidated FDI Policy (Effective from August 28, 2017). http://dipp.nic.in/policies-rules-and-acts/policies/foreign-direct-investment-policy (accessed 6 December 2018).

Government of India, Ministry of Development of North Eastern Region and Shillong, North Eastern Council [MDONER] (2008), North Eastern Region Vision 2020. Delhi.

Government of India, Ministry of External Affairs (2015), 'Joint Declaration between Bangladesh and India during Visit of Prime Minister of India to Bangladesh 'Notun Projonmo – Nayi Disha' (7 June). https://www.mea.gov.in/outoging-visit-detail.htm?25346/Joint+Declaration+between+Bangladesh+and+India+during+Visit+of+Prime+Minister+of+India+to+Bangladesh+quot+Notun+Projonmo++Nayi+Dishaquot (accessed 19 December 2018).

Government of India, Ministry of Finance (2013), Report of the Committee for Evolving a Composite Development Index of States. Delhi.

Government of India, Ministry of Panchayati Raj (2006). Planning for the Sixth Schedule Areas and Those Areas not Covered by Parts IX and IX–A of the Constitution, Report of the Expert Committee. Delhi.

Government of India, Ministry of Petroleum and Natural Gas (2016), Hydro Carbon Vision 2030 for North East India. Delhi.

Government of India, Ministry of Power (2008), Hydro Power Policy 2008. Delhi.

Government of India, Ministry of Power, Central Electricity Authority (2016), Draft National Electricity Plan (Volume 1). Delhi.

Government of India, Planning Commission (1997), Transforming the North East: Tackling Backlogs in Basic Minimum Services and Infrastructural Needs, High Level Commission Report to the Prime Minister. Delhi.

Government of India, Planning Commission (2006), Report of the Task Force on Connectivity and Promotion of Trade and Investment in North East States. Delhi.

Government of India, Planning Commission (2012), Development of Power Sector in North Eastern Region, Working Group on Power for 12th Plan, 2011. Delhi. pp.408–415.

Government of India, Planning Commission (2013), Development of Power Sector in North-Eastern Region, Working Group on Power for 12th Plan. Delhi.

Government of Myanmar, Ministry of Environmental Conservation and Forestry (2015). Myanmar's Intended Nationally Determined Contribution (25 August). Nay Pyi Taw.

Indian Chamber of Commerce (2017), Conference on Energizing North East (5 September). Shillong.

Japan International Cooperation Agency (2014), 'Matarbari Ultra Super Critical Coal-Fired Power Project'. http://www.jica.go.jp/english/news/press/2014/c8h0vm00008t3n1n-att/20140616_01_01.pdf (accessed 23 February 2016).

Lama, M.P. (2001), *Sikkim Human Development Report*, New Delhi: Social Science Press.

Lama, M.P. (2002), 'South Asia Growth Quadrangle: Opportunities, Policy Interventions and Growth Prospects', in S. Afroze (ed.), *Regional Cooperation in South Asia: New Dimensions and Perspectives.* Dhaka: Bangladesh Institute of International and Strategic Studies.

Lama, M.P. (2013), 'India–Bangladesh Energy Cooperation: Historic Newer Trends' (1 June). Delhi: Mainstream; Dhaka: Energy and Power.

Lama, M.P. (2017a), 'Renewable Agenda', Kathmandu Post http://kathmandupost.ekantipur.com/news/2017-12-13/renewable-agenda.html (accessed 1 December 2018).

Lama, M.P. (2017b), 'Integrating Energy Security Dynamics in Four Border Junctions: A Grand Vision for India', Strategic Year Book 2017, United Service Institute of India. New Delhi: Vij Books.

Lama, M.P. (2017c), 'Relocating Electricity Interconnections in Nepal-India-China Tri-Junction', in B.D. Pant, N.K. Joshi, and P. Rijal (eds), *Selected Essays on Nepali Economy*, IIDS Special Edition (June). Kathmandu: Institute of Integrated Development Studies.

Lama, M.P. (2018d), 'Promoting Trans-Boundary Power Trade and Interconnection to Enhance Energy Security and Sustainable Use of Energy in South and South-West Asia'. Draft mimeograph. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.

North Eastern Council (2016), Prime Minister's Address at the 65th meeting of North Eastern Council in Shillong (27 May). Shillong.

North Eastern Electric Power Corporation. http://www.neepco.co.in/neepco/# (accessed 7 January 2018).

Oil and Natural Gas Corporation Tripura Power Company, Initiative by GoT. http://www.otpcindia.in/index.php?option=com_content &view=article &id=46&Itemid=27 (accessed 12 December 2015).

Reserve Bank of India (2006), Report of the Committee on Financial Sector Plan for North Eastern Region. Mumbai: Reserve Bank of India.

Subedi, B. (2018), 'Nepal, Bangladesh Agree to Build Hydro Projects, Kathmandu Post. http://kathmandupost.ekantipur.com/news/2018-12-05/nepal-bangladesh-agree-to-build-hydro-projects.html (accessed 18 December 2018).

Telegraph India. http://www.telegraphindia.com/1160303/jsp/northeast / story_72482.jsp#. VteqQUARogo (accessed 4 March 2016).

Times of India (2017), 'Cabinet Nod Soon for Hydro Power Policy: Singh' (29 November). http://timesofindia.indiatimes.com/business/india-business/cabinet-nod-soon-for-hydro-power-policy-singh/articleshow/61853873.cms (accessed 29 May 2018).

World Bank (2007), *India: Development and Growth in the North East India: The Natural Resources, Water and Environment Nexus.* Washington, DC: World Bank.

World Bank (2016), World Bank Approves US$ 470 Million to Improve Electricity Supply in the North Eastern Region, India. http://www.worldbank.org/en/news/press-release/2016/06/24/world-bank-approves-usd470million-improve-electricity-supply-the-north-eastern-region-india (accessed 4 January 2018).