ASSAM

AS INDIA'S GATEWAY TO ASEAN

MARCH 2021

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6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 8632 4444; Fax +63 2 8636 2444
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Notes:

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On the cover: A girl smiles while performing at the traditional Bihu festival in Guwahati, Assam, which has the potential to leverage regional corridors in Southeast Asia given its geostrategic location (photo by Michal Knitl).

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Dr. K. K. Dwivedi, IAS
Commissioner & Secretary

Government of Assam
Departments of Industries & Commerce,
Transport, Public Enterprises &
Act East Policy Affairs

Foreword

Assam lies at the heart of India's 'Act East Policy' which envisions strengthening trade links and people-to-people ties between India and the Association of South East Asian Nations (ASEAN), one of the world's fastest growing regions with an economy of over USD 3 trillion. With its strategic location, the State offers a market of 800 million people and can serve as the gateway to the Southeast Asian market. The State has the capability to cater to the north eastern region of India and the rest of the country, but also has the potential to become the manufacturing and services hub for the Southeast Asia region.

Assam's emerging local economy grew at compound annual growth rate of 12.75 percent between 2011-12 and 2018-19. The main economic sectors include agriculture (including tea) petrochemicals, oil and gas, energy, tourism, food processing and river transport, among others. The State has credible institutions of higher learning, is developing urban centres, and business-friendly policies to attract investors. It is the single largest tea producing region in the world and contributes to over half of India's total tea production. The growing horticulture industry can be harnessed to benefit the agro and food processing sectors.

To support this growth, the State Government is enhancing airways, roadways, waterways, railways and internet connectivity, and is also working with the central Government to begin direct flights between the State and ASEAN cities. The India-Myanmar-Thailand Trilateral Highway provides the land route through Assam to connect to Myanmar and onward to Thailand, Malaysia, and Singapore. The Government of Assam has also put in place an effective single window clearance mechanism to facilitate customs clearance. Assam is also home to almost 10 percent of India's navigable waterways and the Brahmaputra and Barak rivers will be crucial in connecting the land-locked northeastern region of the country to Chattogram port in Bangladesh, which will facilitate trade with ASEAN.

I would like to express my sincere appreciation to the Asian Development Bank for being our partner in this endeavor and helping us develop an outward looking strategy document for the State. This important publication highlights our collaborative vision. I look forward to strengthening our development partnership in the coming years.

(Dr. K.K. Dwivedi)

Preface

Over the last two decades, the Government of Assam has worked closely with the Asian Development Bank (ADB) in power, public sector management, rural roads, urban infrastructure, agriculture, natural resources and water management, education and skills, and institution building. ADB's programs have been relevant and well-aligned with the state government's priorities. Assam has also been core to discussions on regional cooperation in South Asia.

Assam is the largest state in the northeast region (NER) of India and is rich in natural resources. Given its geographic position, extensive international borders, and proximity to the Association of Southeast Asian Nations (ASEAN), the NER is at the center of India's Act East policy. Assam has the potential to become the hub of economic activity in the NER as well as trade with neighboring Bangladesh, Bhutan, and Nepal (BBN).

The report has laid down an outward looking growth strategy with the objective of developing the state into a \$75 billion economy by 2025 and achieving key sustainable development goals. The pillars of the strategy include developing multi modal connectivity to the high growth ASEAN and BBN markets (estimated market size \$840 billion); an industry strategy to enable manufacturing and service industries to service international markets; identifying and plugging key energy and urban infrastructure gaps; and developing the institutional and regulatory environment for increased cross border trade. The study identifies important gateways to ASEAN and BBN and the status of multi modal connectivity to these gateways. Beyond manufacturing, the study shows that Assam can emerge as a hub for service industries including higher education, medical value tourism, and technology-enabled services.

I would to thank Chandra Mohan Patowary, Minister for Industries and Commerce, Government of Assam; Ravi Capoor, Secretary Textiles, Government of India; K.K. Dwivedi, Commissioner and Secretary Industries Department, Government of Assam; and Meenakshi Sundaram, Commissioner and Secretary to the Governor of Assam for guiding the ADB study team. This publication is a result of these collaborative efforts.

Kenichi Yokoyama
Director General
South Asia Department

Study Team

The report has been prepared under the overall guidance of Kenichi Yokoyama, Director General, South Asia Department, and Sabyasachi Mitra, Deputy Country Director, India Resident Mission, Asian Development Bank.

Asian Development Bank

Kavita S. Iyengar
Shreyans Jain

PricewaterhouseCoopers, India

Mohammad Athar (Saif)
Vaishakhi Shah
Bhuvan Bhaskar Agrawal
Nishant Jain
Jonathan Wen
Piyush Lohia
Jyotiranjana Pradhan
Jiten Hindocha

Deloitte Touche Tohmatsu India Private Limited

Arindam Guha
Shubham Gupta
Madhusree Dasgupta
Sathyanarayana Ganta
Shakya Sengupta

Independent Experts

Raman Ahuja

The team benefited from valuable inputs from Moloy Bora and Sajjad Alam, as also other state government officials. Insights were received from Kamlesh Salam, bamboo expert; Federation of Industry and Commerce of North Eastern Region (FINER); Confederation of Indian Industry (CII) Northeast Chapter; Federation of Indian Chambers of Commerce and Industry (FICCI); and North-East Regional Advisory Council, during the consultation process. Ashok Srivastava, Sanjay Joshi, and Prabhasha Sahu, ADB provided comments and insights into the sector discussions.

Abbreviations

AAGR	Average Annual Growth Rate
ADB	Asian Development Bank
AEGCL	Assam Electricity Grid Corporation Ltd.
AEP	Act East Policy
ANDA	Abbreviated New Drugs Application
APAC	Asia Pacific
APDCL	Assam Power Distribution Company Ltd.
APGCL	Assam Power Generation Corporation Ltd.
API	Active Pharmaceutical Ingredient
ASEAN	Association of Southeast Asian Nations
ASEB	Assam State Electricity Board
AT&C	Aggregate Technical & Commercial Losses
BBIN	Bangladesh, Bhutan, India, and Nepal
BBN	Bangladesh, Bhutan, and Nepal
BCIM	Bangladesh–China–India–Myanmar
BCPL	Brahmaputra Cracker and Polymer Limited
BHEL	Bharat Heavy Electricals Limited
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral and Economic Cooperation
BPM	Business Process Management
BPO	Business Process Outsourcing
CAEDCL	Central Assam Electricity Distribution Company Limited
CAGR	Compound Annual Growth Rate
CBSP	Capacity Building for Service Providers
CEA	Central Electricity Authority
CGS	Central Generating Stations
Ckm	circuit kilometers
COD	Commercial Date of Operation
CPRI	Central Power Research Institute

CRAMS	Contract Research Manufacturing Services
DDUGJY	Deen Dayal Upadhyay Gram Jyoti Yojna
DGCA	Director General of Civil Aviation
DGCIS	Directorate General of Commercial Intelligence and Statistics
DPC	District Planning Committee
EPIP	Export Processing Industrial Park
ESDM	Electronics System Design and Manufacturing
FIBC	Flexible Intermediate Bulk Container
FICCI	Federation of Indian Chambers of Commerce and Industry
FMCG	Fast Moving Consumer Good
GDD	Guwahati Development Department
GDP	Gross Domestic Product
GER	Gross Enrollment Ratio
GMCA	Guwahati Municipal Corporation Area
GMP	Good Manufacturing Practices
GMS	Greater Mekong Subregion
GSDP	Gross State Domestic Product
GST	Goods and Services Tax
GW	gigawatt
HSR	High Speed Railway
IBEF	India Brand Equity Foundation
ICC	International Chamber of Commerce
ICCR	Indian Council for Cultural Relations
ICD	Inland Container Depot
ICP	Integrated Check Post
IEX	Indian Energy Exchange
IIDC	Industrial Infrastructure Development Center
ITeS	Information Technology Enabled Services
JCCCN	Joint Committee on Coordination of Commercial Navigation
JCI	Joint Commission International
kV	kilovolt
kWH	kilowatt hour
LAEDCL	Lower Assam Electricity Distribution Company Limited
LCS	Land Customs Station
LPI	Logistics Performance Index

MDF	Medium Density Fiber
MMSCMD	million metric standard cubic meters per day
MMTPA	million metric tons per annum
MNRE	Ministry of New and Renewable Energy
MOOCs	Massive Open Online Courses
MOU	Memorandum of Understanding
MRO	Maintenance, Repair, and Overhaul
MSMEs	Micro, Small, and Medium-Sized Enterprises
MW	megawatt
NAAC	National Assessment and Accreditation Council
NCR	National Capital Region
NEDFi	North Eastern Development Finance Corporation
NER	Northeast Region
NHESP	National Higher Education Strategic Plan
NSDP	National State Domestic Product
OEM	Original Equipment Manufacturer
PGCIL	Power Grid Corporation of India Limited
PMP	Phased Manufacturing Plan
PPDS	Pharmaceutical Promotion Development Scheme
PPP	Public–Private Partnership
PRC	People’s Republic of China
PRI	Panchayati Raj Institution
PSU	Public Sector Unit
PTC	Power Trade Corporation
PTUAS	Pharmaceuticals Technology Upgradation Assistance Scheme
PVC	Polyvinyl Chloride
PWD	Public Works Department
R&D	Research and Development
RGVY	Rajiv Gandhi Grameen Vidyutikaran Yojna
RISE	Revitalizing Infrastructure and Systems in Education
SAARC	South Asian Association for Regional Cooperation
SARI	South Asia Regional Initiative
SASEC	South Asia Subregional Economic Cooperation
SDG	Sustainable Development Goal
SHC	SAARC Highway Corridor

SKRL	Singapore-Kunming Rail Link
SMEs	Small and Medium-Sized Enterprises
SPTF	Special Purpose Tea Fund
T&D	Transmission and Distribution
TARN	Trans-Asian Railway Network
TPD	tons per day
TUFS	Technology Upgradation Fund Scheme
UAE	United Arab Emirates
UAEDCL	Upper Assam Electricity Distribution Company Limited
UDD	Urban Development Department
ULB	Urban Local Body
WHO	World Health Organization

1

Setting the Context

Strategic and Economic Potential of Northeast India

Geographical and Historical Context of the Region

The northeast region (NER) of India has a wealth of natural resources, dense forests, plentiful rainfall, and a landscape crisscrossed by large and small river systems.¹ It is also home to many social, ethnic, and linguistic groups with diverse customs, cultures, traditions, and languages.

With 265,000 square kilometer (km²) area, the NER is bigger than the United Kingdom and four times the size of Austria. As a land bridge between South Asia and Southeast Asia, it is the only region in India to share borders with five countries: Bangladesh, the People's Republic of China (PRC), Myanmar, Bhutan, and Nepal. It has entry points into all these countries that connect it onward to the Association of Southeast Asian Nations (ASEAN) both by land and sea.²

The region was in fact at the forefront of global trade almost 150 years ago transacting over road, rail, inland waterways, and seas. The Dibrugarh–Chattogram rail connect was one of the earliest projects implemented

by the British in India in the late 19th century. The partition of India in 1947 and the independence of Myanmar the following year landlocked the NER, severing its natural transportation routes and market access.

As a result, the geopolitical advantage of being located at the crossroads of three major economies—East Asia, South Asia, and Southeast Asia—could not translate to NER's economic development in the new world. Its role and contribution in India's rapidly expanding trade with Southeast Asia and the PRC in recent decades, has therefore been marginal at best. The NER has also not been able to integrate into and benefit from the various regional and subregional initiatives that neighboring countries have created.

The Northeast Region as the Focal Point of Regional Cooperation in Asia and India's "Act East" Policy

The NER lies at the confluence of various subregional programs for economic cooperation in Asia such as the South Asia Subregional Economic Cooperation (SASEC),³ Bay of Bengal Initiative for Multi Sectoral Economic Cooperation (BIMSTEC),⁴ and Bangladesh–China–India–Myanmar (BCIM). The region is thus significant for India's participation in these programs (Figure 1.1).

India's "Look East" Policy (launched in 1991) for developing extensive economic and strategic

¹ For the purpose of this report the NER of India refers to the states of Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura.

² Members include Indonesia, Thailand, Malaysia, Singapore, the Philippines, Viet Nam, Brunei Darussalam, the Lao People's Democratic Republic (Lao PDR), Myanmar, Cambodia.

³ Members include Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, and Sri Lanka.

⁴ Members include Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand.

Figure 1.1: Northeast India is at the Center of the Regional Cooperation Frameworks in Asia

SAARC	SASEC	BIMSTEC	BCIM	GMS	ASEAN
Afghanistan					
Pakistan					
Bangladesh	Bangladesh	Bangladesh	Bangladesh		
India	India	India	India		
Nepal	Nepal	Nepal			
Bhutan	Bhutan	Bhutan			
Sri Lanka	Sri Lanka	Sri Lanka			
Maldives	Maldives	Maldives			
	Myanmar	Myanmar	Myanmar	Myanmar	Myanmar
		Thailand		Thailand	Thailand
			PRC	PRC	
				Viet Nam	Viet Nam
				Lao PDR	Lao PDR
				Cambodia	Cambodia
					Indonesia
					Malaysia
					The Philippines
					Singapore
					Brunei Darussalam

Regional Cooperation Frameworks: SAARC = South Asian Association for Regional Cooperation, SASEC = South Asia Subregional Economic Cooperation, BIMSTEC = Bay of Bengal Initiative for Multi-Sectoral and Economic Cooperation, BCIM = Bangladesh–China–India–Myanmar, GMS = Greater Mekong Subregion, ASEAN = Association of Southeast Asian Nations.

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: Study team analysis.

relationship with ASEAN has today transformed into the “Act East” Policy (AEP) that focuses on the extended neighborhood in the Asia and Pacific region. The NER is a physical and strategic component of India's AEP, enhancing connectivity by land, air, and sea to transform corridors of connectivity into corridors of economic cooperation. India's use of soft power while implementing the AEP involves building upon common cultural ties, state visits, focusing on tourism, and increasing connectivity and people-to-people contact with the “East” through the NER. Some of the major infrastructure projects under the AEP

located in the NER include the Kaladan Multimodal Transit Transport Project, the India–Myanmar–Thailand Trilateral Highway Project, Rhi-Tiddim Road Project, and Border Haats.

The combined gross domestic product (GDP) of ASEAN was \$2.73 trillion in 2017, putting the group ahead of the United Kingdom's \$2.63 trillion and India's \$2.61 trillion.⁵ Between 1995 and 2016, trade between India and ASEAN grew at a compound annual growth rate (CAGR) of about 11.9%. Of the total trade of nearly \$64.3 billion in 2016, India was the destination for a substantive 59% of ASEAN exports while only 0.17% of ASEAN's imports were from India.⁶

The Bangladesh–Bhutan–Nepal (BBN) triad is a priority for India both in the economic and strategic sense. Besides being immediate neighbors they are also intricately integrated with the Indian economy. India's share in BBN's total imports was 22.6% in 2016. For Bhutan or Nepal it was more than 80%.

The NER is a physical and strategic component of India's AEP, enhancing connectivity by land, air, and sea.

⁵ World Bank Database of GDP of countries. <https://data.worldbank.org/indicator/ny.gdp.mktp.cd>.

⁶ ITC Trademap. <https://www.trademap.org>.

As of 2017, ASEAN and BBN together represented an export opportunity of more than \$1,000 billion for India.⁷

Yunnan as a Gateway to Southeast Asia: Lessons for India

Like the NER of India, the PRC's Yunnan province shares borders with many neighbors. The natural advantage of Yunnan's 4,060 km border with Lao People's Democratic Republic (Lao PDR), Myanmar, and Viet Nam enables the province to act as a land-based connector between the PRC and ASEAN (Figure 1.2).

Figure 1.2: Yunnan Shares Borders with Three Neighbors

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: Macro Note. The Belt and Road Series: The Yunnan–ASEAN Chapter. *Global Economics & Markets Research*. United Overseas Bank. 2017. https://www.uobgroup.com/assets/pdfs/research/MN_171117B.pdf.

Yunnan is also close to Bangladesh, Cambodia, India, and Thailand. Together with Guangxi and Chongqing in the PRC, Yunnan is naturally positioned as a passage to both Southeast Asia and South Asia by land, with

a strategic role in enhancing border stability and cooperation with neighbors. Also like the NER, Yunnan offers many types of terrain, rich flora and fauna, high tourism potential, and historic economic and cultural connect with ASEAN.

Despite these natural advantages, both Yunnan (in the PRC) and the NER (in India) were less developed than other parts of their respective countries in the mid-20th century. However, once the PRC undertook reforms and opened up its economy after 1979, Yunnan came to be positioned as a gateway to both

Box 1.1: Interventions by the People's Republic of China that Positioned Yunnan as the Gateway to Southeast Asia

Targeting Sectors with High Export Potential

Five industries were identified for promotion—high and new technology, biological resources, tobacco, minerals, and tourism.

Focus on Connectivity

- Various highways were built to improve the land link between Yunnan and ASEAN. For instance, in 2008, a 1,900 km expressway was opened between Kunming (Yunnan's capital) and Bangkok via the Lao People's Democratic Republic (Lao PDR). There are plans for a high speed Singapore–Kunming Rail Link via the Lao PDR, Thailand, and Malaysia under the Belt and Road Initiative of the PRC.
- Yunnan is part of the Greater Mekong Subregion (GMS) program connecting Cambodia, the PRC, the Lao PDR, Myanmar, Thailand, and Viet Nam. Under the GMS, high priority subregional projects in transport, energy, telecommunications, environment, human resource development, tourism, trade, and agriculture are to be implemented.
- The province is also part of the Bangladesh–China–India–Myanmar (BCIM) economic corridor. Despite initial delays, the BCIM offers great potential for cooperation in connectivity, trade, investment, and sustainable development. There is also a plan for a road linking Kolkata (India) and Kunming.

⁷ Trade data sourced from ITC Trademap. <https://www.trademap.org>. ASEAN and BBN imports in 2017 arrived at after subtracting intra-ASEAN and intra-BBN trade from total trade.

Building Border Trade Infrastructure

- Four border cooperation zones were developed to promote trade and investment in Yunnan. These were located in Ruili, Muse, Wanding, and Lincang for Myanmar, and in Hekou for Viet Nam (Figure B1.1). Strategies such as preferential tax policies helped to attract investments into these regions. A PRC–Myanmar Border Economic Cooperation Zone is currently being planned.
- In 2015, the PRC's State Council approved the establishment of the Yunnan Dianzhong New Area in Kunming, covering 482 km². The Yunnan Dianzhong New Area focuses on mid- to high-end industries such as automobile and equipment manufacturing, electronic information, and biological products.

Diplomatic Support

Government of Yunnan has set up platforms for cross-border cooperation such as the Joint Committee on Coordination of Commercial Navigation (JCCCN) on the Lancang–Mekong River, the Economic Cooperation Consultation of Yunnan and Four Provinces of Viet Nam, the Yunnan–North Thailand Cooperation Working Group, and the Yunnan–Myanmar Economic and Trade Cooperation Forum.

Figure B1.1: Ruili (PRC)–Muse (Myanmar) Cross-Border Economic Zone

PRC = People's Republic of China.

Note: The Joint Committee on Coordination of Commercial Navigation involves the PRC, the Lao PDR, Myanmar, and Thailand.

Source: Study team analysis based on *Migration in the Greater Mekong Subregion Resource Book: In-depth Study: Border Economic Zones and Migration*. Mekong Migration Network and Asian Migrant Centre. 2013. Thailand. <http://www.mekongmigration.org/wp-content/uploads/2019/03/finalised-BEZ-pdf-file-1.pdf>.

southwest PRC and Southeast Asia. A series of industrial and infrastructural measures strengthened the socioeconomic development of the province (Box 1.1).

As a result, Yunnan's real GDP growth averaged at 10.9% per annum between 2010 and 2016, well above the national average of 8.1% in the same period.⁸ The province recorded \$21.3 billion worth of trade in 2016, with export at \$12.7 billion and import at \$8.5 billion, a near 60% increase from \$13.4 billion in 2010.⁹

Key merchandise exports for Yunnan included agricultural products and fertilizers as well as labor-intensive manufactured goods while imports chiefly comprised commodities and energy-related products. Services may be expected to expand with the rise of the tourism industry which was almost a quarter of Yunnan's GDP in 2016, up sharply from 14% in 2010.¹⁰

Trade facilitation efforts have contributed to expanding trade links with ASEAN which is Yunnan's largest trading partner. Merchandise trade between ASEAN and Yunnan totaled \$6.0 billion in the first half of 2017, accounting for 63.1% of the province's trade.¹¹

Assam as India's Gateway to Southeast Asia

Assam is the largest state in the NER both in terms of geographic spread and the size of the state economy. It shares borders with seven states and two

neighboring countries, i.e., Bangladesh and Bhutan. Assam has ample water resources and fertile land. Most of the state population lives in the lush valleys of its two major river systems, the Brahmaputra and the Barak.¹² In FY2017, Assam's Gross State Domestic Product (GSDP) at constant prices was ₹1,955 billion, contributing 61% of the GDP for the region.¹³

The Government of Assam has established industrial infrastructure that is currently supporting 800 industrial units including an export processing industrial park at Amingaon in Kamrup district, 3 industrial growth centers, 11 industrial infrastructure development centers, a food park at Chaygaon and a North East Mega Food Park at Nalbari District, along with 21 industrial estates, 8 mini industrial estates, 17 industrial areas, and 18 growth centers.¹⁴ Despite these endeavors, Assam has limited participation in regional trade and 95% of India's exports to its eastern neighbors Bangladesh, Bhutan, and Myanmar come from states outside the NER.¹⁵

Given Assam's geostrategic location, it is well-suited to meet the import demand of neighbors, provided it develops appropriate manufacturing capabilities, human resources, and infrastructure including logistics. To get integrated with global and regional value chains, Assam could leverage the strategic regional corridors passing through it such as the East–West Corridor, Asian Highway 1, South Asian Association for Regional Cooperation (SAARC) Rail Corridor 1, and SAARC Rail Corridor 5 (Figure 1.3).

⁸ United Overseas Bank. 2017. Global Economics & Markets Research. Macro Note. The Belt and Road Series: The Yunnan–ASEAN Chapter. https://www.uobgroup.com/assets/pdfs/research/MN_171117B.pdf.

⁹ Footnote 8.

¹⁰ Footnote 8.

¹¹ Footnote 8.

¹² Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2018. *Economic Survey of Assam 2017–18*. https://des.assam.gov.in/sites/default/files/swf_utility_folder/departments/ecostat_medhassu_in_oid_3/portlet/level_1/files/final.pdf.

¹³ GSDP data sourced from <https://des.assam.gov.in/portlets/state-income>.

¹⁴ Footnote 12.

¹⁵ Federation of Indian Chambers of Commerce and Industry and PwC. 2014. *Gateway to the ASEAN, India's North East Frontier*. <https://www.pwc.in/assets/pdfs/publications/2014/gateway-to-the-asean.pdf>.

Figure 1.3: International Regional Corridors across Assam

SAARC = South Asian Association for Regional Cooperation, SASEC = South Asia Subregional Economic Cooperation.

Source: Study team analysis.

Since the NER is landlocked and has a difficult terrain, international trade traffic (beyond BBN) through the region needs to reach ports in West Bengal through the long winding and narrow Siliguri Corridor which is both costly and time consuming. Economic and logistical connectivity to key port gateways in the vicinity of Assam—Chattogram (Bangladesh), Mongla (Bangladesh), Haldia (India), and Sittwe (Myanmar)—can transform the economics of the state and the region (Figure 1.4).

Economic access to and development of border trade gateways like Integrated Check Posts (ICPs) will enable land-based movement of goods. The ICPs include Sutarkandi (Assam), Sabroom (Tripura), Kawarpuchia (Mizoram), Zorinpui (Mizoram), Hatisar (Assam), Moreh (Manipur), Zokhawtar (Mizoram), Agartala (Tripura), and Dawki (Meghalaya).

Figure 1.4: Gateways around Assam

ICP = Integrated Check Post.

Source: Study team analysis.

Assam has the natural advantage of an intricate inland waterways network, which could be developed and integrated with other modes of transport to allow for efficient movement of goods. Of the 12 national waterways identified in Assam, only NW-2 and NW-16 are currently in use. The development of the rest of the waterways will unlock the full potential of inland waterways as a transportation mode, connecting the neighboring landlocked states to the Indian mainland as well as to the global value chains by leveraging the connectivity of river bodies with Bangladesh.

Setting the Vision for the Study

Background

The GSDP of Assam at constant (2011/12) prices for the FY2017 (Quick Estimates) is estimated at ₹1,955 billion which is approximately 1.6% of the national GDP in the same year.¹⁶ The average annual growth rate (AAGR) of Assam's per capita income in terms of National State Domestic Product (NSDP) at constant (2011/12) prices between 2011/12 and 2015/16 was 4.01%. Per capita income of Assam lagged behind India's average by about 38% in FY2017.¹⁷

Composition of Assam's GSDP has transformed substantially over the past 25 years. Contribution of primary sector has reduced from 47% (FY1994) to 19.34% (FY2017), whereas tertiary sector has become the most dominant sector during the same period (from 38% to 45.5%).¹⁸ However, agriculture continues to support more than 75% of Assam's population, either directly or indirectly, providing employment to

more than 50% of its total workforce.¹⁹ This indicates that majority of the population depends on the state's least productive sector for livelihoods.

As mentioned earlier, for Assam to leverage its geostrategic location to grow its economy, it needs to aggressively promote industrial and infrastructural growth. In this task, it faces the same set of challenges as the rest of NER in terms of land acquisition, availability of power, ease of transport and logistics, credit disbursal, availability of skilled labor, and marketing and taxation issues.²⁰

All the successful industries in Assam are based on local (NER-based) value chains. Raw materials are either procured from within Assam or from neighboring states like Meghalaya and Tripura. Industrial manufacturing output from Assam in FY2016 was about ₹597.88 billion, which was about 0.87% of India's industrial manufacturing output.²¹

Key sectors which contribute to Assam's industrial output are tea and petroleum refining (Table 1.1).

For Assam to leverage its geostrategic location to grow its economy, it needs to aggressively promote industrial and infrastructural growth.

¹⁶ State data sourced from <https://des.assam.gov.in/portlets/state-income>. National data sourced from <https://community.data.gov.in/all-india-gross-domestic-product-at-constant-prices-from-2011-12-to-2016-17/>.

¹⁷ India Brand Equity Foundation. 2018. IBEF- <https://www.ibef.org/download/Assam-May-20181.pdf>.

¹⁸ Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2018. *Economic Survey of Assam 2017-18* https://des.assam.gov.in/sites/default/files/swf_utility_folder/departments/ecostat_medhassu_in_oid_3/portlet/level_1/files/final.pdf. Open Government Data (OGD) Platform India, <https://data.gov.in/>. India Brand Equity Foundation. 2018. IBEF- <https://www.ibef.org/download/Assam-May-20181.pdf>.

¹⁹ Government of Assam. Department of Panchayat and Rural Development. Assam State Rural Livelihood Mission. <https://asrlms.assam.gov.in/as/node/90627>.

²⁰ Federation of Indian Chambers of Commerce and Industry and PwC. 2014. *Gateway to the ASEAN, India's North East Frontier*. <https://www.pwc.in/assets/pdfs/publications/2014/gateway-to-the-asean.pdf>.

²¹ Government of India. Ministry of Statistics and Programme Implementation. 2016. *Annual Survey of Industries, 2015-16*.

Table 1.1: Major Industries of Assam

Industrial Sector	Major Products of Assam	Output in 2014/15 (\$ million)
Refined petroleum products	-	3,349
Food products	Processed and blended tea	1,756
Chemical products	Pesticides, other agrochemical products, paints, varnishes, soaps, and detergents	598
Nonmetallic mineral products	Cement and limestone	473
Paper and paper products	-	373
Iron and steel	-	365
Basic chemicals, fertilizer and nitrogen compounds, plastics, and synthetic rubber in primary forms	Polymer granules (feedstock for plastic industry)	246
Tobacco products	-	201
Grain mill products, starches, and starch products	-	196
Pharmaceuticals, medicinal, and botanical products	-	137
Plastic products	-	85

Note: Output in 2014/15 provided in the data source in Indian National Rupees has been converted to US Dollars @ \$1 = ₹70.

Source: Government of India. Ministry of Statistics and Programme Implementation. *Annual Survey of Industries, 2015–16*.

Figure 1.5: Assam's Exports Profile and Growth between 2008 and 2018

CAGR = Compound Annual Growth Rate.

Source: Government of India. Ministry of Commerce. Directorate General of Commercial Intelligence and Statistics.

Reporting a healthy CAGR of 23% in 2008–2018, exports from Assam were valued around ₹25 billion in FY2018, which was less than 1% of India's exports (Figure 1.5).²²

The export profile however remained undiversified and unchanged during that period. Majority of exports from Assam are primary resource-based and undergo minimal value addition within the state.

Assam Tea contributing 80% share in its total exports in FY2018, makes its way to the United Arab Emirates (UAE), the United States of America (US), the PRC, Germany, the Russian Federation, and Kazakhstan. However, this export was routed through dealers and auctioneers in Kolkata (West Bengal) who purchase around 50% of the produce.²³

Besides tea, primary resource-based products such as oil products, raw minerals, and mineral-based

²² Study team analysis based on foreign trade data provided by the Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce, Government of India.

²³ Study team analysis based on stakeholder consultations.

products contribute another 15% of Assam's exports, bringing the total share of primary products to 96%. This clearly reflects that industrial development in the state is suboptimal and does not generate export surpluses.

Assam's share in India's export to ASEAN and BBN is very low. The NER acts as a transit zone for India's land-based exports to these regions. Given the fact that Assam is the most industrialized state in the region, it can create a space for itself in India's export profile by tapping into specific commodities demanded by ASEAN and BBN and moving up the value chain of resource-based industries that it has a natural advantage in.

The pace of economic development in NER in general, and Assam, in particular, has fallen behind

the national average due to a number of barriers (Table 1.2).

Framework for Making Assam a Gateway to Southeast Asian Nations

This study is focused on export-oriented economic development of Assam (with a focus on ASEAN and BBN) by overcoming barriers mentioned in Table 1.2. The framework is divided into three parts: (1) Vision, (2) Outcomes (required to be attained to realize this vision) and (3) Approach (key interventions to attain desirable outcomes)

Vision. The overall vision of this study is:

1. to develop Assam into a \$75 billion economy by 2025
2. while upholding the state's commitment to Sustainable Development Goals (SDGs).

Table 1.2: Key Barriers to Economic Development in Assam

S.No.	Barrier	Explanation
1	<i>Regionally concentrated economic development</i>	<ul style="list-style-type: none"> • Concentration of industrial and urban development in and around Guwahati • Economic and urban backwardness of Barak Valley area • Inadequate urban development in upper Assam region leading to industrial dependence on petroleum sector
2	<i>Small industrial base with low output and value addition</i>	<ul style="list-style-type: none"> • Narrow manufacturing product portfolio mainly dependent on locally available raw materials • Low capital investment • Low value addition in overall output • Limited value chain backward linkages with other states of India • Lack of industrial diversification
3	<i>Inadequate transport connectivity across the state</i>	<ul style="list-style-type: none"> • Difficult terrain reducing effective economic access of the entire state • Inadequate penetration of railways • Poor utilization of waterways for movement of people and goods
4	<i>Inadequate provisioning of utility infrastructure</i>	<ul style="list-style-type: none"> • Inefficient power transmission and distribution infrastructure • Low scale of water supply network development and penetration across the state
5	<i>Negligible exports share in India</i>	<ul style="list-style-type: none"> • Less than 1% share in India's exports • Less than 1% of exports to output ratio of the state • High dependence on tea and petroleum products • Lack of success in capitalizing on India's export competitiveness in other products • Negligible presence in import profile of ASEAN and BBN • Lack of industrial diversification
6	<i>Logistical disadvantages</i>	<ul style="list-style-type: none"> • Lack of success in recovering from post-partition loss of economic access to gateways • The compulsion of using ports of West Bengal for tea exports • Lack of capacity of roads connecting border towns to take heavy-duty trucks • Inadequate railway siding capacity
7	<i>Outflow of talent from the state</i>	<p>Long-standing subpar socioeconomic prospects have:</p> <ul style="list-style-type: none"> • set the trend for out migration for education and livelihood opportunities and • resulted in a loss of talent for manufacturing and services in Assam

ASEAN = Association of Southeast Asian Nations, BBN = Bangladesh, Bhutan, and Nepal.

Source: Study team analysis.

Outcomes. The twofold vision will be realized through two critical outcomes:

1. increasing the share of manufacturing in GSDP from current 11% to 18% and
2. increasing goods and services exports to \$1 billion by FY2025 (translating into increased gross state value addition of manufacturing by \$7 billion by 2025).

Approach. To achieve industrial and export-based outcomes, a three-pronged approach is recommended (Figure 1.6):

1. enabling manufacturing and utility infrastructure (through a suitable mix of locations for industrial development);
2. developing multimodal transport corridors to South Asia and Southeast Asia (after determining precise transport and urban infrastructural requirements); and
3. reforming institutional and regulatory norms (by identifying suitable trade-enabling interventions).

It is hoped that these interventions will reinforce each other to enhance the competitiveness of Assam's industries while developing high value-added supply chains.

Figure 1.6: Approach for Assam to Become India's Expressway to Southeast Asian Nations

ASEAN = Association of Southeast Asian Nations, BBN = Bangladesh–Bhutan–Nepal, EODB = Ease of Doing Business, GDP = Gross Domestic Product, GSVA = Gross State Value Added, ICD = Inland Container Depot, MMLP = Multimodal Logistics Park.

Note: “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2017 ends on 31 March 2017.

Source: Projections based on study team analysis.

2

Potential Manufacturing Locations

National Highway 27 as the Network Core

Policies to support the current paradigm of industrial development could be either “horizontal” (to facilitate resource access across sectors, such as of power) or “vertical” (specific to the requirements of a particular sector). The study team’s approach to achieving higher industrial output and better export-

based outcomes includes the development of high potential manufacturing clusters along multimodal transport corridors. The transport infrastructure network serves as a “horizontal” input in industrial development.

The study team conceptualized the core transport infrastructure network as the “network core” which connects major cities of the region and enables economic interactions with other significant networks and gateways (Figure 2.1). National Highway 27 forms

Figure 2.1: Overlap of Assam’s “Network Core” with Regional Connectivity Initiatives

Source: Study team analysis.

such a network core because it is part of various ongoing transport infrastructure development projects in NER—East–West corridor, Asian Highway 1, SAARC Rail Corridor 1, and SAARC Rail Corridor 5. It runs across Assam connecting major cities like Bongaigaon with Silchar via Guwahati and Nagaon. Beyond Bongaigaon it connects to road networks of Eastern India via Srirampur, bordering West Bengal.

The mobilization of land, labor, and capital may be expected to accelerate in the hinterland of NH-27 given its connectivity with the rest of the world and thus stimulate industrial development along the corridor. This will help in reduction of regional imbalances and spread of industrialization and urbanization away from overburdened economic centers.

The “influence area” of NH-27, falling within 25 km on either side, comprises of 17 districts of Assam which contributed to over 50% of the GSDP in FY2010. Hence NH-27 is said to be the lifeline of the Assam economy (Figure 2.2).¹

Cluster Approach to Industrial Development

Given the constraints of land availability and congestion in major urban centers, a decentralized model of industrial development has been proposed for Assam across three kinds of activity nodes—economic centers, manufacturing centers, and border centers.

Figure 2.2: Economic Potential of Districts Along the Selected Core Network

Source: Study team analysis.

¹ Study team analysis based on the following data sources: Employment data sourced from Directorate of Employment and Craftsmen Training, Government of Assam. 2015. *Employment Review 2014*. GSDP data sourced from Open Government Data (OGD) Platform India. <https://data.gov.in/resources/district-wise-gdp-and-growth-rate-assam-based-constant-price2004-2005-year-2009-10>.

1. Economic centers are cities with already high levels of industrial and urban development, and thus, limited capacity for further industrial growth in the long term, primarily due to limited land within their administrative boundaries.
2. Manufacturing centers are satellite industrial towns close to economic centers with expanding greenfield manufacturing and urbanization activities. They are well-connected to border centers which are gateways for international trade.
3. Border centers are locations on the international borders of Assam which have trade facilitation infrastructure.

Under this study, key economic, manufacturing, and border centers of Assam have been identified and assessed to map the (existing and potential) industrial capability of the state (Figure 2.3).

Economic Centers as Hubs of Industrial Development

Five economic centers—Bongaigaon, Amingaon, Guwahati, Nagaon, and Silchar—have been selected

along the network core which will act as economic activity hubs.

These centers are nodes of economic activity, which promote development of the region. They exhibit both historical and future potential for supporting manufacturing and services activities coupled with urban development. This may be due to (i) better endowment of primary resources, (ii) direct and indirect policy incentives for industrialization targeted at the center, or (iii) locational advantages such as proximity to gateways, better hinterland connectivity, etc.

Selection of economic centers is based on the evaluation of parameters such as the industrial and urban ecosystem, proximity to gateways, and proximity to markets.

Key economic, manufacturing, and border centers of Assam have been identified and assessed to map the (existing and potential) industrial capability of the state.

Figure 2.3: Cluster Approach to Industrial Development in Assam

Source: Study team analysis.

Administrative headquarters of districts have been conceptualized as economic centers which:

1. serve as industrial activity nodes in the state and therefore have an industrial ecosystem;
2. are proximate to gateways and thus can emerge as connecting hubs for international markets (especially ASEAN); and
3. demonstrate potential for socioeconomic development that is commensurate with industrial development.

Districts in Assam present varied profiles in terms of the above parameters (Figure 2.4). For key traditional exports of Assam—tea and petroleum products—districts of Upper Assam have historically been the focus areas. There are districts like Tinsukia and Kamrup (Rural) which have the potential to emerge as hubs for plastic products whereas districts like Sonitpur and Kamrup (Rural) have the potential to house large

scale pharmaceutical facilities. Reasons behind these distributed competencies include natural endowments (terrain, weather, soil, etc.), relative levels of urbanization, availability of specialized labor, and historical presence of an industrial ecosystem.

Kamrup (Metro) is the most industrialized district in Assam (both in terms of invested capital and diversity) with activities across all major industrial segments and services such as education, tourism, information technology, and services enabled by it (upcoming). This is primarily due to proximity to the administrative center, better transport infrastructure, availability of an international airport, and good connectivity to BBN.

The districts have been further evaluated to support current and future potential of industrial demand and supply (Table 2.1). The study has thus developed a framework for selecting districts that are better placed to support export-based growth of industries, which may be used for other states as well.

Figure 2.4: Evaluation of Potential Economic Centers

Source: Study team analysis.

Table 2.1: Overview of Selected Economic Centers

Economic Centers	
Guwahati and Amingaon	Highly industrialized Close to international airport Well connected both within and across state(s)
Bongaigaon	High potential for inland water transport MMLP proposed Close to Nepal and Bhutan
Silchar	High potential for inland water transport MMLP proposed Close to Bangladesh and Myanmar
Nagaon	Heavily industrialized Close to both inland waterway terminal and airport Four-laned connectivity with Guwahati
Other Potential Centers	
Morigaon	Labor is easily available Industrial density is low Low potential to support large scale development
Darrang	Low potential to support large scale development Currently industrial profile scattered and low scale

MMLP = Multimodal Logistics Park.
Source: Study team analysis.

Manufacturing Centers and Border Centers as Spokes of Distributed Industrial Development

To facilitate trade with countries neighboring the NER, the Government of India has taken the initiative to create comprehensive export infrastructure facilities along the border. Government of Assam had approved the setting up of five border trade centers—Sutarkandi in Karimganj district, Mankachar and Golokganj in Dhubri District, Darrang in Baksa District, and Jagun

in Tinsukia District—which are at various stages of implementation.²

Manufacturing centers were selected based on their locations between the connected economic center and the nearest trade exit point (or border center). All three will serve as an integrated industrial ecosystem for promoting sector-specific manufacturing (Table 2.2).

Table 2.2: Selection of Manufacturing Centers

Connected Economic Centers	Nearest Border Centers	Selected Manufacturing Center
Bongaigaon, Guwahati, and Amingaon	Hatisar	Kokrajhar
Bongaigaon	Mankachar and Golokganj	Dhubri
Nagaon	Darrang	Mangaldoi
Silchar	Sutarkandi and Karimganj steamer ghat	Karimganj

Source: Study team analysis.

Key centers identified under the cluster approach followed in this study are presented in Table 2.3.

Table 2.3: Selected Economic Centers, Manufacturing Centers, and Border Centers

Economic Centers	Manufacturing Centers	Border Centers
Guwahati and Amingaon	Kokrajhar	Hatisar
Bongaigaon	Dhubri	Mankachar and Golokganj
Nagaon	Mangaldoi	Darrang
Silchar	Karimganj	Sutarkandi

Source: Study team analysis.

² Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2018. *Economic Survey of Assam 2017–18*. <https://des.assam.gov.in/information-services/economic-survey-assam>.

3

Manufacturing and Services

Learning Points from Literature Review

Assam is not only the largest but also industrially the most advanced state economy of the North

East Region (NER) of India. Various studies over the years have identified strength areas for Assam in manufacturing and services that can be built upon to promote growth (Table 3.1).¹

Previous studies have highlighted the importance of the segments mentioned in Table 3.1 in promoting

Table 3.1: Assam's Industries: Strengths and Opportunities

Thrust Areas		Strengths and Opportunities
Manufacturing		
1	Tea	<ul style="list-style-type: none"> Comprising nearly half of India's production, Assam tea is a historical stronghold. All major tea players have presence in Assam. Assam tea is in high demand in western countries. The world's second-largest tea auction center is located in Guwahati. Assam tea has a Geographical Indication (GI) tag. A Special Purpose Tea Fund (SPTF) has been instituted for rejuvenation of tea bushes.
2	Agriculture and agro-based	<ul style="list-style-type: none"> Agriculture is a major contributor to state's economy. Assam's agro-climatic conditions support the cultivation of a wide range of horticultural and plantation crops, flowers, spices, medicinal and aromatic plants, nuts, and tubers. Over 600 varieties of orchids grow naturally in Assam. Agri-waste (which has high fiber content in Assam) could be used to produce medium density fiber (MDF) boards as a substitute for plywood and timber.
3	Bamboo-based	<ul style="list-style-type: none"> Indian bamboo production is concentrated in the NER. Climatic conditions in Assam (and rest of NER) are very favorable for bamboo cultivation.
4	Mineral-based	<ul style="list-style-type: none"> Assam accounts for a substantial proportion of the crude output in India. The wells at Digboi, Duliajan, and Sivasagar also produce natural gas. Limestone reserves of about 500 million tons are estimated in the state. The China clay available in the Karbi-Anglong district is a vital input for the ceramics industry. Deposits of decorative stones like granite are also present.

¹ Recent publications reviewed for this study are

- India Brand Equity Foundation. 2008. *Investment Climate in North East*. An Ernst & Young Report for IBEF. Accessed from https://www.ibef.org/download/North_East_8Oct_08.pdf.
- Indian Chamber of Commerce and PwC. 2013. *India's North East: Diversifying Growth Opportunities*. Accessed from https://www.pwc.in/assets/pdfs/publications/2013/north-east_summit-2013.pdf.
- India Brand Equity Foundation. 2013. *Assam: Land of Red Rivers and Blue Hills*. Accessed from <https://www.ibef.org/download/Assam-110313.pdf>.
- AT Kearney and Federation of Indian Chambers of Commerce. 2016. *Connectivity-led Development of North East India through BBIN Corridor*. Accessed from <https://www.adb.org/sites/default/files/institutional-document/193351/sasec-operational-plan2016-2025.pdf>.

Thrust Areas		Strengths and Opportunities
5	Plastics	<ul style="list-style-type: none"> Upstream segment of the plastic value chain is already operational in Assam. Downstream segment of the plastic value chain needs to be developed in the state. There is potential for downstream linkages with Bangladesh.
6	Cement	<ul style="list-style-type: none"> Good quality cement-grade limestone is found in the central Assam districts of North Cachar Hills and Karbi-Anglong, where a total reserve of about 670 million tons is available for exploitation. Several cement factories have come up in Assam in recent years.
7	Medicinal and aromatic plants	<ul style="list-style-type: none"> Around 300 types of medicinal herbs and plants are known to exist in abundance in Assam. The Brahmaputra valley itself has 150 varieties of herbs and plants of commercial value. It is estimated that only around 5%–10% of the plants and herbs are currently utilized. A scientific and systematic approach to exploration and conservation of such plants and value addition in terms of medicinal and cosmetic and therapeutic products is required.
8	Sericulture	<ul style="list-style-type: none"> Assam silk, like its tea, has been a traditional source of livelihood in the state. Assam's environment is suitable for silkworms to flourish. Significant local knowledge already exists, given the antiquity of the practice. Assam silk has the potential for large scale production and marketing—nationally and internationally.
9	Forest-based	<ul style="list-style-type: none"> Assam forests are home to various valuable trees like bamboo, cane, sal, teak, bansom, simul, sishu, gamari, sarol, and halokh. Forest-based industries such as plywood mills and paper mills already operate in large numbers in the state.
10	Handicraft and handloom	<ul style="list-style-type: none"> Assam has a rich heritage of artistic craft and skilled workmanship. Incentives provided to export-oriented units make it lucrative for local artisans to pursue their craft.
Services		
11	Tourism	<ul style="list-style-type: none"> Assam is endowed with mesmerizing natural beauty and bewildering ecological and cultural diversity. Tourism could be developed across a wide range of interest areas such as wildlife, adventure, pilgrimage, culture, nature, and heritage.
12	Information technology	<ul style="list-style-type: none"> Given the large pool of literate and English-speaking population in NER, its potential for developing an information technology enabled service (ITES) industry is immense.
13	Higher education	<ul style="list-style-type: none"> Given the relative shortage of professional educational institutes in the NER, students are forced to travel to other states in pursuit of higher education. This presents an opportunity for private professional educational institutions to flourish in the NER, especially in the areas of IT, management, biotechnology, mining, minerals, and agro-sciences.

Source: Study team analysis of existing literature.

the overall industrial development of Assam without clearly focusing on either the export or the domestic market. Since the current study specifically focuses on Assam as a hub for India's trade with Association of Southeast Asian Nations (ASEAN) and Bangladesh, Bhutan and Nepal (BBN), only the sectors relevant to these markets have been discussed here¹

Selection of Manufacturing Sectors

For increasing exports from Assam, 15 industrial manufacturing sectors with competitive advantage have been identified as focus areas.

Assam on its growth path has to not just unclog the traditional structural bottlenecks impeding basic growth but also speed up to meet the aspirational needs of a fast growing India. Hence focus industries in any economic corridor planned through Assam must include both

- low-risk industries with well-known patterns of technological development that can be emulated and in which the government can play a lead role by identifying bottlenecks and addressing coordination failures; and
- high-risk high-growth technologically advanced sectors that need evolved policy interventions to attract private participation.

¹ ASEAN includes Indonesia, Thailand, Singapore, Malaysia, Viet Nam, the Philippines, Cambodia, Brunei Darussalam, Myanmar, and the Lao PDR.

Planned policy and regulatory interventions may contribute to removing bottlenecks and improving the competitiveness of traditional sectors while capitalizing on Assam's natural endowments and simultaneously focusing on nontraditional sectors. Significant sectors for the Assam's economy include those which either have a large share in the imports of the target market (ASEAN+BBN) or are prominent in India's exports basket to both the target market and world—characterized by high tradability as well as large domestic presence. The study team arrived at a long list of 44 such sectors using these characteristics as filters. This long list was then pared down to a mix of industries which could deliver maximum manufacturing competitiveness in India while leveraging local synergies to create upstream and downstream value chain linkages. The study team thus drew up the focus list of industries which Assam can target to increase its share in India's exports by capitalizing on its linkages with ASEAN and BBN and its natural endowments (Table 3.2).

Of the industries identified in Table 3.2, the demand, supply, and trade scenario of four key sectors—

electrical equipment and accessories; plastic and plastic products; electronics system design and manufacturing (ESDM); and pharmaceuticals—were studied to highlight opportunities and future action areas for Assam. The findings for each sector are presented in the sections that follow.

Electrical Equipment and Accessories

India, especially in its western and southern states, manufactures a wide range of high- and low-technology electrical equipment and accessories that may be broadly classified into “generation equipment” and “transmission and distribution (T&D) equipment”. Besides meeting domestic needs, these are exported to the United States of America (US), the People's Republic of China (PRC), Germany, United Arab Emirates (UAE), France, and Bangladesh.

Assam contributes a mere 0.2% of the all-India output for the sector, which is slated to touch \$100 billion mark by FY2022 posting a compound annual growth rate (CAGR) of 25%.² The state primarily manufactures transformers, wires, and cables in

Table 3.2: Selection of Industrial Sectors for Assam

		Short list of sectors which Assam can target to increase its share in India's exports	
Parameters	Significance	Strong	Upcoming
Industrial output from the northeastern region of India	Preference to such sectors which can benefit from regional/local synergies with upstream and downstream value chain entities	Cement	Plastic processing
		Petrochemicals	Wood products (mainly bamboo-based)
Share of Assam in industrial output from northeastern region of India	Preference to such sectors which have high export potential from India	Apparel and textile	Metal-based products (including fab steel)
		Tea	Automobiles
Competitiveness of India's exports (Revealed Comparative Advantage calculated using Lafay Index)		Pharmaceuticals	Engineering goods (electrical equipment and accessories)
		Paper and paper products	Glass-based products
Share of India in import basket of target market		Agriculture and food processing	Chemicals (including fertilizers and paints)
			Electronics System Design and Manufacturing

Source: Study team analysis.

² The fiscal year (FY) of the Government of India ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2022 ends on 31 March 2022. The projection data has been sourced from Engineering Exports Promotion Council, IEESMA, Invest India.

Kamrup (Rural), Kamrup (Metro), Jorhat, Tinsukia, and Golaghat without any investment from major domestic or international players.³

Export Opportunity for Assam

Given the dependence of Nepal and Bhutan on India for electrical equipment and the \$1.7 billion export opportunity to Myanmar and Bangladesh, the prospects for Assam are bright (Figure 3.1).⁴

Assam has a minuscule share in India's electrical exports to its neighbors. Western states of Maharashtra and Gujarat and landlocked state of Telangana are top three exporters to Bangladesh in the east, whereas Assam acts as a transit state for Uttar Pradesh, West Bengal, and Madhya Pradesh to export to Bhutan.⁵ With suitable capital investment in the sector in Assam, it should be possible for the state to

meet the industrial demand of BBN and Myanmar very easily.

Domestic Opportunity for Assam

Besides exports, there are several factors at play in the NER which may drive the domestic demand for heavy electricals as well (Figure 3.2). These factors are highlighted below:

- Electrification is expected to rise in NER
 - The annual per capita power consumption in the NER is one-third the national average and will inevitably rise as the economy grows.⁶
 - According to Census 2011, household electricity access rate in the NER was around 48% compared to the all-India figure of over 67%. For rural NER this

Figure 3.1: India's Electrical Equipment Export to Southeast Asia and Bangladesh–Bhutan–Nepal

ASEAN = Association of Southeast Asian Nations, CAGR = Compound Annual Growth Rate.

Source: ITC Trademap and study team analysis.

³ Based on compilation of information from District Industries and Commerce Centers.

⁴ ITC Trademap. <https://www.trademap.org>. Study team analysis.

⁵ Data sourced for study team analysis from Directorate General of Commercial Intelligence and Statistics.

⁶ According to data shared by the Central Electricity Authority (CEA).

Figure 3.2: Key Demand Drivers of Electrical Equipment Industry for Assam

GW = gigawatts, kWh = kilowatt hour, MU = million units, NER = Northeast Region, T&D = Transmission and Distribution.

Source: Study team analysis based on data drawn from:

- North Eastern Council Regional Plan (2017–18 to 2019–20), <http://megplanning.gov.in/circular/NEC%20Regional%20Plan%202017-18%20to%202019-20.pdf>.
- Government of India. Ministry of Home Affairs. Office of the Registrar General and Census Commissioner of India. 2011. *Census of India 2011*.
- Central Electricity Authority.

figure is even lower at 37% compared to the all-India figure of more than 55%. This statistic is also expected to catch up with the rest of India over time.⁷

- The NER may be expected to address the dichotomy of energy shortage experienced while generation potential lies untapped in the region
 - In 2016, the region faced energy shortage of over 5% and peak shortage of 8% on suppressed demand.⁸
 - At the same time, it is well known that 40% of the 150GW hydro power potential of India lies in the region.⁹ As soon as the NER states endeavor to bridge the power supply deficit with hydel power produced in NER, the electrical

equipment players in Assam will find a ready market for their products.

- The NER states may be expected to respond to the huge transmission and distribution capacity deficit that the region faces.
 - Investments into transmission and distribution (T&D) in NER have been historically low with many NER states suffering severe T&D capacity deficits and bottlenecks. On top of that, the recent expansion of T&D infrastructure in Assam has largely been serviced by players outside NER (given the paucity of competitive suppliers within NER). These two observations indicate that a window of opportunity exists for the electrical equipment producers in Assam to move

⁷ Government of India. Ministry of Home Affairs. Office of the Registrar General and Census Commissioner of India. *Census of India 2011*. New Delhi.

⁸ According to data shared by the Central Electricity Authority (CEA).

⁹ Footnote 8.

- into this space if they adopt the right strategies.
- Investment in T&D infrastructure is never a one-time exercise. Such infrastructure requires regular replacement and maintenance, which implies that once the Assam industry players get a foothold, future equipment and accessory sales are guaranteed.
 - While NER states are connected to the national transmission network mainly at 220 kV and 132 kV, the power distribution system in the NER states runs on an ageing 33 kV network that is prone to high technical and nontechnical losses as well as frequent interruptions and outages. A shift in policy toward ensuring 132 kV/220 kV connectivity to the NER states for proper voltage management and lower distribution losses will immediately open up very attractive prospects for electrical equipment manufacturers in Assam.

Key Interventions Required for Assam

So how can Assam make the best of these opportunities both inside and outside the region and the country?

The state may invite large public enterprises like Bharat Heavy Electricals Limited (BHEL) to set up manufacturing locally. Their presence in the state will foster the ecosystem for the sector to grow. Within such an ecosystem, the state will find it easier to incentivize global majors like Crompton Greaves (already present in India), to set up heavy engineering units in Assam. This will enhance the state's share in global exports.

Guwahati and Bongaigaon could serve as ideal manufacturing centers for heavy electricals given their access to raw materials and proximity to gateways. Industry inputs—both from within Assam and from

nearby West Bengal and Jharkhand by rail—can be easily rolled into Guwahati and Bongaigaon. These centers have the required railway sidings infrastructure to support loading and unloading of heavy material as well as the advantage of preexisting organized logistics facilities that service industrial clusters around Guwahati. Furthermore, access to gateways such as the Guwahati airport and the Chattogram port can promote exports.

The *Indian Electrical Equipment Industry Mission Plan 2012–22* formulated by the Union Ministry of Heavy Industries and Public Enterprises, notes that the sector has, over the years, reported substantial unutilized capacity twinned with a progressively widening trade deficit.¹⁰ The Mission identified four critical intervention areas to address this conundrum which Assam may also incorporate into its growth strategy (Table 3.3). These are (i) improving industry competitiveness; (ii) upgrading technology; (iii) skilling of human resources; and (iv) conversion of latent demand.

Projections of the study team indicate that as the Indian economy grows and exports to ASEAN and BBN expand, Assam's electrical equipment and accessories sector can reach about \$1.16 billion (₹81 billion) by FY2038.¹¹

Plastic and Plastic Products

Indian plastics figure among the fastest growing export segments globally. Plastics consumption of the country is projected to increase from about 13 million metric tons per annum (MMTPA) in FY2015 to 22 MMTPA in FY2020. Plastics make significant contribution to the growth of other key sectors in the country such as automotive, construction, electronics, health care, textiles, and fast moving consumer goods. Products from the Indian plastic industry are exported to over 150 countries round the globe including major trading partners such as European Union, the US, the PRC, UAE, and Saudi Arabia.¹²

¹⁰ Government of India. Ministry of Heavy Industries & Public Enterprises. 2013. *Indian Electrical Equipment Industry Mission Plan 2012–2022*. https://dhi.nic.in/writereaddata/Content/indian_mission_plan_2012-2022.pdf.

¹¹ At the exchange rate of \$1 = ₹70.

¹² Federation of Indian Chambers of Commerce and Industry and Tata Strategic Management Group. 2016. *A Report on Plastic Industry*. Knowledge paper prepared for Poly India 2016, the Third National Conference on Polymers and Plastics.

Table 3.3: Key Interventions for Assam in the Electrical Equipments Industry

	State Government's Domain	Central Government's Domain
Industry competitiveness	<ul style="list-style-type: none"> Subsidies on raw materials Incentives for exports Supporting SMEs in technology upgrade and testing Augmenting domestic testing facilities to cover the type testing of all equipment Incentivizing foreign suppliers of heavy equipment to set up phased manufacturing facilities in the state 	<ul style="list-style-type: none"> Import duty rationalization Customs duty waiver on import of vital cold rolled grain oriented electrical steel Negotiating with countries that do not recognize the test certificates issued by the Central Power Research Institute Standardization of product ratings and specifications
Technology upgrade	Promotion of research and development in areas like <ul style="list-style-type: none"> High surge impedance loading lines High temperature log sag carbon core conductors Supporting and promoting established players in boiler turbine generators and transmission and distribution (T&D) like Bharat Heavy Electricals Limited and Power Grid Corporation of India Limited	Promoting public-private partnership based models for fast development of new technology / systems
Skill development	<ul style="list-style-type: none"> Plugging skill gap at graduate and diploma levels Modernizing training facilities Industry-relevant curriculum upgrade Accreditation of training institutions led by the National Skill Development Corporation and certification of students by Sector Skill Councils	
Conversion of latent demand	Reducing delays in commissioning of power projects and T&D infrastructure development leading to spillover effects on manufacturing schedules and capacity utilization	

Source: Study team analysis.

Some of the key exports from India include plastic raw materials, plastic sheets, films, plates, packaging items, woven sacks or flexible intermediate bulk containers, optical items (including optical frames, lenses, sunglasses, etc.), medical disposables, floor coverings and houseware, etc. Gujarat contributing 43% of India's plastics export is the top performer followed by Maharashtra at 19%; Assam is far behind at only 0.02%.¹³

Since industrial activity in NER in general and Assam in particular is subpar, its plastics industry too is underdeveloped (contributing only 0.6% of India's plastics). Assam sticks to low value products such as

molded containers, small trays, basins, soap dishes, molded chairs (recently started), and a range of films. Its production capacity is cramped by its poor polymer-feedstock supply. Though the situation has eased significantly with the setting up of the Brahmaputra Cracker and Polymer Limited, of the 15,000 ton polymer-feedstock required in Assam annually, over 85% is bought from other states.¹⁴

Exports (only \$1.62 million) are limited to mainly raw materials (99%) with no presence in ASEAN countries.¹⁵ Given that Nepal and Bhutan largely source their plastics from India, and neighboring Bangladesh is also a big consumer of plastics, Assam

¹³ Data for 2017–18 provided by Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce and Industry, Government of India.

¹⁴ North Eastern Development Finance Corporation. 2003. *Pre-Investment Feasibility Study on Plastic/Polymer based Industries*. https://www.nedfi.com/sites/default/files/tedf_summary/36_Executive_Summary_PIS_study_on_PLastic_Polymer_TPCS.pdf.

¹⁵ Footnote 13.

is well poised to enter the international plastics trade value chain as long as it manages to address the raw material and logistics bottlenecks.

Key Issues Faced by the Plastics Industry

Despite high product demand, the plastics industry in India (and Assam) is dogged by certain chronic issues:

- **Solid waste disposal and recycling.** Unprecedented growth in the use of plastics as packing material has created a huge plastics waste hazard while the development of a new plastics economy is still nascent in India.¹⁶
- **Unstable feedstock prices.** Given its dependence on imported naphtha, the industry is vulnerable to volatility in global oil prices and diplomatic tussles.
- **Import dependence for polyvinyl chloride.** India imports 60% of its polyvinyl chloride. With rapid demand growth, domestic downstream processors will find it difficult to secure polyvinyl chloride resin even from international sources in the near future.
- **Fragmentation.** The downstream plastic processing industry is highly fragmented and consists mainly of micro, small, and medium-sized enterprises (MSMEs) which have poor market access and are slower at adopting new technologies. This makes Indian players internationally uncompetitive vis-à-vis the PRC or the UAE.

Key Interventions Required for Assam

1. Access to the Chattogram port is crucial for the development of Assam's plastics industry. It will not only provide logistical advantage in servicing demands of ASEAN and Western countries, but will also facilitate forward

and backward integration of polymer value chains with countries of West Asia. It will reduce input cost for the industry and thereby increase competitiveness.

2. Growth of tool room facilities, mold-making facilities, testing labs, equipment manufacturers, etc., needs to be promoted to create a mature plastic and polymer sector in the region.
3. To replace obsolete machinery, plastics MSMEs need fund support similar to the central government's Technology Upgradation Fund Scheme (TUFS) for textiles and pharmaceuticals.
4. Assam will benefit from a new plastics economy vision and a comprehensive plastic waste management plan. Urban local bodies (ULBs) may also explore decentralized (ward wise) waste management models along the lines suggested in the Solid Waste Management Rules, 2016 of the Government of India.¹⁷
5. After due feasibility studies, plastic waste recycling including waste-to-energy projects may be piloted in select urban centers within a public-private partnership (PPP) framework.
6. Plastic wastes may be upcycled in various ways such as road laying, energy generation, and blending of recycled plastics with fly ash for developing fire-retardant composites.

Projections of the study team indicate that as the Indian economy grows and exports to ASEAN and BBN nations expand, Assam's plastics industry can reach about \$652 million (₹44.3 billion) by FY2038.¹⁸

¹⁶ In a new plastics economy, plastic never becomes waste or pollution. Three actions are required to achieve this vision and create a circular economy for plastic. **Eliminate** all problematic and unnecessary plastic items. **Innovate** to ensure that the plastics that are necessary are reusable, recyclable, or compostable. **Circulate** all the plastic items in use to keep them in the economy and out of the environment.

¹⁷ Government of India. Ministry of Environment, Forest, and Climate Change. Central Pollution Control Board. <http://cpcb.nic.in/displaypdf.php?id=aHdtZC9TV01fMjAxNi5wZGY=>.

¹⁸ At the exchange rate of \$1 = ₹70.

Electronics System Design and Manufacturing

India is and shall remain for a while, a net importer of ESDM products, in particular consumer electronics and mobile phones (62% of ESDM imports at present). Its demand for electronics is expected to grow at a CAGR of 41% during 2016–2020 to reach \$400 billion by 2020. However, domestic production is expected to reach a mere \$104 billion in 2020, despite a brisk projected CAGR of 27% during 2016–2020 (as compared to 9.6% during 2010–2016).¹⁹

Electronics manufacturing in India is concentrated in areas around Delhi in the north (37% of India output), around Bengaluru, Hyderabad, and Chennai in the south (32%), and around Mumbai and Pune in the west (25%). India mostly manufactures mobile phones (29% share in total output) followed by industrial and strategic electronics (26%), and consumer electronics (20%).²⁰ A majority of these manufacturing units assemble the final product using imported components which are the technologically complex,

involving substantial R&D. Government of India has been emphasizing upon indigenization of high-tech manufacturing in the ESDM value chain through initiatives like the Phased Manufacturing Plan (PMP) for mobile phones.

Currently, India has only 0.2% of share in global ESDM exports. Approximately 50% of India's ESDM exports consist of mobile phones and industrial and strategic electronics. About 35% of such exports go to the US, UAE, and the PRC.²¹ India also has a presence in ESDM import baskets of BBN and ASEAN member nations—Singapore, Viet Nam, Myanmar, Bangladesh, Bhutan, and Nepal.

Assam's share of 0.2% in India's ESDM manufacturing is expected to increase with the development of the 220 acre mega ESDM cluster in Guwahati planned by the Government of India and the launch of the North East Digital Vision 2022 of the Ministry of Electronics and Information Technology, Government of India.²² However, to fully leverage these initiatives, Assam needs to improve the availability of the key enablers of this sector (Table 3.4).

Table 3.4: Key Enablers of the Electronics Industry and Their Availability in Assam

Enabler	Criticality	Availability					
		Assam		Uttar Pradesh	Karnataka	Tamil Nadu	Gujarat
		Availability	Remarks				
Urban proximity	High	Moderate	Limited locations	Moderate	Moderate	High	High
Gateway proximity	High	Poor	Current port access at Kolkata via Siliguri corridor No access to Chattogram port No cargo handling capacity at Guwahati airport	High	High	High	High
Industrial area proximity	Moderate	Moderate	Pre-existing industrial infrastructure in Assam	High	High	High	High
Manufacturing policy	Moderate	Moderate	Weaker incentives	Moderate	High	Moderate	High
Resource proximity	Low	Poor	No local R&D Less engineering graduates No possibility of import because there is no access to gateway	Poor	High	Moderate	Poor
Land availability	Low	Poor	Lack of large and contiguous land parcels	High	High	Moderate	High

R&D = Research and Development.

Source: Study team analysis.

¹⁹ ASSOCHAM and NEC. 2017. *Electricals and Electronic Manufacturing in India*. Associated Chambers of Commerce and Industry of India and NEC Technologies India Private Limited. https://in.nec.com/en_IN/pdf/-AssochamReport-NTIasKnowledgePartner.pdf.

²⁰ Study team analysis based on data drawn from Government of India. Ministry of Statistics and Programme Implementation. 2015. *Annual Survey of Industries, 2014–15*.

²¹ Study team analysis based on data drawn from Government of India. Ministry of Commerce and Industry. Directorate General of Commercial Intelligence and Statistics.

²² Footnote 21.

The following interventions will enable the growth of ESDM in Assam:

1. **Providing gateway access.** Globally, ESDM is a highly integrated sector strongly dependent on distributed value chains and brisk trade in intermediate goods necessitating access to international gateways. The sector in Assam will benefit from:
 - a. **Access to Chattogram port.** It is the nearest high capacity international port in the region. Development of transport linkages with Chattogram will not only enhance the movement of international ESDM cargo but also reduce the (“costlier”) dependence on ports in West Bengal.
 - b. **Development of air cargo terminal at Guwahati.** Since ESDM products have a high value-to-volume ratio, movement by air cargo improves cost and time efficiency. Hence, it is important to facilitate such movement through the Guwahati airport.
2. **Identification of Product Basket within ESDM.** It is important for Assam to assess demand in the target market product-by-product and develop a disaggregated product-level manufacturing plan that forges both upstream links with ESDM manufacturers in the rest of the India (for cheap intermediate inputs) and downstream links with the target market (for lucrative selling prospects). To begin with, Assam could focus on mobile phones, industrial and strategic electronics which already have a lion’s share in India’s ESDM exports.
3. **Incentivizing original equipment manufacturers (OEMs) and their multitier**

suppliers to establish their value chain segments in Assam. Indian ESDM has already attained maturity in terms of assembly-based manufacturing across segments. At the next stage India should be able to produce cutting-edge technological output with a higher share of value addition in final product of a global value chain. Establishment of clusters of OEMs along with their suppliers can be a game changer in this context. Assam could run investment promotion campaigns with global OEMs along with scale-based incentive packages to attract such clusters.

Based on the availability of enablers, the study identified Kamrup (Rural) and Cachar districts as potential locations for promoting ESDM centers in Assam. Government of Assam has already proposed a tech city and information technology (IT) park near Guwahati (near upcoming campus of the Indian Institute of Information Technology), a software technology park near Guwahati, and incubation centers for IT and IT-enabled services (ITES) at Guwahati, Dibrugarh, Jorhat, and Silchar.

Projections of the study team indicate that as the Indian economy grows and exports to ASEAN and BBN nations expand, ESDM in Assam can reach about \$184.3 million (₹12.9 billion) by FY2038.²³

Pharmaceuticals (including Medicinal Plants)

Health care in India is a global high growth sector, which is expected to cross \$372 billion by 2022.²⁴ India is a global leader in pharmaceutical manufacturing, particularly generics. Slated to breach \$55 billion by 2020 (with a CAGR of 22.4% since 2015), the sector is dominated by the top 20 drug makers that account for three-quarters of its revenue.²⁵ About 35% of the

²³ At the exchange rate of \$1 = ₹70.

²⁴ Healthcare. India Brand Equity Foundation. February 2018. <https://www.ibef.org/download/Healthcare-February-2018.pdf>.

²⁵ India Brand Equity Foundation. <https://www.ibef.org/archives/detail/bmV3cyYzNzc4ODQ5Jjkw>.

industry revenue is domestic while a substantive 30% flows in from sales in the US.²⁶

Pharmaceuticals production in Assam is limited to only 20 manufacturing units (located in Kamrup Rural and Metro districts) contributing merely 0.4% of the national pharma output.²⁷ The current manufacturing capacity in Assam is not sufficient to meet even its internal consumption demand, which is catered to by other states.²⁸

Medicinal plants are a key ingredient of the biopharma industry of which Assam's forests are a veritable storehouse. However, only 5%–10% of the near 300 varieties of medicinal flora indigenous to Assam are commercially cultivated for extraction purposes. Evidently, despite substantial resources at its disposal Assam has not been able to emerge as a pharma hub in NER.

The Indian bioindustry, which includes biopharma, bioagri, IT services, biofuels, and bioservices, was estimated at \$35 billion²⁹ in 2016. Biopharma alone accounted for 64%.³⁰ Recognizing the significance of developing sustainable supply chains of biopharma ingredients for its economy, Government of Assam is

planning to invest in dedicated infrastructure including a pharmaceutical park at Chaygaon in Kamrup district, a pharma hub at Balipara, and upgrading of the Guwahati Biotech Park.

Export Scenario

India is the world's largest provider of generic medicines and accounted for 20% of global exports in generics (volume) in 2018.³¹ India's overall pharmaceutical exports stood at \$17.3 billion in 2017/18 and are expected to reach \$20 billion by 2020.³² Indian drugs are exported to more than 200 countries in the world, with the US as the key market.³³

In FY2018, 31% of India's pharma exports were to North America, followed by 19.4% to Africa and 15.9% to the European Union.³⁴ India's pharma exports to ASEAN countries were about \$745 million in FY2016 which was approximately 6% of India's total pharma exports.³⁵ For BBN countries it was about \$220 million (about 2% of national pharma exports).³⁶ The Philippines (26% regional share) and Myanmar (23%) are major destinations for Indian pharma exports to ASEAN.³⁷ Among BBN countries, Nepal (85% share) and Bangladesh (14%) are significant markets for India.³⁸ As per the data of the Directorate

²⁶ Data on the total sector size is drawn from Government of India. Ministry of Statistics and Programme Implementation. 2016. *Annual Survey of Industries 2015–16*. <http://microdata.gov.in/nada43/index.php/catalog/143>. The rest of the data is drawn from India Brand Equity Foundation. 2019. <https://www.ibef.org/industry/pharmaceutical-india.aspx>.

²⁷ Study team analysis based on Government of India. Ministry of Statistics and Programme Implementation. 2016. *Annual Survey of Industries 2015–16*. <http://microdata.gov.in/nada43/index.php/catalog/143>.

²⁸ Documents released during Advantage Assam Summit 2018. The Assam Global Investors' Summit or Advantage Assam Global Investors' Summit held on 3–4 February 2018 was an economic summit organized by the Government of Assam. The main aim of the summit is to increase the trade and other relations with Southeast Asia. Members and Delegates from ASEAN and BBIN countries along with industrialists and business leaders of India and around the world are invited in this summit.

²⁹ Study team analysis supported by data from India Brand Equity Foundation. 2018. <https://www.ibef.org/download/Pharmaceuticals-February-2018.pdf>.

³⁰ Footnote 29.

³¹ India Brand Equity Foundation. 2018. <https://www.ibef.org/download/Pharmaceuticals-Report-June-2018.pdf>.

³² Study team analysis supported by data from India Brand Equity Foundation. 2018. <https://www.ibef.org/industry/pharmaceutical-india.aspx>.

³³ Press Information Bureau. <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1568930>.

³⁴ India Brand Equity Foundation. 2018. <https://www.ibef.org/download/pharmaceuticals-dec-2018.pdf>.

³⁵ ITC Trademap. <https://www.trademap.org/>. Study team analysis.

³⁶ Footnote 35.

³⁷ Footnote 35.

³⁸ Footnote 35.

General of Commercial Intelligence and Statistics (DGCIS), Assam's exports in this sector (₹94 million in 2016/17) are mostly to Nepal (95%) and the rest to Indonesia.

Issues and Enablers

The competitiveness and growth of the Indian pharmaceutical sector are both strongly linked to export demand and global market conditions. The sector (particularly in generics) has been facing challenges recently due to changes in the global market. Some of these are enumerated below:³⁹

1. **Consolidation among distributors and pharmacy chains.** It has caused a steep fall in generic drug prices in the US, the largest health-care market in the world.
2. **Increased product approvals and resulting competition in the generics space.** The number of filings and drug approvals is rising sharply, with an increasing number of Indian companies (accounting for around 40% of the Abbreviated New Drugs Application approvals in 2017) vying for a share of the same pie.⁴⁰ This increased competition has resulted in price erosion in this space.
3. **Drop in new launch sales.** The average new launch sales per year have dropped due to lower value of drugs going off patent.
4. **Increasing price control and protectionism in various global markets.** Protectionism has significantly reduced the value of exports, which contribute around half of India's pharmaceutical industry value.

India has an opportunity to build on its strengths in generics and move up the value chain by enabling innovations and new drug discovery. Complex

generics and specialty products, which are difficult to manufacture, and niche drugs will add sustainability to the industry in the near- to mid-term as they are more resilient to pricing pressure.

The Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India has prepared a Scheme for the Development of Pharmaceuticals Industry to ensure drug security in the country by increasing the efficiency and competitiveness of domestic pharmaceutical industry with the following subschemes:⁴¹

1. **Assistance to bulk drug industry for common facility center.** Financial assistance in the form of one time grant-in-aid for creation of common facilities in any upcoming Bulk Drug Park promoted by state governments/state corporations
2. **Assistance to Medical Device Industry for Common Facility Center**
3. **Pharmaceuticals Technology Upgrade Assistance Scheme.** Enable small and medium-sized pharma enterprises to upgrade their plant and machinery to World Health Organization/Good Manufacturing Practices (WHO/GMP) standards so as to enable them to participate and compete in global markets through interest subvention against sanctioned loan.
4. **Assistance for cluster development.** Financial assistance in the form of one time grant-in-aid for creation of common facilities in any pharma cluster including bulk drug, medical device, Ayurveda, Unani, and cosmetics units.

³⁹ Federation of Indian Chambers of Commerce and Industry. 2018. *Trends and Opportunities for Indian Pharma*. New Delhi. <http://ficci.in/spdocument/22944/india-pharma-2018-ficci.pdf>.

⁴⁰ Isha Trivedi. 2017. Generic drug approvals in US hit record high in FY17. *Livemint*. 9 October. <https://www.livemint.com/Industry/Zmt4UOoqngaxC5M9IK8hYK/Generic-drug-approvals-in-US-hit-record-high-in-FY17.html>.

⁴¹ Government of India. Department of Pharmaceuticals. *Scheme for Development of Pharmaceuticals Industry*. [https://pharmaceuticals.gov.in/sites/default/files/Scheme for Development of Pharmaceutical Industry_1.pdf](https://pharmaceuticals.gov.in/sites/default/files/Scheme%20for%20Development%20of%20Pharmaceutical%20Industry_1.pdf).

5. **Pharmaceutical Promotion Development Scheme.** Financial support for conducting seminars, conferences, exhibitions, sending delegations to and from India for promotion of exports as well as investments, conducting studies and offering consultancies, for facilitating growth in exports, as well as other critical issues affecting pharmaceuticals.

Key Interventions Required for Assam

Government of Assam needs to build upon the efforts of the central government to increase the overall competitiveness of its pharmaceutical sector. In the

absence of a separate pharma policy, the state intends to introduce appropriate elements into the industrial policy to incentivize and support pharmaceuticals. Assam needs to make strategic interventions in the sector across five key dimensions—innovation, supply of raw-material, supply-chain ecosystem, ease of logistics, and skilled human resources (Table 3.5).

Projections of the study team indicate that as the Indian economy grows and exports to ASEAN and BBN nations expand, Assam's plastics industry can reach about \$8billion (₹560 billion) by FY2038.⁴²

Table 3.5: Key Interventions Required for Pharmaceutical Sector in Assam

Key Levers of Growth for Pharmaceuticals in India ↓	Support by Government of India				Support required from Government of Assam			
	Assistance to bulk drug industry for Common Facility Center	Pharmaceuticals Technology Upgrade Assistance Scheme	Assistance for cluster development	Pharmaceutical Promotion Development Scheme	Incentivizing establishment or relocation of R&D unit(s)	Ensuring sustainable supply of quality raw material	Policy incentives for all players in the pharma supply-chain ecosystem	Providing economic access to export gateways to serve global demand
Increasing manufacturing capacity	✓		✓			✓	✓	✓
Expansion of cold chain and packaging industry			✓				✓	
Increasing availability of trained personnel								✓
Upskilling								✓
R&D investments to win new drug categories		✓			✓			
Increasing automation and technology transfer		✓						
Forward movement in the supply chain	✓	✓	✓					✓
Quality assurance	✓	✓	✓			✓	✓	

R&D = Research and Development.

Source: Study team analysis based on data and information from the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India.

⁴² At the exchange rate of \$1 = ₹70.

Selection of Service Sectors

India's services-led growth experience has been well acknowledged and studied extensively by policymakers, academics, and practitioners alike. Learning from the country experience, Assam may leverage the high domestic and international demand for services to drive economic growth by stimulating and supporting the following service segments:

1. Higher education
2. Medical tourism (Medical value travel)
3. Information Technology and IT-enabled services
4. Aircraft Maintenance, Repair and Overhaul (MRO)

Higher Education

Higher Education in India: Export Potential

India holds an important place in the global education industry. With 36.6 million students enrolled in its higher education institutions in 2017/18 (more than either the PRC or the US), India is working hard to respond to the needs and aspirations of its massive young population (the world's largest in the 3–23 years age bracket).⁴³ Nevertheless, India is a net importer of higher education services spending approximately

\$16 billion annually for its near 250,000 students in the US alone⁴⁴ as compared to a little over 46,000 international students studying in Indian institutions.⁴⁵

Karnataka has the highest number of international students (12,041) followed by Uttar Pradesh (4,465), Maharashtra (4,306), and Punjab (3,775). Assam accounts for just 0.4% of total foreign students enrolled in India (190).⁴⁶

India is a preferred destination for higher education for students from BBN. Of the 46,144 foreign students in Indian universities and colleges, 25% are from Nepal, 4.3% from Bhutan, and 3.4% from Bangladesh.⁴⁷

Foreign students prefer to enroll in Engineering and Management streams in India rather than in Arts/Humanities/Social Sciences.⁴⁸

Higher Education Scenario in the NER

According to UGC's Annual Report for 2016/17 as on 31 March 2017, there were 10 central universities, 13 state universities, 31 private universities, 1 deemed university, and 924 colleges in the NER.⁴⁹ Most of these institutions offer programs in Arts, Science, and Commerce (not preferred streams for foreign students in India). The NER has a palpable supply deficit of educational infrastructure and technical, professional, and medical education services. This

⁴³ (1) Government of India. Ministry of Human Resource Development. 2018. *All India Survey of Higher Education 2017–18*. <http://aishe.nic.in/aishe/viewDocument.action?documentId=245>. (2) Nisha Kumari and Aditya Sharma. 2017. The Role of Higher Education in Economic Development. *International Journal of Commerce and Management Research*. ISBN: 978-93-85895-57-9. <http://www.managejournal.com/up/conference/20170210155257.pdf>.

⁴⁴ Lalit K. Jha. 2018. Nearly 2.5 lakh Indian students studying in US universities: Report. *Livemint*. 29 October. <https://www.livemint.com/Education/mQhGL5ON3eK8LNuhcUZ9oK/Nearly-25-lakh-Indian-students-studying-in-US-universities.html>.

⁴⁵ Government of India. Ministry of Human Resource Development. 2018. *All India Survey of Higher Education 2017–18*. <http://aishe.nic.in/aishe/viewDocument.action?documentId=245>.

⁴⁶ Footnote 45.

⁴⁷ Footnote 45.

⁴⁸ Footnote 45.

⁴⁹ Government of India. University Grants Commission. 2017. *Annual Report 2016–17*. New Delhi. https://www.ugc.ac.in/pdfnews/9764381_Complete-AR-2016-17-English.pdf.

is supported by the evidence that in 2010, nearly 415,000 people migrated from NER to other mega cities to pursue higher studies and seek employment.⁵⁰

Key Challenges for Assam

- **Low college density.** On an average India has 28 colleges per 100,000 eligible population (age group 18–23 years); the density ranges from 7 in Bihar to 51 in Karnataka—the figure for Assam is 14.⁵¹
- **Limited proportion of private colleges.** Private colleges with flexible admission policies and fee structures offer attractive options for both international and Indian students. In India 78% colleges are privately managed, of which 64.7% are private-unaided. Andhra Pradesh and Telangana have about 82% private-unaided colleges and Tamil Nadu has 76.2%. This figure for Assam is a mere 12.0%⁵², which signals that the higher education market in Assam is not as mature as the rest of India and does not attract enough private players who have the confidence to run a successful business model.
- **Dearth of Institutions of Excellence.** Also, due to fewer institutions of excellence such as the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs) in NER, the aspirants move to other parts of India or overseas for quality higher education. Admissions to IIT Guwahati and IIM Shillong are secured through pan-India tests. Therefore local students have to face competition from all over the country. Presence of more such institutions will
- definitely increase opportunities for local students.
- **Accreditation.** Quality education is only possible when facilities, resources, and technologies are upgraded periodically with adequate funds. According to the April 2019 status shared by the National Assessment and Accreditation Council (NAAC), only 137 colleges (of 498) in Assam are accredited, of which merely 14 are A-graded.⁵³
- **Lack in convergence with industry.** Colleges in the NER have limited engagement with industry. As a result, both faculty and students have fewer opportunities to participate in seminars, conferences, internships, and projects that bring together the explorations of academic research and the richness of industry experience. This is, in a way, both a cause and an outcome of the modest industrial development in the region.
- **Inadequate research work.** Paucity of quality research is a hallmark of nearly all institutions of higher learning in India. This is especially true for the universities in the NER which do not have adequate infrastructure, funding support, and alumni and research network to deliver research output of global standards. Enrollment into PhD programs is low; the region does not have enough quality researchers; there are few opportunities for interdisciplinary and multidisciplinary work leading to a lack of early stage research experience. This, along with poor industry engagement, creates a weak ecosystem for innovation.

⁵⁰ Press Trust of India. 2011. '50 lakh people may migrate from North-East in 5 years'. *The Hindu Business Line*. 26 December. <https://www.thehindubusinessline.com/economy/50-lakh-people-may-migrate-from-north-east-in-5-years/article23069875.ece>.

⁵¹ Footnote 45.

⁵² Footnote 45.

⁵³ Accreditation status viewed from <http://www.naac.gov.in/19-quick-links/32-accreditation-status>. Total number of colleges in Assam sourced from Government of India. Ministry of Human Resource Development. 2018. *All India Survey of Higher Education 2017–18*. <http://aishe.nic.in/aishe/viewDocument.action?documentId=245>.

Figure 3.3: A Higher Education Strategy for Assam

Actions	Tools	Benefits
Accessibility	Enabling affordable connectivity Providing immigration conveniences Internet penetration; MOOCs Scholarships	<ul style="list-style-type: none"> • Improvement in GER • Export of education services • Reduction of inequality in access to higher education • Mutualism with tourism and hospitality sectors
Capability	Leveraging GOI's initiatives Bringing in private institutions Training/retaining faculty Latest curriculum and pedagogy	<ul style="list-style-type: none"> • Easy availability of financing for upgradation of infrastructure (e.g. GOI's RISE initiative) • Bringing in best practices • Capitalizing on private brand identities • Imparting market-relevant learning
Collaboration	Student, faculty, and knowledge exchange with foreign institutions Industry-driven internship and placement programs	<ul style="list-style-type: none"> • International exposure to diverse cultures • Engaging world-class faculty • R&D exchanges • Enhanced employability
Communication	Branding through: - education fairs - advertisement campaigns - social media connect	<ul style="list-style-type: none"> • Identifying and reaching out to target market • Positioning Assam as an education hub • Increased inflow of domestic and foreign students • Mutualism with tourism and hospitality sectors

GER = Gross Enrollment Ratio, GOI = Government of India, MOOCs = Massive Open Online Courses, RISE = Revitalizing of Infrastructure and Systems in Education, R&D = Research and Development.

Source: Study team analysis.

Key Interventions for Assam

To overcome these challenges, a four dimensional strategy covering accessibility, capability, collaboration, and communication is suggested for Assam. These dimensions represent demand drivers for higher education (Figure 3.3).

Based on projections done by the study team, with the growth in India's output and exports of higher education services, additional demand for colleges in Assam will reach 713 in business-as-usual scenario and 893 in business-induced scenario by FY2038.

Assam may draw upon the experiences of economies such as Malaysia; Singapore; Hong Kong, China; and the Republic of Korea which have successfully transformed their higher education systems to successfully deploy the tools suggested in Figure 3.3.

Medical Tourism

The India Scenario

India is a popular destination for those seeking low-cost advanced medical procedures ranging from cancer management, heart surgery, joint replacement, and hip resurfacing to cataract operations, cosmetic surgery, dentistry, and gall stone removal. Medical tourists also visit India for alternative treatments like Ayurveda, Yoga, and Kairali.

Key medical tourism destinations within India include hospitals and diagnostic centers in the National Capital Region (Delhi-NCR), Mumbai, Bengaluru, Chennai, and Kolkata. Bangladesh accounted for nearly half the foreign patients who visited India during 2017 (221,000 of 495,000). Others came from Afghanistan, Iraq, Maldives, Nepal, United Arab Emirates (UAE), and Nigeria.⁵⁴

⁵⁴ Yuthika Bhargava. 2018. Medical Tourists Flocking to India. *The Hindu*. 23 July. <https://www.thehindu.com/news/national/medical-tourists-flocking-to-india/article24497896.ece>.

The Government of India has acknowledged this opportunity to promote India as a health-care hub, support research in health care, and embrace advances in information and communication technology that have driven up India's health services exports.⁵⁵

Medical value tourism in India has grown due to a mix of pull and push factors. Pull factors include

1. advanced facilities;
2. skilled doctors;
3. low treatment cost;
4. lower air transport costs; and
5. lower language barriers.

Push factors include

1. circumstances in the home countries of service recipients such as
 - a. lack of specialized facilities;
 - b. shortage of health-care practitioners; and
 - c. long waiting time in hospitals.
2. psychometric and demographic profile of treatment seekers such as
 - a. growing awareness about fitness and medical upkeep; and
 - b. increased lifestyle diseases such as diabetes, obesity, and anxiety.
3. ageing populations in developed countries (which generate high per patient revenue);

Key Interventions for Assam

If Assam could overhaul and reinvent its medical infrastructure and services, it could easily wrest the BBN medical clientele from the megacities of India. Going in its favor are geographical proximity, cultural affinities, and centuries-old historical and commercial relationships with these economies (only recently disrupted post-1947). Such a move would also be in

sync with the overall agenda of the Government of India to promote NER as the bridge between India and BBN and ASEAN. Also, the services demanded by tourists from BBN are technologically less complicated than those demanded by patients from more

Table 3.6: Medical Tourism Industry Enablers and Their Availability in India and Assam

Rank	Parameters for Destination Decisions	India	Assam
1	Availability of qualified and accomplished medical staff	High	Low
2	Availability of low-cost treatment	High	Low
3	Standards of hospital or clinic accommodation	High	Low
4	Availability of accredited hospitals or clinics	High	Low
5	Comments and ratings by other patients	High	Low
6	Availability of clinical outcome data	Low	Low
7	Fluency of service providers in the patient's language	High	High
8	Availability of post-treatment services in the patient's country	Low	Low
9	Quality of hotel or apartment accommodation available	High	Medium
10	Availability of pre-treatment consultation in the patient's country	Low	Low
11	Availability of a written guarantee	Low	Low
12	Accessibility and connectivity	High	High
13	Provision of concierge services	Low	Low
14	Cultural and religious match	High (for high demand sources)	High (for high demand sources)
15	Tourism and sightseeing opportunities	High	Low (in the absence of integrated multimodal transport infrastructure)

Source: Parameters are based on inputs from the Medical Tourism Climate Survey 2016. *International Medical Tourism Journal*. <https://www.imtj.com/resources/medical-tourism-climate-survey-2016/>. The India and Assam assessment vis-à-vis the parameters is part of the study team analysis.

⁵⁵ International Medical Tourism Journal. 2016. *Medical Tourism Climate Survey 2016*. <https://www.imtj.com/resources/medical-tourism-climate-survey-2016/>.

developed countries. Assam may therefore find it relatively easy to respond to this need with appropriate enabling changes in its health-care sector and build upon India's global credentials as a medical tourism destination. Key enablers of medical tourism industry and their relative availability in India and Assam are presented in Table 3.6.

Key interventions required for Assam to position itself as a destination for medical tourism have been summarized in Figure 3.4.

Figure 3.4: Key Interventions for Developing Medical Tourism Industry in Assam

Source: Study team analysis.

Based on projections done by the study team, in the business-as-usual scenario, with the growth in India's exports of medical services, annual inflow of foreign patients seeking medical treatments in Assam will

reach 53,000 by FY2038 and accordingly, number of hospital beds for foreign patients required to service this demand will be 743 by FY2038.

Information Technology and Enabled Services

The India Scenario

India has established itself as a global leader in the IT sector, which, along with ITES comprises of IT services, business process management (BPM), software products, and engineering services and hardware. The market size of India's IT sector (excluding hardware) is expected to grow to \$350 billion by 2025 and BPM is expected to account for \$50 billion–\$55 billion out of the total revenue.⁵⁶

India emerged as a global leader in IT services and an outsourcing hub serviced by its large pool of computer science engineers, IT graduates, and skilled, English-speaking workforce. The US has traditionally been the biggest importer of Indian IT exports (over 62% during FY2017) followed by the UK (approximately 18% share in FY2017). Demand from Asia Pacific (APAC), Latin America, and Middle East has also been growing over the years.⁵⁷

The large domestic IT–BPM services are experiencing a surge in growth as the government is pushing for rapid digitization and a cashless economy. Indian enterprises are deploying digital technologies to cater to online shoppers, and survive in a highly competitive market. Tier II and III cities are gaining traction as new IT destinations owed to cheap labor, affordable real estate, favorable government regulations, tax breaks, and Special Economic Zone (SEZ) schemes.

In 2016, ASEAN represented a \$15.5 billion market for IT-services import which grew at a CAGR of 10% between 2011 and 2016.⁵⁸ Thailand, Indonesia, Malaysia, the Philippines, Viet Nam, and Singapore

⁵⁶ To verify market size of \$350 billion see Press Trust of India. 2017. IT-BPM industry set to touch \$350 billion by 2025. *Economic Times*. 5 June. <https://economictimes.indiatimes.com/tech/ites/it-bpm-industry-set-to-touch-350-billion-by-2025/articleshow/59005087.cms>. To verify projection for BPM at \$55 billion see Nilesh Christopher. 2017. Nasscom pegs BPM income at \$55 bn by 2025. *Economic Times*. 13 October. <https://m.economictimes.com/tech/ites/nasscom-sees-big-scope-for-indias-bpm-sector/articleshow/61053731.cms>.

⁵⁷ India Brand Equity Foundation. 2019. IT & ITES. <https://www.ibef.org/download/it-ites-feb-2019.pdf>.

⁵⁸ ASEAN Secretariat. Also, Silja Baller, Soumitra Dutta, and Bruno Lanvin (eds). 2016. *Global Information Technology Report 2016: Innovating in the Digital Economy*. World Economic Forum. Geneva. http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf.

collectively accounted for a sizable market for technology goods and services, and figured among the fastest growing economies for technology in the APAC. Given the availability of cost effective workforce, these economies are also being explored globally as alternative destinations for setting up ITES services such as BPM. Myanmar has recently entered the IT sector both as a serious player and a market.

Key Interventions for Assam

Assam needs to develop key IT infrastructure staffed by a sizable pool of trained resources to compete with other IT hubs of India (Figure 3.5). The presence of substantial English-speaking population in the NER and the ITES-friendly policies of the government can together create an ecosystem that is conducive for such change. Some of the additional interventions required to build IT in Assam are

- **Creation of technology infrastructure**
 - Last mile connectivity to around 75,000 government institutions and 26,000 villages
 - Extension of connectivity from Cox Bazar international gateway (Bangladesh) to Guwahati
 - Laying of optical fibers integrated with the construction of Asian Highway stretches
 - Enabling the establishment of a certified Tier-4 data center in PPP mode to serve needs of countries like Nepal and Bhutan
 - High performance computing capability
 - String remote sensing–geographic information system (RS-GIS) infrastructure with PPP support as done at the Asian Institute of Technology in Bangkok
- **Developing skilled human resources**
 - Increasing the batch size of graduating engineers (it is about 4,000 currently and is considered inadequate)⁵⁹

- Creating industry-driven skill development infrastructure
- **Maximum utilization of policy initiatives such as**
 - North East Business Process Outsourcing (BPO) Promotion Scheme
 - Assam Electronics and IT Innovation Scheme, 2015
 - IT & Electronics Policy of Assam, 2017

Projections made by the study team indicate that with the growth in India's output and exports in IT sector, output from Assam will reach ₹6.07 billion by FY2038.

Figure 3.5: Proposed and Upcoming IT Infrastructure in Assam Along with Key Focus

BPM = Business Process Management; IT = Information Technology; IIIT = Indian Institute of Information Technology; R&D = Research and Development; SMAC = Social, Mobility, Analytics, and Cloud.

Source: Advantage Assam documents. <https://advantageassam.com/>. Study team analysis.

⁵⁹ Assam Electronics Development Corporation Ltd. www.amtron.in.

Aircraft Maintenance, Repair, and Overhaul

The India Scenario

India is the seventh largest aviation market in the world (tenth in 2010) and is expected to become the third largest after the US and the PRC by 2024.⁶⁰ Domestic traffic posted double-digit monthly growth for 46 consecutive months preceding June 2018 and in the first half of 2018, it grew by 22% compared to a world average of around 7%–8% (over similar duration of preceding year).⁶¹

Quintupling of the fleet size of carriers in India in next 20 years along with delayed retirements of older jets is expected to generate huge demand for maintenance, repair, and overhaul (MRO) services in the country that may reach \$5.2 billion by 2036.⁶² However, at the present, scheduled commercial airlines in India outsource about 90% of their MRO requirements. Most of the MRO service providers in India provide only A & B check services; for advanced services, airlines use MRO hubs in Southeast Asia, Sri Lanka, and the Middle East.⁶³ This is mainly due to

1. import dependence of aircraft components,
2. high customs duty on import of spares and tool kits,
3. no Goods and Services Tax (GST) exemption,
4. long-term contracts with MROs in hubs outside India, and
5. lack of well-trained technicians.

While the National Civil Aviation Policy (NCAP) 2016 does provide support to the sector, poor implementation of these provisions (such as delays in removing 19% import duty on tools and spares and 13% airport royalty for MRO services) is impeding progress.

Key Interventions for Assam

Currently there is no MRO servicing capability in Assam. However, given the keenness of the Government of India to provide international connectivity to NER and the launch of initiatives like Regional Connectivity Scheme (UDAN), Assam can try to build the capability to service some of the MRO demand in India, BBN, and ASEAN. Although the primary onus of improving the competitiveness of Indian MRO service providers lies with the Government of India, the state government can still play a role (Table 3.7).

Projections made by the study team suggest that with the growth in India's ability to cater to MRO service requirements, output from Assam will reach \$9.9 million by FY2038.

Assam can try to build the capability to service some of the MRO demand in India, BBN, and ASEAN.

⁶⁰ International Air Transport Association. 2018. 20 Year Air Passenger Forecast. <https://www.iata.org/en/publications/store/20-year-passenger-forecast/>. Also, India Today Web Desk. 2018. India set to become third largest aviation market in the world. <https://www.indiatoday.in/educationtoday/gk-current-affairs/story/india-set-to-become-third-largest-aviation-market-in-the-world-1377630-2018-10-29>.

⁶¹ Amber Dubey. 2018. India's aviation industry set to soar. *Gulf News*. 15 August. <https://gulfnews.com/gn-focus/country-guides/reports/india/indias-aviation-industry-set-to-soar-1.2266056>.

⁶² Projection of fleet size by Boeing. Press Trust of India. 2018. India will need 2,300 planes worth \$320 bn in 20 yrs: Boeing. *Economic Times*. 19 December. Accessed from <https://economictimes.indiatimes.com/industry/transportation/airlines/-aviation/india-will-need-2300-planes-worth-320-bn-in-20-yrs-boeing/articleshow/67159161.cms?from=mdr>. Projection of MRO services is based on proceedings of the India Aviation 2016, the Fifth International Conference on Civil Aviation organized 16–20 March 2016 in Hyderabad, India by the Federation of Indian Chambers of Commerce and Industry and the Ministry of Civil Aviation, Government of India.

⁶³ Press Trust of India. 2018. India will need 2,300 planes worth \$320 bn in 20 yrs: Boeing. *Economic Times*. 19 December. Accessed from <https://economictimes.indiatimes.com/industry/transportation/airlines/-aviation/india-will-need-2300-planes-worth-320-bn-in-20-yrs-boeing/articleshow/67159161.cms?from=mdr>.

Table 3.7: Key Interventions Required to Develop Maintenance, Repair, and Overhaul Industry in India (Assam)

Prerequisite	Rationale	Domain
Waiving of customs duty on consumables	Consumables constituting 25% of the MRO inventory attracts 20% import duty which should be waived.	Central government
GST concession	Since MRO services are globally zero-rated, import of services is cheap In India the GST slab needs to be reduced, at the very least State GST concession on locally sourced components can boost competitiveness	Central and state governments
Reducing charged revenue share	Percentage of revenue share charged above land licensing fee should be reduced	Central government (restructuring of airport contracts through incentives for existing ones and modifications for new ones is in order)
Promoting indigenous manufacturing	Only 0.1% of the components (by volume) are made in India Domestic manufacturing can reduce cost of procurement	Central and state governments
Infrastructure incentives	Availability of land and utilities	State government

GST = Goods and Services Tax, MRO = Maintenance, Repair, and Overhaul.

Source: Study team analysis.

Origin–Destination Analysis for Key Sectors

Table 3.8 summarizes the results of the origin–destination analysis of key industries including sources of raw materials, markets, and mode choice.

Table 3.8: Origin–Destination Analysis for Key Sectors

Priority Industries	Proposed Development Location	Sources	Markets	Mode Choice	Key Routes	Key Border Cities/Towns	Gateways
Cement	Nagaon, Guwahati	Karbi Anglong, Dima Hasao, and Meghalaya	Nepal, Bhutan, Bangladesh, and NER	Road, rail, waterways	NH-6, NH-206, NH-37, NH-27, NW-2 and NW-16	Dawki, Karimganj, and Golakganj	Chattogram
Agro/food processing	Nagaon, Bongaigaon, Silchar, Guwahati	Dima Hasao, Morigaon, Darang, Sonitpur	Nepal, Bhutan, West Asia and Bangladesh	Road, air	NH-27, NH-6, NH-206, NH-37	Dawki, Karimganj, and Golakganj	Guwahati, Chattogram, Dhaka, and Silchar
Plastics	Guwahati, Nagaon	Dibrugarh, Tinsukia, Sivasagar	Indian Hinterland	Road	NH-27, NH-15	Srirampur	
Bamboo wood	Nagaon, Bongaigaon, Silchar, Guwahati	Nagaland and Meghalaya	Japan, Indian hinterland	Road	NH-6, NH-206, NH-37, NH-27	Srirampur	Chattogram and Dhaka
Pharmaceuticals	Guwahati and Nagaon	Air Cargo, Meghalaya, Dima Hasao, Karbi Anglong	ASEAN	Air, road	NH-29, NH-37, NH-27, NH-6, Guwahati Airport	Moreh, Gelephu, and Zorinpui	Moreh and Zorinpui

Priority Industries	Proposed Development Location	Sources	Markets	Mode Choice	Key Routes	Key Border Cities/Towns	Gateways
Electronics	Guwahati	Gateways	Indian hinterland	Air	Guwahati Airport		Guwahati, Chattogram, Dhaka, and Silchar
IT/ITEs	Guwahati and Silchar	Local educational institutions and NER	ASEAN – LMICS	Air	Guwahati, Silchar Airports		Guwahati and Silchar
Medical tourism	Guwahati	Bangladesh, Myanmar, and NER	BBN and ASEAN	Air, rail, road	NH-29, NH-37, NH-27, NH-6, Guwahati and Silchar Airport	Dawki, Karimganj, and Golakganj	Guwahati and Silchar
Education	Guwahati, Silchar	Bhutan, Bangladesh, Myanmar, and NER	BBN	Air, rail, road	NH-29, NH-37, NH-27, NH-6, Guwahati and Silchar Airport	Dawki, Karimganj, and Golakganj	Guwahati and Silchar

ASEAN = Association of Southeast Asian Nations; BBN = Bangladesh–Bhutan–Nepal; IT = Information Technology; ITEs = Information Technology; LMICS = Lower Middle Income Countries; NER = Northeast Region; Enabled Services; NH = National Highway; NW = National Waterway.

Source: Study team analysis.

4

Agribusiness, Bamboo, and Tea

The northeast region (NER) of India can become a big player in the global market for agriculture and horticulture products. The region produces surpluses in several horticulture commodities and there is great potential for domestic and international trade for

pineapple and ginger products (Figure 4.1). The ADB study has highlighted certain supply chain and value chain constraints, which, when overcome, will clear the decks for NER to realize its potential in agribusiness (including horticulture), forest produce, and tea.

Figure 4.1: The Horticulture, Bamboo, and Tea Promise for Assam

With over 75% of the population dependent on horticulture, bamboo, and tea, these sectors can lead economic development in Assam.

CAGR = Compound Annual Growth Rate, GDP = Gross Domestic Product, GSDP = Gross State Domestic Product, NER = Northeast Region, PRC = People's Republic of China, US = United States of America.

Sources: Data for India sourced from the Ministry of Statistics and Programme Implementation, Government of India.

Data for the PRC sourced from Andrew Flynn, Kin Wing Chan, Zhao Hua Zhu, and Li Yu. 2017. Sustainability, Space, and Supply Chains: The Role of Bamboo in Anji County China. *Journal of Rural Studies*. 49 (2017). pp: 128–139.

Horticulture in Assam

The Opportunity

Almost 70% of Assam's population is directly dependent on agriculture with more than 80% of the landholders classified as small and marginal.¹ Rice is the main food grain cultivated in Assam, occupying about 91% of the total cropped area followed by pulses, maize, and wheat.² This chapter argues that promoting cultivation of high value horticulture products can lead to balanced growth and diversification of risk, particularly in those districts of Assam where industries are not widespread.

The NER as a whole already produces sizable marketable surpluses across a wide range of fruits, vegetables, spices, flowers, medicinal and aromatic plants, mushrooms, processed foods, and honey (Figure 4.1).

Assam produces a wide variety of plantation crops such as sugarcane, ginger, and turmeric; horticultural crops such as potato, orange, and pineapple; oilseeds including castor, rapeseed, linseed, mustard, nizer, and sesame; and more recently, flowers too. These products have significant demand in international markets including ASEAN, Western and Eastern Europe, as well as the US and the Middle Eastern countries.

The Challenges

Nevertheless, leveraging the horticulture opportunity presents certain obvious challenges for Assam. For its geographically dispersed small and marginal farmers, marketable surplus with individual farmers is low, dependence on local aggregators is high, and access to organized value chains challenging. Other challenges are

- lack of effective marketing mechanism;
- lack of real-time pricing information;
- lack of processing facilities;

- lack of cold chain facilities;
- supply glut and wastage within NER during peak seasons leading to lower income realization by farmers; and
- high logistics cost for movement of raw or processed fruits and vegetables to the rest of India.

Building quality and reliability in such an environment demands focus on the long-term and patient investment in value chains which most companies are unable to do.

The Approach for the Development of Horticulture Value Chain in Assam

Investment in primary production, agricultural infrastructure (including processing and logistics), and agricultural services are essential ingredients for stable horticulture value chains.

Interventions to promote sector growth are

- clustering of complementary hard investments (such as in energy, irrigation, and industrial parks);
- unlocking market potential through soft interventions in policy, law, and regulation;
- forging both public and private partnerships with venture capitalists, research institutions, and entities at different stages in the supply chain to open new markets;
- creating auction centers for focus crops such as ginger as one stop shops for buyers to ensure maintenance of quality and an unbroken chain of documentation from production to post-harvest stages;
- developing a micro, small, and medium-sized enterprises (MSME) network with support from the North Eastern Development Finance

¹ Advantage Assam February 2018. Guwahati. <https://advantageassam.com/assets/front/pdf/Agriculture+Food-Processing.pdf>. Niti Aayog. Report on the Task Force on Agricultural Development of Assam. <http://niti.gov.in/writereaddata/files/Assam-reports.pdf>.

² Advantage Assam February 2018. Guwahati. <https://advantageassam.com>.

Corporation (NEDFI), the venture assistance fund named Small Farmers Agribusiness Consortium (SFAC), etc., to build strong value chains in the rural economy;

- developing a robust startup ecosystem linked to the region's engineering and management institutes; and
- building local food parks to encourage enterprise across production clusters.

Focused Crop Strategy

In order to leverage the investments outlined in the previous section, it is important to focus on specific crops that Assam has competitive advantage in, such as pineapple and ginger.

Assam's Pineapples Strategy

Among Indian states, Assam has the highest area under pineapple cultivation—both kew and queen varieties. Dima Hasao (North Cachar Hills), Karbi Anglong, Cachar, Kamrup, and Hailakandi districts together contribute 60% of the pineapple production area in Assam (Figure 4.2).

Figure 4.2: Distribution of Pineapple Production across the Northeast Region

NER = Northeast Region.

Source: Government of Assam. Department of Horticulture. Also, Government of India. Ministry of Statistics and Programme Implementation.

Strategies to expand the pineapples economy in Assam are

- establishing a Pineapple Center of Excellence (COE) in Cachar to provide production and post-harvest inputs to growers in the neighboring districts;
- promoting small farm mechanization (similar to the Philippines) to enhance productivity and reduce cost of cultivation;
- creating an ecosystem for farmers' collectives and informal commodity groups to engage in interregional crop derivatives trading;
- encouraging new age entrepreneurs to enter the value chain with "Farming-as-a-Service (FAS) businesses" to reduce both upfront costs and labor costs of pineapple cultivation;
- minimizing wastage through appropriate post-harvest infrastructure (such as solar drying and packing houses);
- training growers on quality norms including post-harvest handling; and
- using a logistics hub, like the proposed Multimodal Logistics Park (MMLP) in Silchar, to enable containerized movement of fresh pineapples to the rest of India and also ease the export to Gulf countries.

Assam's Ginger Strategy

At 166,500 MT in 2016/17, Assam is the largest producer of ginger across Indian states.³ Main ginger producing districts are Barpeta, Kamrup, Darrang, and Sonitpur (Figure 4.3).

Focused strategy for ginger could include the following:

- establishing a COE in partnership with an international institute (such as Wageningen University of Netherlands) that specializes in global value chains;

³ Government of India. Ministry of Agriculture and Farmers' Welfare. Department of Agriculture, Cooperation, and Farmers' Welfare. Horticulture Statistics Division. 2017. *Horticulture at a Glance, 2017*. New Delhi. [http://nhb.gov.in/statistics/Publication/Horticulture%20At%20a%20Glance%202017%20for%20net%20uplod%20\(2\).pdf](http://nhb.gov.in/statistics/Publication/Horticulture%20At%20a%20Glance%202017%20for%20net%20uplod%20(2).pdf).

Figure 4.3: Distribution of Ginger Production across the Northeast Region

NER = Northeast Region.

Source: Government of Assam. Department of Horticulture. National Research Programme on Plantation Development.

- promoting tissue culture-based ginger cultivation for improved climate resilience, consistent quality, etc. with know-how from the tissue culture lab in Silchar;
- producing organic ginger which can also be marketed for use in medicinal products;
- promoting farmers' collectives for stronger ginger value chains; and
- establishing market linkages with international processors for dedicated purchase of locally grown ginger.

Action by Government of Assam for Developing Horticulture Value Chains

Production

- **Collectivizing.** Strengthen Farmer Producer Organizations (FPOs).
- **Skilling.**
 - Train farmers in farming practices, processing, and marketing.

- Provide information on education and community programs through Information and Communication Technology (ICT) Solutions.
- Develop a cadre of Chief Executive Officers (CEOs) for FPOs to drive the state's agribusiness agenda.
- **Aggregation and logistical support.** Collect and aggregate farmer produce closer to the farm gate and link to storage, processing, and packing units in Assam.
- **Institution building.** Establish COEs for pineapple and ginger in order to capture and disseminate appropriate technology.
- **Improving availability of credit.**
 - Leverage the recent deregulation of fruits and vegetables from the Assam State Agriculture Produce Marketing (APM) Act to improve access to credit (APMC agents also provide informal credit).
 - Support the development and access to financial services, for farmers and agribusiness MSMEs.
- **Food safety.**
 - Strengthen the capacity of relevant agencies to enforce food safety rules and standards.
 - Promote hygienic and good agricultural, manufacturing, packaging, storage, and distribution practices.
 - Support greater collective actions.
 - Make targeted investments in consumer awareness, laboratories, etc.

A cadre of Chief Executive Officers for FPOs is needed to drive the state's agribusiness agenda.

- **Regulatory and policy intervention.**
 - Support Farmer Producer Companies (FPCs) for at least three business cycles.
 - Reduce statutory requirements for FPCs as these are rural entities.
 - Promote commodity-specific credit schemes for faster uptake of funds and shorter time to market.

Storage and Processing

- Create a **logistics hub** through public and private participation that is integrated into existing agro-food parks and government-sponsored programs in Assam.
- Modernize and streamline grading, sorting, packing, and labeling.
- Build the **cold chain**.
- **Regulatory and policy intervention.**
 - Regulations for issuance of negotiable warehouse receipt need to be in place to allow credit on stored stock.
 - Existing unused or defunct processing infrastructure needs to be revived through appropriate policy action and settlement with current owners or entrepreneurs. This will enable quick turnaround on capacity creation.

Wholesale and Retail Markets

- Mobilize private and institutional investment into building **private market yards** that have

greater autonomy, are integrated with logistics hubs, and supported by transparent and strong regulatory structure.

- Enhance **online markets for fruits and vegetables** that directly connect farmers with consumers through the FPOs and eliminate multiple players.
- **Regulatory and policy intervention.** Ensure structural uniformity and efficiency of *mandis* (wholesale markets) through standardized by-laws, model guidelines, and other procedures, which resonate with the broader policy objectives of the state and central governments.

The Opportunity: Green Bamboo Shoots

Global Bamboo Trade

The bamboo is a versatile fast growing plant (a type of grass) that is used for a wide range of products for human use such as furniture, flooring, mat boards, charcoal, paper, scaffoldings, etc. (Table 4.1).

Though India has 37.8% of the world's bamboo forest area (next only to the People's Republic of China [PRC]), it accounts for merely 4.5% of the global market.⁴ United Nations COMTRADE database revealed that international trade of bamboo and rattan products amounted to \$2.5 billion in 2013. The world's most significant export market is the European Union, which accounted for 38% of the

Table 4.1: Bamboo Product Classification

Bamboo plant	Product segment	Examples
Middle and lower part of culms	Premium products	Flooring, laminated furniture, bamboo wood etc.
Mid quality parts	Medium value processing	Chop sticks, mat boards, etc.
Upper parts of large culms and residue parts	Lower value and bulk processing	Charcoal, paper, and pulp
Unprocessed culms		Scaffolding, traditional construction, etc.
Bamboo shoots	High value	Human consumption both fresh & processed

Source: Study team analysis.

⁴ Centre for Science and Environment 2018. *State of India's Environment in Figures*. Delhi. <http://csestore.cse.org.in/state-of-india-s-environment-in-figures-2034.html>.

world's bamboo and rattan imports while the world's largest producer and exporter of bamboo and rattan remains the PRC (Box 4.1).

Box 4.1: Bamboo in Anji County in the People's Republic of China

Anji County (Zhejiang Province) in east coast of the People's Republic of China (PRC) is globally known for its bamboo-based industries. Bamboo management here is changing from intensified monoculture to ecological and multi-functioning forest management to meet the need of further exploration of value of bamboos in ecological, cultural, and even leisure and recreational aspects. Bamboo is seen by local population as the cash tree where everything of bamboo is utilized, from culm to leaves, from shoots to sheaths, and from rhizomes to sawdust.

The supply chain works in an industrialized mode starting with production of raw bamboo. This supply chain is based on Moso (monopodial) variety being planted at predetermined intervals to ensure regular supply of raw material for the downstream supply chain. Preprocessing is done closer to growing areas to leverage lower labor costs while also ensuring that only the right quality and quantity of preprocessed raw material is sent to the appropriate end-product factory. High degree of specialization and planning leads to lower system costs (wastage, below 10%) and it has the potential of better fulfillment of market requirements. Preprocessed parts are transferred to designated factories in the factory clusters for the canning of bamboo shoots followed by manufacturing of bamboo flooring, craft, filament, and furniture.

The impact of the bamboo promotion initiative in Anji is palpable. By 2012, the production of bamboo shoots there was valued at \$2 billion. Tourist footfall in the bamboo forests also increased with 7.74 million tourists spending \$850 million. Most importantly, farmers' annual income increased by 50%—CNY1,000 over the income before the project began.

Source: Food and Agriculture Organization of the United Nations and International Bamboo and Rattan Organisation. 2018. *Bamboo for Land Restoration*. INBAR Policy Synthesis Report 4. Beijing, the PRC.

International trade in bamboo-based products was estimated at \$1.89 billion in 2012 wherein traditional products such as handicrafts, traditional furniture, and bamboo shoots accounted for almost 95% of the world market by value.⁵

Emerging industries, particularly wood substitute-based markets (such as flooring, panels, and nontraditional furniture) are growth drivers of the future which would rival traditional markets and claim about 45% of the total bamboo market over the medium term.⁶

India's Bamboo Supply Chain

Bamboo cultivation, harvesting, and processing are still in nascent stages in India. The bamboo raw material supply chain in Assam (and India in general) is underdeveloped compared to the PRC and Viet Nam. It is fragmented, with too many intermediate players. Given that most (greater than 95%) of the raw material is used for handicrafts or unprocessed use (scaffolding, etc.), there is very little mechanization involved in the entire chain. There are a few manufacturing units in Assam which use aggregators and traders to procure the raw material. Pricing is fixed in advance and quality standards expected are shared with the market intermediaries. Wastages in the supply chain are very high.

Besides having too many intermediaries, bamboo value chains in India are also burdened by a complex web of legislations and jurisdictions of multiple ministries and departments. Every aspect of the bamboo economy—production, sourcing, transportation, processing, and marketing of bamboo-based products—is subject to multiple rules and regulations and also judgments of the Supreme Court of India. At last count there were 14 central ministries/departments whose policies and programs had a bearing on the development of bamboo value chains. The big ones are the Ministry of Environment Forest and Climate Change, the Ministry of Tribal Affairs, and the Ministry of Agriculture and Farmers' Welfare.

⁵ International Bamboo and Rattan Organisation. 2015. *Global Bamboo Trade: Trend & Development Report*. Beijing, PRC.

⁶ Footnote 5.

The Opportunity for Assam

Besides the domestic consumption of bamboo shoots, the bamboo plant (both wild and cultivated) is an important input for the Assamese handicraft and paper industries. It is therefore a source of livelihood for large sections of society in Assam.

Assam could take the lead in developing a \$1 billion bamboo product value chain covering segments like furniture, flooring, handicrafts, etc. in next 8–10 years.

Target Products for Assam

In order to get there, the state needs to develop its supply chains to capture the India, European Union, and North American markets with a targeted approach for early results by leveraging opportunities listed below.

1. In the short-run:
 - a. **Bamboo timber.** Bamboo timber is a 100% wood substitute and should be used to replace at least 10% of imported wood logs (valued at \$1.56 billion in 2015) immediately.⁷ Units producing bamboo wood don't require higher order of skills (in manufacturing and design) or equipment, unlike the factories that produce furniture, wood composites, decking material, etc.
 - b. **Round-stick incense (*Agarbatti*).** Assam can target replacing at least 20% of imported sticks with domestic products. Existing manufacturing units (both

active and dormant) would need to be revived with appropriate technology, debottlenecking, and access to finance.

2. In the medium to long term Assam bamboo industries could diversify into products such as bamboo mat boards, bamboo mat corrugated sheets, bamboo laminates, bamboo mat high density panels, bamboo mat molded skin board, bamboo mat ridge caps, etc.
3. Preservative-treated bamboo poles could be used to make high-end profitable components in houses, resorts, school buildings, pantries, prefab houses for temporary shelters etc. These products meet global testing norms and also significantly contribute to reducing deforestation.

Key interventions for Assam

The immediate opportunity for Assam lies in building a vibrant bamboo wood supply chain that follows green principles (which integrate environmental-cost minimization into supply chain management) to ensure least wastage with ample opportunities for reuse and recycling. This study arrives at a set of coordinated actions to develop the industrial supply chain for bamboo in Assam with maximum private participation (Figure 4.3). The program is envisaged as flexible and nimble with appropriate feedback loops to ensure course correction in policy, fund deployment, marketing strategy, etc. over time.

A three-phase (steps) implementation strategy is outlined in Figure 4.4.

Figure 4.4: Phased Approach to Building Assam's Bamboo-Based Industries

Source: Study team analysis.

⁷ United Nations COMTRADE Database. <https://comtrade.un.org/>. Also, Soujanya Shrivastava and Ajay Kumar Saxena. 2017. Wood is Good: But, is India Doing Enough to Meet its Present and Future Needs?. Centre for Science and Environment, New Delhi.

The elements of step 1 ‘Building Competitiveness’ are detailed in Figure 4.5.

Figure 4.5: Building Competitiveness in Bamboo

3. Institutional and regulatory interventions

Capex = Capital Expenditure, JLG = Joint Liability Group, MSMEs = Micro, Small, and Medium-Sized Enterprises, NEDFI = North Eastern Development Finance Corporation, PRC = People's Republic of China, SHG = Self Help Group; VSAT = Very Small Aperture Terminal (Satellite).

Source: Study team analysis.

Tea Industry in Assam

The tea industry in Assam is about 180 years old. The first Indian tea produced in Assam was sent to the United Kingdom for public sale in the year 1838. Assam is the second-largest tea production region in the world after the PRC. About one-sixth of the tea produced

in the world comes from Assam.⁸ Tea industry in Assam contributes more than ₹50 billion annually as agriculture income and adds to foreign exchange earnings through its exports. Assam tea is currently exported to over 70 countries, including Pakistan, Egypt, Japan, and Israel. Iran, the Russian Federation, and United Arab Emirates (UAE) command more than 50% share of Assam tea exports.⁹

⁸ <https://industries.assam.gov.in/portlet-innerpage/about-tea-industries>.

⁹ India Brand Equity Foundation. 2018. Tea Industry and Exports in India. December. <https://www.ibef.org/exports/indian-tea-industry.aspx>.

The Government of Assam has secured a Geographical Indication (GI) tag for the tea produced in the state and as a result Assam tea is known as 'Assam Orthodox Tea'.

Though Assam plantations generally produce black tea, the region also produces smaller quantities of green and white teas. Tea in Assam is primarily grown in the Brahmaputra and Barak plains.

Most tea gardens are located in Dibrugarh, Sivasagar, Lakhimpur, Darrang, Nagaon, Kamrup, Goalpara, Karbi Anglong, Jorhat, Golaghat, Tinsukia, Sonitpur, Dima Hasao, and North Cachar Hills districts. There are 85,344 tea gardens in Assam (comprising 84,577 small tea growers and 767 big tea growers) that cover 304,000 hectares of land. The estimated production of tea in Assam was 642,000 tons in 2016.¹⁰

Tea Production and Supply Chain in Assam

While tea manufacturing has become technologically advanced, there has not been much change in field operations, which still demand a large number of unskilled workers for plucking. In the international

supply chain for tea, there is a predominance of a few companies like Unilever, Tata Global Beverage, and Associated British Foods which own Twinings. These companies have sold most of their tea estates and moved to blending, packaging, branding, and retailing of tea which is more profitable (Figure 4.6). This has led to closure of large estates or quick change in management.

The finished tea is either auctioned or sold directly to tea companies which undertake blending, branding, and packing for onward transportation to distributors and retailers (Figure 4.7). While most of the labor-intensive work is done by the workers, it is seen that in the final pricing of tea the blenders corner 33% and the retailers 53%, while tea pickers get a paltry 1%.¹¹

Between 2012 and 2016, while the total tea production in Assam has increased by 9%, area under tea has reduced by 6% while the number of gardens has increased by 8%. The average size of gardens is reducing—indicating fragmentation into smaller gardens—and area under cultivation is also coming down as large companies are exiting the production space (Tables 4.2 and 4.3).

Figure 4.6: Tea Supply Chain

Source: Study team analysis.

¹⁰ Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2017. *Economic Survey of Assam 2016-17*. <https://des.assam.gov.in/information-services/economic-survey-assam>.

¹¹ Study team industry research including discussions with industry experts.

Figure 4.7: Tea Supply Chain Downstream (Sample Supply Chain of Tata Tea)

Source: Study team analysis.

The top five districts of Dibrugarh, Sivasagar, Darrang, Cachar, and Nagaon have 91% of Assam's area under tea cultivation.

For the past couple of decades the Assam tea industry is facing numerous challenges including increased

competition from new tea producing countries, steadily declining price of tea, high cost of production, labor issues, sporadic rainfall due to climate change, lack of storage facilities, and low research and development. These issues have been exacerbated by inability of the local supply

Table 4.2: Tea Statistics of Assam and India, 2012 to 2016

Year	No. of Tea Gardens		Area under Tea (in '000 hectare)		Total Tea Production (in '000 kg)		Average yield (kg/hectare)	
	Assam	India	Assam	India	Assam	India	Assam	India
2012	78,856	NA	322	579	590,120	1,111,760	1,833	1,919
2013	69,220	NA	322	564	629,050	1,208,780	1,953	2,143
2014	77,710	NA	304	564	610,970	1,208,780	2,010	2,143
2015	83,566	NA	316	564	526,185	-	1,665	-
2016	85,344	NA	304	-	642,180	-	2,112	-

Source: Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2014, 2016, and 2017. Economic Surveys of Assam 2013-14, 2015-16, and 2016-17. Dispur.

Table 4.3: Area Under Tea Cultivation in Assam, 2009 to 2015: Top Districts

District	Area under Tea cultivation (in hectare)						
	2009	2010	2011	2012	2013	2014	2015
Dibrugarh	122,965	122,845	122,623	121,390	121,390	115,534	115,534
Sivasagar	94,934	95,056	94,921	93,630	93,630	88,454	88,454
Darrang	41,923	42,139	41,805	41,506	41,506	39,211	39,211
Cachar	32,745	32,413	34,380	35,834	35,834	33,853	33,852
Nagaon	8,014	8,209	8,024	8,086	8,086	7,639	7,639
Assam	321,687	322,222	322,210	322,210	322,210	304,400	304,400

Source: Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2013, 2015, and 2017. *Statistical Handbook of Assam 2013, 2015, and 2017*. Dispur.

chains to adapt to changing patterns of consumer demand.

Consumer Shift to High Value Orthodox and Loose Tea

Many western buyers are now consuming orthodox tea or loose tea, which is processed using traditional methods as opposed to the crush-tear-curl (CTC) variety. Orthodox teas maintain the original flavor of the tea leaves and their production is labor intensive. Over 90% of India's tea consumption is orthodox and bulk of India's exports comprise of orthodox leaves. India's exports fetch \$2.70 per kg, whereas Sri Lanka gets 25% more at \$3.30 per kg and the PRC exports at twice the price of India. Industry estimates that global demand for orthodox tea has now crossed 50% of total tea sold.¹² Not keeping with this trend, traditional exporters like India, Kenya, etc., are stuck in a cycle of producing large quantities of very low value tea.

Opportunity for Assam

The current strategy of selling CTC tea leads to low value output in a highly competitive, commodity-led market. Investments in appropriate debottlenecking infrastructure and leveraging the small tea growers (STGs) of Assam can develop the entry into high value global and Indian leaf tea market.

The state's top 10 districts in terms of the number of growers comprise 97% of all STGs in Assam (Table 4.4).

Traditionally the STGs were not part of the Tea Board database. According to discussions with industry experts, the dramatic shift post 2014 in the number of STGs is on account of the increase in outreach to connect the STG to the overall tea supply chain system. In view of this, a rediscovery and reorientation of Assam's tea garden management strategy toward STGs is overdue. Some key action points are

1. **Organize STGs into producer groups.** The producer groups would gain economies of infrastructure, while retaining ownership and uniqueness of each tea garden. A registration drive for all the STGs within the state needs to be undertaken.
2. **Map infrastructure needs of STGs.** Building and maintenance of local roads, quality assurance labs, tea tasting and testing, and packaging infrastructure need focus.

Traditional exporters like India, Kenya, etc., are stuck in a cycle of producing large quantities of very low value tea.

¹² Dan Bolton. 2018. India's Tea Exports are Out of Step with World. *World Tea News*. 19 November. <https://worldteanews.com/market-trends-data-and-insights/indias-tea-exports-are-out-of-step-with-world-demand>.

Table 4.4: District-wise Small Tea Growers of Assam Registered with Tea Board of India, 2012/13 to 2014/15

District	No. of Small Tea Growers			Registered Area in Hectare		
	2012/13	2013/14	2014/15	2012/13	2013/14	2014/15
Dibrugarh	208	19,160	19,160	529	15,434	15,434
Tinsukia	265	18,595	18,595	605	16,674	16,674
Sivasagar	290	9,590	10,868	676	9,943	11,149
Golaghat	1,387	11,286	9,503	2,716	7,485	9,160
Sonitpur	1,073	4,651	8,750	1,897	4,729	8,677
Jorhat	194	5,879	6,366	366	6,066	6,159
Udalguri	0	3,583	4,773	0	4,223	5,030
Lakhimpur	266	1,489	1,815	512	1,475	1,649
Karbi Anglong	489	489	1,520	2,627	2,627	3,345
Nagaon	145	643	1,032	345	1,181	1,659
Assam	4,955	77,229	84,591	12,392	72,401	82,250

Source: Government of Assam. Directorate of Economics & Statistics. Transformation and Development Department. 2015 and 2017. *Statistical Handbook of Assam 2015 and 2017*. Dispur.

- Brand building around STGs.** Recapturing the substantial tea heritage of Assam through brand building for STGs would be needed.
- Export strategy for STGs.** A dedicated export marketing agency for STGs should be set up, beyond the existing Tea Board.
- Product differentiation and positioning.** Single Estate or Single Origin Tea could be promoted.
- Marketing.** Marketing campaigns could especially target global tea buyers.
- Organic farming.** Incentivizing STGs to move toward organic cultivation could make the Single Estate or Single Origin Tea even more exclusive and high value.
- Promoting tea tourism.** Tea tourism combines tea experience with wellness tourism as consumers seek health benefits from consuming green tea. There is a clear opportunity for STGs to diversify into tea tourism for supplementary income streams.¹³

¹³ There are home stays in Japan that provide tea-picking experience to their guests. See <http://greentea-homestay.com/>.

5

Multimodal Transport Corridors

Background

As the gateway to Bangladesh–Bhutan–Nepal (BBN) and economies of the Association of Southeast Asian Nations (ASEAN), while also serving as a manufacturing and services hub for these regions, Assam will need a logistics backbone.¹ Given Assam’s terrain, the development of multimodal transport corridors including roadways, railways, and inland waterways—is essential to reduce the time and cost of transporting bulk goods and increase international trade with these markets.

This chapter explores ways in which the transport infrastructure in Assam can be aligned with the existing and future transnational corridors to ensure the smooth movement of high potential industrial products identified in Chapter 3 of this report.

Under the three economic and transport cooperation programs—South Asian Association for Regional Cooperation (SAARC), Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), and the South Asia Subregional Economic Cooperation (SASEC)—strategies for strengthening sea, air, land, and waterway

transport have been examined, along with border infrastructure, to ensure smooth movement of goods and passengers across borders (Box 5.1, Figure 5.1).²

The study found that

- road infrastructure has a key role to play in all the programs as the countries are land-linked while some of the countries are also landlocked;
- rail infrastructure is also crucial for connectivity; however, due to differing gauge of railways used across countries, rail connectivity becomes a challenge;
- airways support people-to-people connect and can be used to promote tourism circuits across the region;
- ports create gateways for connecting to global value chains for goods manufactured in the region; and
- Inland waterways transport (IWT) along the course of rivers is a cheaper, though less flexible, alternative to road and rail in landlocked regions.

¹ For the purpose of this report, the NER consists of the states of Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Member countries of ASEAN are Indonesia, Thailand, Singapore, Malaysia, the Philippines, Viet Nam, Cambodia, Myanmar, Brunei Darussalam, and the Lao People’s Democratic Republic. (Lao PDR)

² Reports reviewed:

- South Asian Association for Regional Cooperation (SAARC) Secretariat. 2007. SAARC Regional Multimodal Transport Study. Kathmandu; ADB. Updated 2012.
- Research and Information System for Developing Countries. 2016. BIMSTEC: The Road Ahead. New Delhi. <http://www.ris.org.in/sites/default/files/BIMSTEC%20Report%20%283%29.pdf>.
- ADB. 2018. BIMSTEC II Draft Master Plan. Unpublished.
- ADB. 2017. SASEC Powering Asia in the 21st Century. Manila, the Philippines. <https://www.adb.org/sites/default/files/publication/233646/sasec-powering-asia.pdf>.
- ADB. 2016. South Asia Sub regional Economic Cooperation Operational Plan 2016–2025. Manila, the Philippines. <https://www.adb.org/sites/default/files/institutional-document/193351/sasec-operational-plan2016-2025.pdf>.

Connectivity to Gateways to Tap International Markets

Key Gateways around Assam

Assam can kick-start economic development by strengthening links with important gateways in the region to capitalize on proximate neighboring international markets. The gateways include border centers, integrated check points (ICPs), ports, and airports that provide access to these markets (Figure 5.2).

The cluster approach of industrial development hinges on access to economic centers such as Guwahati, Amingaon, Bongaigaon, Nagaon, and Silchar, and manufacturing centers such as Kokrajhar, Dhubri, Mangaldoi, and Karimganj through these gateways.

Chattogram and Mongla Ports as Transshipment Hubs for Cargo Originating from Assam

The Chattogram port in Bangladesh was the key export–import (EXIM) port for NER before the British partition of India. The governments of India and Bangladesh have recently signed an agreement allowing the use of Chattogram and Mongla ports

Figure 5.1: Key routes for SAARC/SASEC/BIMSTEC/Mekong-Ganga

BIMSTEC = Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation, SAARC = South Asian Association for Regional Cooperation, SASEC = South Asia Subregional Economic Cooperation.

Source: Study team analysis.

Figure 5.2: Key Gateways around Assam

ICP = Integrated Check Post.

Source: Study team analysis.

in Bangladesh for movement of goods to and from India.³

Currently goods to and from NER have to take a circuitous route through the Siliguri Corridor to Kolkata Port. The development of Chattogram port as a transshipment hub for transporting goods to ASEAN can spur trade from NER. Analysis reveals that the use of Chattogram port over the Kolkata/Haldia port for goods originating from and going to Assam is not only more cost effective but also less time consuming.

Crucial international road corridors such as the Asian Highway, the India–Myanmar–Thailand Trilateral Highway, the East–West Corridor, and the proposed

Bangladesh–China–India–Myanmar (BCIM) Economic Corridor, run through Assam, which can link up its industries to global value chains, cutting across commodities (Figure 5.3).

However, connectivity issues between Assam and Mongla port (and over the intersecting Padma River) need to be resolved before it can be considered a viable transshipment hub for cargo from Assam.

Network Core

Significance of National Highway 27

As discussed in Chapter 2 of this report, the wide expanse of National Highway 27 (NH-27), its linkages

³ Government of India. Ministry of External Affairs. 2015. MoU on the use of Chittagong and Mongla Ports for Movement of Goods from India. New Delhi. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2423.pdf>.

with key gateways and markets and synergies with flagship projects make it a natural choice as the core of transportation network for Assam. It extends from the border between West Bengal and Assam, passes through Bongaigaon, Guwahati, and Nagaon toward Silchar (Figure 5.4). The core runs along the NH-27 with a parallel broad gauge rail line (Figure 5.5).

Key Roads Connecting the Hinterland to the Network Core

The development of state, national, and international highways is critical to provide seamless movement of goods between Assam and international markets, mainland India, and the rest of NER and for last mile connectivity within Assam. The NH-27 links Guwahati to Silchar, thus connecting upper Assam to the Barak

valley. Other important national highways in Assam are NH-37 and NH-29.

Roads

Assam is landlocked, centrally located in the NER, and connects to Siliguri corridor to the west; it therefore acts as a land bridge between the other northeastern states and the rest of India as well as between India and BBN and ASEAN. Given the hilly terrain, heavy rainfall, and high seismic activity in the NER, road conditions here are generally poor and need upgrade, multilaning, and continuous maintenance. Hence alternate routes to connect to ASEAN and BBN are necessary.

Figure 5.3: International Road Corridors across Assam

BCIM Corridor = Bangladesh, China, India, and Myanmar Corridor.

Source: Study team analysis.

Figure 5.4: National Highway 27 and its Synergies with Other Modes of Transport

IW Terminal = Inland Waterways Terminal, LCS = Land Customs Station.

Source: Study team analysis.

Figure 5.5: Connectivity of Network Core with Hinterland

Source: Study team analysis.

Connectivity to Bangladesh

Improvement of connectivity via different modes of transport to Bangladesh border will reduce transit time and cost of industries in the NER. Two routes have been identified as critical for connectivity to Bangladesh.

Route 1 Guwahati–Shillong–Dawki–Chattogram

The shortest and the most direct route from Guwahati to Chattogram runs via Shillong (Meghalaya) passing through Dawki Land Customs Station (LCS) and onward to Chattogram via Tamabil (Bangladesh border crossing point) and Sylhet (Figure 5.6).

The Dawki LCS is being developed as an ICP by the Land Ports Authority of India. Currently, Guwahati to Shillong is four-laned, whereas, Shillong to Dawki is a two-lane highway. Considering the importance of Dawki as an ICP, four-laning of the stretch between Shillong and Dawki should be a priority.

Route 2 Guwahati–Shillong–Kalain–Sutarkandi–Chattogram

This is the shortest route from Guwahati to Chattogram via Sutarkandi which is the only planned ICP in Assam with access to Bangladesh. The route travels via Meghalaya and reenters Assam (Figure 5.7).

Figure 5.6: Route 1 Guwahati–Shillong–Dawki–Chattogram

Source: Study team analysis.

Figure 5.7: Route 2 Guwahati–Shillong–Kalain–Sutarkandi–Chattogram

Source: Study team analysis.

National highways 6 and 37 are the main roads on this route. Most of the route falls in Meghalaya and is prone to landslides during monsoons. National Highway 6 is four-laned from Guwahati to Shillong and two-laned for the rest of the stretch. The route is also the mainstay for travelers and industries in Shillong to connect to Silchar and other northeastern states. Hence local traffic on the route already exists. Increase of trade via Chattogram will add traffic movement, which is likely to congest the road.

It is advisable to widen the two-laned road from Shillong to Kalain to four lanes to avoid future traffic congestion. Also, maintenance of NH-6 along hilly stretches should be carried out regularly to minimize the damage from landslides.

Projects identified along the Guwahati–Chattogram routes 1 and 2 need to be fast tracked to ensure timely completion (Table 5.1).

Connectivity to Myanmar

Connectivity to Myanmar, essential for India to link with the ASEAN market, is being improved under the India–Myanmar–Thailand Trilateral Highway and Asian Highway programs. The presence of Assam on the key route opens the opportunity for it to evolve as trading hub in the region as well as the manufacturing hub linking with the value chains of products manufactured in ASEAN. However, the route passes through the hilly terrain of Manipur, Nagaland, and Assam and requires continuous maintenance.

Table 5.1: Projects Identified on the Guwahati–Chattogram Routes

	State	Project Name	Project Cost (₹ million)	Length (km)	Project Status
1	Assam	Silchar–Badarpur	770	5	Feasibility Stage
2	Assam	Sutarkandi–Karimganj	2,030	14	Feasibility Stage
3	Assam	Panchgram–Silchar	3,340	23	Feasibility Stage
4	Meghalaya	Dawki–Shillong	13,780	95	DPR stage
5	Meghalaya	Mawlyngkhung–Mawryngkneng (Shillong bypass)	7,110	49	Feasibility Stage

DPR = Detailed Project Report.

Source: National Highways and Infrastructure Development Corporation.

Route 1 Guwahati–Nagaon–Silchar–Imphal–Moreh...Mandalay

Passing through all the major cities in Assam—Guwahati, Nagaon and Silchar—this is the longest route from Guwahati to Moreh (Indian border town abutting Myanmar) (Figure 5.8).

The route includes parts of national highways 27, 37, and 102. National Highway 27 is four-laned till Nagaon and then two-laned up to Silchar. As the main route for passenger movement from Nagaon to Silchar, it is fairly congested. Therefore, upgrading to four lanes is essential to ensure smooth movement

Figure 5.8: Route 1 Guwahati–Nagaon–Silchar–Imphal–Moreh...Mandalay

of goods. National Highway 37, which is two-laned between Silchar and Imphal, is the lifeline that connects Manipur to Assam and mainland India. The road is prone to landslides in the monsoons and upgrading of the stretch to four lanes needs to be considered.

Route 2 Guwahati–Nagaon–Dimapur–Kohima–Imphal–Moreh...Mandalay

The shortest route from Guwahati to Mandalay, Route 2 is also part of Asian Highway and India–Myanmar–Thailand Trilateral Highway. It is considered the main route for transportation from mainland India to Myanmar (Figure 5.9).

This route passes through NH-27 (Guwahati–Nagaon), NH-29 (Nagaon–Dimapur–Kohima), NH-2 (Kohima–Imphal) and NH-102 (Imphal–Moreh). National highways 29 and 2 are currently two-laned

with the NH-29 section between Dimapur and Kohima being widened to four lanes. National highway 102 is currently being developed through ADB financial assistance. With only 32% of road length being four-laned, the route traverses through the hilly terrain of Nagaland and Manipur and is bad in stretches. Despite facing periodic economic blockades, this route is preferred by freight operators. Therefore, widening and maintenance of NH-29 and NH-2 are crucial to ensure smooth connectivity on the route.

Connectivity to Bhutan

Road connectivity to Bhutan uses two border points in Assam—Gelephu and Samdrup Jongkhar—of which Gelephu is more significant as it lies on the shortest route to Thimpu from the border. Road connectivity with Assam is important for Bhutan to access the Chattogram port. In 2017 India and Bangladesh discussed development of trade route connecting

Figure 5.9: Route 2: Guwahati–Nagaon–Dimapur–Kohima–Imphal–Moreh...Mandalay

Source: Study team analysis.

Gelephu (Bhutan) via Dalu (India) to Nakugaon land port (Bangladesh) (Figure 5.10).

With the planned development of a multimodal transport hub at Jogighopa, the route will position Assam as a trade hub between Bhutan and Bangladesh. The multimodal hub will act as a distribution and aggregation center for goods moving in and out of Bhutan and Bangladesh.

Maintenance of Road Infrastructure for Uninterrupted Movement of Goods

Bad roads increase both logistical time and cost. Landslides due to heavy rains and earthquakes routinely disrupt key routes in the NER. The study has identified national highways 27, 29, and 37 in Assam besides NH-6 and NH-306 in the rest of NER as vital for the region. The National Highway and Infrastructure Development Corporation should

monitor these stretches continuously to ensure year round operations.

Corresponding Road Connectivity in Bangladesh, Bhutan, and Myanmar

The development of corresponding road network in neighboring countries—Bangladesh, Bhutan and Myanmar—is critical for facilitating increased international trade from Assam. Apart from the Asian Highway, the India–Myanmar–Thailand Trilateral Highway (specifically, the Moreh–Tamu–Kalemyo–Kalewa, Kalewa–Yagyi, and Yagyi–Monywa–Mandalay sections), an alternate route to Mandalay through Zokhawthar (Mizoram, India), and the Kaladan Multimodal Project are crucial for connecting to ASEAN. Also, the BCIM Economic Corridor and the South Asian Association for Regional Cooperation (SAARC) Road Corridor 5 is vital for connecting to Bangladesh.

Figure 5.10: Road Connectivity to Bhutan, the Gelephu–Dalu Corridor

Priority Projects

Crucial road stretches in the NER that have been identified for improved connectivity with neighboring countries based on road route assessment are presented in Table 5.2.

Further discussions with National Highway and Infrastructure Development Corporation and Ministry of Road Transport and Highway along with review of reports led to identification of 20 road projects across Assam and NER which have been analyzed through a priority framework (Figure 5.11).

Railways

Background

Railway connectivity in NER is crucial as it allows for movement of bulk goods along longer routes at more economical rates than roads. Assam has one

of the highest railway densities among Indian states per square km of area as well as per 1,000 persons. However, the hilly terrain in lower Assam hinders railway network connectivity to remote locations and neighboring states. Railway lines in Assam are mostly single-line broad gauge with most of the stretches converted from meter gauge to broad gauge in the past decade. The delay in switching to double broad gauge lines has resulted in low utilization of freight rail services for movement of goods from lower Assam and neighboring states. Full migration to double line broad gauge is an urgent need in the state.

While the stretch from West Bengal to Guwahati has alternate routes to ensure seamless goods movement, from Guwahati to Silchar there is no alternative to the single line that not only connects the NER to mainland India but also to ASEAN countries. An alternate route is crucial to ensure unhindered connectivity in case a flood or landslide causes disruption.

Table 5.2: Roads in the Northeast Region to Connect with Neighbors

State	Section	National Highway (NH) or Asian Highway (AH)	Total Length (km)	Length in Assam (km)	Lanes	Remarks	Type
Manipur	Kohima to Imphal	AH-1	135	0	2	Shortest route to Imphal and Moreh	Spine connectivity
Manipur	Imphal to Moreh	AH-1	110	0	2	Key section that serves all three routes	Gateway connectivity
Assam/Manipur	Kacharipara to Dimapur	AH-1	135	120	2	Shortest route to Imphal and Moreh	Spine connectivity
Meghalaya/Assam	Shillong to Silchar	NH-6	200	60	2	Access to Bangladesh (Dawki, Karimganj, Agartala) and Imphal/Moreh	Spine connectivity
Assam/Manipur	Silchar to Imphal	NH-37	250	50	2	Key section that serves two routes	Spine connectivity
Assam/Mizoram	Silchar to Aizawl	NH-306	175	50	2	Connectivity to Sittwe Port (Kaladan Project via Zorinpui in Mizoram)	Spine connectivity
Assam/Tripura	Silchar to Agartala	NH-8	200	100	2	Access to Bangladesh	Gateway connectivity
Assam	Silchar to Karimganj	NH-37	50	50	2	Access to Bangladesh	Gateway connectivity
Assam	Srirampur to Guwahati	NH-27	270	270	4	Already developed by National Highways Authority of India (NHAI)	Spine
Assam	Kacharipara to Silchar	NH-27	250	250	2/4	Being developed by NHAI	Spine

Source: Study team analysis.

Figure 5.11: Prioritization Matrix of Road Projects in Assam

DPR = Detailed Project Report.

Source: Study team analysis.

The Network Core and Railway Network in the Northeast Region

Guwahati is the hub for movement of goods between NER and mainland India as also between India and neighboring BBN and Myanmar. Guwahati handles the largest number of passengers per day among all major cities in Assam by a large margin.⁴ Goods originating from eastern Assam cities like Dibrugarh or Tinsukia have to either pass through Guwahati or go around it to reach the mainland. Similarly, goods coming in from mainland India to this region also have to pass through Guwahati.

Goods and people moving in and out of Meghalaya, Mizoram, Nagaland, Tripura, and Manipur by rail have to compulsorily pass through Guwahati. Plans

for doubling stretches and providing alternate routes are in place to improve connectivity with neighboring states, expand capacity of the railway network, and reduce the congestion around Guwahati junction. Assam is included in the plan of Indian Railways to electrify the entire rail network to reduce operating cost and improve efficiency. It also plans to connect all the capitals of northeast states to the network by 2020. At present, Agartala is the only capital city in NER outside Assam connected to the railway network.

The dependence of the rest of NER on railway network connectivity to Guwahati will reduce in the future as other infrastructure projects, such as the Kaladan Multimodal Transport Project become operational and connectivity through the Trans-Asian Railway Network

⁴ As revealed by the data shared by the North East Frontier Railway.

(TARN) to Bangladesh and Myanmar is established properly. The Southern TARN Corridor connecting Europe to Southeast Asia through India envisages an integrated freight network across the landlocked countries in the region to cater to the huge increase in trade. Gaps in the network need to be bridged with rail connectivity between India and Bangladesh, India and Myanmar, Myanmar and Thailand, etc.

Connectivity to Bangladesh

Access to Chattogram port is crucial for industrial development in the region, connecting to regional value chains, and facilitating containerized and heavy bulk transshipment. Connectivity improvement to Bangladesh border on the crucial Agartala–Sabroom route is expected to achieve this and reduce transit time to the proposed ICP. The 110 km project, currently in final stages of construction, is estimated to cost ₹33,740 million. When complete, this will provide a new rail route to Bangladesh.

While there are three rail-routes to connect Guwahati to Chattogram, the difference between gauges in India and Bangladesh poses a challenge for seamless connectivity.

Route 1 Guwahati–Karimganj–Kulaura–Akhaura–Chattogram

On the Indian side, the entire route falls in Assam, passing through Digaru, Silchar, and Karimganj. It then crosses the border to Kulaura (Bangladesh) and proceeds to Chattogram via Akhaura. The Guwahati–Digaru line is double-lined broad gauge but beyond Digaru, it is single-lined broad gauge till Karimganj. The meter-gauge connect between Kulaura and Akhaura in Bangladesh is not in use at present and needs upgrade. Similarly, upgrading of the Mahishasan (India)–Shahbajpur (Bangladesh) meter-gauge link to broad-gauge will be a game changing intervention on this route.

Access to Chattogram port is crucial for industrial development in the region.

Route 2 Guwahati–Agartala–Akhaura–Chattogram

This route is single-lined broad gauge from Digaru to Agartala. The connectivity between Agartala–Akhaura (under construction) is fully funded by India to improve access to the Chattogram port. The line from Akhaura to Lakhsam in Bangladesh, being upgraded to dual gauge with ADB funding, serves as a key route linking Dhaka to Chattogram port.

Route 3 Guwahati–Belonia–Feni–Chattogram

This third Guwahati–Chattogram route has the shortest line length in Bangladesh. Currently the route is nonoperational as connectivity between Belonia (Tripura) and Feni (Bangladesh) needs to be developed. Rail lines from Agartala to Belonia were completed and operationalized in February 2019.

Connectivity to Myanmar

The key railway route between India and Myanmar is planned through Imphal (Manipur) to ensure TARN access to India. Once developed, this network will pass through Guwahati–Jiribam–Imphal–Moreh–Kalay.

Two rail projects have been identified as critical for connectivity to Myanmar.

- **Jiribam–Imphal.** The project is under construction and timely completion is crucial for ensuring Manipur's link with the pan-India rail network and India's rail-connect with Myanmar. The project cost is ₹138,090 million and the length of the track is 125 km.
- **Imphal–Moreh.** As the last leg, this project completes the rail connect to the Myanmar border and should be fast-tracked. Its detailed project report (DPR) is being prepared at present. The project cost is estimated at ₹54,280 million for a track length of 111 km.

Connectivity to Bhutan

Assam's northwestern boundary borders Bhutan. As Bhutan does not have a railway network, an Indian rail network up to the Bhutan border is being planned. Goods transported through this network will be moved to their destination in Bhutan by road.

Two India–Bhutan rail routes have been planned:

- **Rangia (Assam)–Darrang (Assam)–Samdrup Jongkhar (Bhutan).** The total route length of 48 km is estimated to cost ₹9,010 million (the survey was completed in 2007/08 and the cost was updated in 2013/14).
- **Kokrajhar (Assam)–Gelephu (Bhutan).** The total route length of 58 km is estimated to cost ₹5,540 million (the survey was completed in 2007/08 and the cost was updated in 2013/14).

Corresponding Rail Connectivity in Bangladesh and Myanmar

The study team has identified critical railway links in Bangladesh and Myanmar, the development of which would facilitate increased trade between India and its neighbors.

Rail Network in Bangladesh

- **Mahishasan–Shahbajpur.** Mahishasan, near the Sutarkandi (India) border post, is connected to Shahbajpur in Bangladesh. This 51.5 km stretch, also part of TARN, has not been operational since 1996 due to low traffic. Restoring this route is expected to enhance connectivity with Bangladesh.
- **Shahbajpur–Kulaura.** Onward connectivity in Bangladesh, from Shahbajpur to Kulaura (44.77 km) is critical to connect Assam with Chattogram port. India is financing the rehabilitation of this link at an estimated cost of \$65.17 million. Work commenced in September 2018 toward rebuilding of the rail tracks and construction of bridges, the station, platforms, and sheds.
- **Agartala–Akhaura.** This 15 km stretch connects India to Bangladesh via Agartala (Tripura). Government of India is financing the development of this route and the Ministry of External Affairs is the nodal agency for the project. The construction started in September, 2018 and is expected

to be operational by 2020. This route is not only expected to link northeastern India to Chattogram, but also provide direct connectivity from Agartala to mainland India via Bangladesh.

- **Belonia–Feni.** The route is 27 km long. Rail connectivity to Belonia was operationalized in 2019. Rail network linkage to Feni needs to be upgraded.

Rail Network in Myanmar

Rail connectivity to Myanmar is at a nascent stage. While the Jiribam–Imphal line in India is under construction, the line between Imphal and the Myanmar border town of Tamu is at a DPR or survey stage. Slow progress is owed to the difficult terrain and frequent landslides in the area. Beyond the Indian border, the Tamu–Kalay stretch in Myanmar is also critical for onward connectivity. The governments of India and Myanmar have agreed to cooperate on the DPR preparation for this 135 km line.

Priority Projects

Based on discussions with North East Frontier Railway and analysis of reports on the NER, 17 rail projects across Assam and the NER have been identified (Figure 5.12).

Inland Waterways

Background

With over 12 national waterways in the state, Assam has a natural advantage in this form of transportation which is the cheapest though slowest mode. Traversing easily through hilly terrain, these national waterways provide hinterland connectivity to Assam

The development of critical railway links in Bangladesh and Myanmar would facilitate increased trade between India and its neighbors.

Figure 5.12: Railway Project Priority Framework

DPR = Detailed Project Report.

Source: Study team analysis.

with its neighboring states, mainland India, and neighboring countries. The development of inland waterways and their integration with other modes of transport will facilitate faster and more economical movement of goods.

Out of the 12 waterways identified in Assam, currently, national waterways 2 and 16 (NW-2 and NW-16) are operational while technical studies on the rest are underway.

- **Brahmaputra River (NW-2).** The Brahmaputra River (NW-2) connects the Indian waterways to Jamuna River in Bangladesh, under the India–Bangladesh Protocol on Inland Water Transit and Trade, 2015. It originates from Dhubri near Bangladesh border and ends at Sadiya in

Assam covering around 85% of Assam's population and transporting both passenger and cargo.

- **Barak River (NW-16).** Originating from Lakhimpur and ending at Bhanga, NW-16 flows through southern Assam carrying only passenger transport at present. The feasibility of cargo transportation through it is still being assessed.

The full operation of the India–Bangladesh protocol route will facilitate quicker and shorter transport between NER and mainland India through waterways in Bangladesh. However the low draft in two critical stretches in Bangladesh—Sirajganj to Daikhawa (175 km) in the Jamuna river (Brahmaputra in India) and Ashuganj to Zakiganj (295 km) in the Kushiara river

(Barak in India)—has restricted use. India has signed a memorandum of understanding with the Government of Bangladesh to dredge these stretches periodically to ensure year-round navigation.

The Waterway Advantage

The development of waterways and the operationalization of the India–Bangladesh protocol routes will significantly boost the movement of goods in and out of NER (Figure 5.13). It is likely to significantly reduce the cost of transportation as compared to overland NER–mainland India goods movement through the Siliguri Corridor.

As per the Inland Water Authority of India (IWAI), approximately 3 million tons cargo per annum can move through waterways. With improved infrastructure and dredging of waterways along the route the modal split toward waterways can be improved. However, India and Bangladesh should work on improving the facilities at border check posts to minimize delays due to customs checks.

Operationalizing the India–Bangladesh Protocol Route

The India–Bangladesh Protocol route, formalized in June 2015, is valid for an initial period of 5 years, extendable by mutual consent. The protocol allows for the use of each other's waterways for trade and commerce between two places in the same country or with a third country through each other's territory. Four onward and corresponding return routes identified under the protocol are

- **Routes 1 and 2.** Kolkata–Haldia–Raimongal–Chalna–Khulna–Mongla–Kawkhali–Barisal–Hizla–Chandpur–Narayanganj–Aricha–Sirajganj–Bahadurabad–Chilmari–Dhubri–Pandu–Silghat
- **Routes 3 and 4.** Kolkata–Haldia–Raimongal–Mongla–Kawkhali–Barisal–Hizla–Chandpur–Narayanganj–Bhairab Bazar–Ashuganj–Ajmirganj–Markuli–Sherpur–Fenchuganj–Zakiganj–Karimganj

Figure 5.13: Inland Waterways in Assam

Source: Study team analysis.

- **Routes 5 and 6.** Rajshahi–Godagari–Dhulian
- **Routes 7 and 8.** Karimganj–Zakiganj–Sherpur–Markuli–Ajmirganj–Ashuganj–BhairabBazar–Narayanganj–Chandpur–Aricha–Sirajganj–Bahadurabad–Chilmari–Dhubri–Pandu–Silghat

The routes identified above will reduce distance and cost of goods movement from Kolkata to Karimganj and Agartala. A Kolkata–Karimganj waterways connect can result in cost saving of ₹1,471 per ton of cargo while a similar Kolkata–Agartala connect could save ₹2,317 per ton. If operations along the protocol could be smoothened out with well-defined standard operating procedures and regular dredging of low draft stretches, the reduction in logistical costs could boost trade significantly.

Waterways Infrastructure in India

Infrastructure along National Waterway 2

The available facilities along NW-2 are as follows:

- The Dhubri–Sadiya NW-2 on the Brahmaputra River is 891 km long with 2 permanent terminals and 11 floating terminals.
- It also has four Differential Global Positioning System (DGPS) stations to monitor the movement of vessels on the river and ensure safe operations.
- The draft along the waterway varies between 1.5 meters and 2.5 meters.
- Night navigation is allowed from Dhubri till Silghat. To ensure smooth functioning of the waterway, a fleet of five survey vessels and four dredgers is used. Cargo handling and passenger services are provided on the waterway.

Infrastructure along National Waterway 16

National Waterway 16 is on Barak River, the second longest river in the NER. Navigable for 121 km between Lakhimpur and Bhanga, NW-16 currently has two functional terminals at Karimganj and Badarpur. The

waterway provides access to the hinterland of lower Assam, Manipur, Tripura, Mizoram, and Nagaland and can facilitate movement of key commodities such as fly ash and grains to and from Bangladesh once the India–Bangladesh Protocol route becomes fully operational.

Development of NW-16 will be carried out in two phases. In Phase I dredging will be carried out between Silchar and Bhanga along with the upgrade of terminals at Karimganj and Badarpur and the development of a multimodal hub at Ranighat. In Phase II dredging will be undertaken between Silchar and Lakhimpur (50 km) along with development of a new terminal at Lakhimpur after a market assessment is carried out.

For goods to be transported between West Bengal and Assam through Bangladesh via the protocol route, the possibility of moving containerized cargo through NW-2 and NW-16 needs to be explored. The stretch from Dibrugarh to Sadiya needs dredging to increase the draft to 2 m from 1.5 m.

Priority Projects

However, deficient infrastructure support along inland waterway networks, especially at the terminals, limits their economic potential. Therefore, IWAI has identified the following projects to address infrastructure need along NW-2:

- building a ship repair facility at Pandu;
- developing new roll-on–roll-off (ro-ro) terminals for the transportation for cars along with passengers across the Brahmaputra at
 - Neamati–Kamlabari
 - Majian (Dibrugarh)–Sengajan
- establishing new terminals at
 - Bogibeel to cater to eight districts of upper Assam;
 - Silghat to attract cargo movement between refineries and cement plants in the area and Guwahati; and
 - Neamati to act as gateway to Majuli islands;

- procuring four cargo vessels, two cutter section dredgers, four ro-pax vessels and two ro-ro vessels.

The IWAI has launched a portal to connect cargo owners and shippers and provide real time data on availability of vessels. Since only bulk cargo is transported on NW-2 as of now, potential of container cargo shipment needs to be explored.

Priority projects identified along NW-2 and NW-16 are listed below:

- **Developing a DPR on the cargo potential of and infrastructure development on NW-2.** Developing a strategy for future cargo on NW-2 and provisioning for adequate infrastructure is crucial. The project should be taken up immediately.
- **Dredging of NW-16.** The route length of 121 km along NW-16 that is being dredged currently should be completed on schedule under the oversight of the IWAI to ensure the development of the Barak Valley.
- **Upgrading terminals at Karimganj and Badarpur and developing a floating terminal at Silchar.** The terminal feasibility study is underway and the project cost is estimated at ₹174.4 million. The project should be fast-tracked to align with the dredging on NW-16.

Nine inland waterway projects to improve connectivity between economic centers and ASEAN and BBN have been identified.

Based on discussions with the Transport Department, Government of Assam, nine inland waterway projects to improve connectivity between economic centers and ASEAN and BBN have been identified. These projects have been prioritized through the priority framework presented in Figure 5.14.

Four projects are under construction or at the procurement stage, whereas five projects are at very initial stages with no cost estimations available at this point.

Airports

Background

The airborne transport network in Assam is critical for both domestic and international connectivity as the state is prone to floods and landslides, which disrupt land- and water-based modes. Helicopters provide essential evacuation services to remote locations during emergencies.

Assam's existing airport infrastructure provides good coverage within the state and connectivity to remote locations.

It has seven airports: Guwahati, Tezpur, Silchar, Jorhat, Lakhimpur, Dibrugarh, and Rupsi (nonoperational) of which Guwahati provides international connectivity (Figure 5.15).

As of now air connectivity in Assam follows a hub and spoke model, with Guwahati and Kolkata (West Bengal) functioning as the hub and small airplanes providing connectivity to the smaller airports. Air connectivity to major northeast cities needs to be prioritized to boost trade and commerce within the region. Government of India's Regional Connectivity Scheme (RCS), also known as UDAN, is expected to boost air connectivity from and within the region.⁵ To facilitate greater air travel, Silchar airport can be expanded into a hub for aggregation of traffic from the southern parts of Assam and adjoining states and to ensure sufficient load factor, initially, small aircraft may be used.

⁵ UDAN stands for *Ude Desh ka Aam Naagrik* (in Hindi) which roughly translates to "May the Common Citizen Fly".

Figure 5.14: Inland Waterway Project Priority Framework

DPR = Detailed Project Report.

Source: Study team analysis.

Figure 5.15: Airports in Major Cities of Northeast Region (including Assam)

Source: Study team analysis.

The Aviation Advantage

Assam's location provides a natural advantage to position itself as an aviation hub in east India; however, at present connectivity to BBN and ASEAN is limited.

The study assessed the feasibility of connecting Assam to ASEAN and BBN through small and medium range aircraft (Figure 5.16).

This assessment showed that long haul aircraft, such as A-330 and B-777/787, were not essential for connectivity to ASEAN countries and medium haul aircraft operated by carriers in domestic circuits were ideal. Infrastructure in Guwahati too was adequate to handle medium haul aircraft. Direct flight connectivity to Dhaka (Bangladesh) has been proposed recently,

to improve trade and commerce whereas direct flight connectivity with ASEAN capitals is under discussion.

Aviation Infrastructure

Air traffic in Assam is on the rise and according to Airports Authority of India (AAI), almost all airports have shown double-digit passenger traffic growth in 2018/19 over the previous year. Analysis shows that Guwahati and Silchar airports are overutilized and need expansion to reduce delays in operations. Jorhat airport is also approaching capacity utilization. With year-on-year growth above 20% for all three airports, it is prudent to ensure additional capacity at the earliest.

The following interventions should be prioritized:

- Expanding the passenger handling capacity at Guwahati and Silchar airports. The AAI has

initiated the process and timely completion needs to be ensured.

- Expanding the cargo handling capacity at Guwahati airport. Air cargo movement is essential for sectors such as pharmaceuticals and medicinal plants, electronics, and tea. Therefore time and temperature sensitive cargo handling capacity needs to be developed at Guwahati airport.

Priority Projects

Based on current airport infrastructure and various reports by central and state governments, three airport projects for Assam have been identified and analyzed through the priority framework in Figure 5.17.

Two of the projects are under construction while one is in procurement stage.

Figure 5.16: Aircraft Flying Range

Source: Study team analysis.

Multimodal Logistics Parks

Background

Multimodal Logistics Parks (MMLPs) facilitate trade by rationalizing freight and logistics costs and reduce vehicular pollution and congestion. Assam's geo-strategic location and the potential for all modes of transport position it as an ideal location for MMLPs. The establishment of these parks could facilitate regional and international trade for the NER.

Apart from the one already planned in Jogighopa, the study team has identified Silchar and Teliamura (Tripura) as two probable locations for setting up MMLPs. These locations have been selected based

on the presence of multiple modes of transport, availability of land, and proximity to regional connectivity corridors.

Silchar

Silchar is the second-largest city in Assam after Guwahati and its industrial ecosystem, gateway and market proximity, and presence of multimodal transport make it ideal for establishing an MMLP. Silchar is strategically located at the center of NER, and is accessible from Bangladesh and Myanmar (Figure 5.18). Sutarkandi is the border post nearest to Bangladesh from Silchar. Key exports to Bangladesh from this border point are coal, tea, and agri-products while imports include household items. Thus Silchar can emerge as a hub for aggregation and distribution from and to the entire NER.

Figure 5.17: Airport Project Priority Framework

DPR = Detailed Project Report.

Source: Study team analysis.

Silchar is also important for trade via Chattogram and Mongla ports in Bangladesh and via Sittwe port in Myanmar.

Panchgram, close to Silchar, has been identified as the location for the proposed MMLP as it is centrally located and has access to all modes of transport—

waterways, roadways, railways, and air links (Figure 5.19). Panchgram can be reached via national highways 6, 8, and 37, which connect it to Assam, Meghalaya, Manipur, Tripura, and Mizoram. The Barak River (NW-16) flows past Panchgram ensuring connectivity to Bangladesh and Myanmar.

Figure 5.18: Silchar Strategically Located to Emerge as a Regional Logistics Hub

AH = Asian Highway, NH = National Highway.

Source: Study team analysis.

Figure 5.19: Panchgram's Locational Advantage as a Multimodal Logistics Park

Source: Study team analysis.

Teliamura

Teliamura is located 47 km from Agartala in Tripura and can act as a hub for integration of goods to be exported from Mizoram and southern Manipur (Figure 5.20). It can also act as distribution hub for cargo moving in from ICPs in southern NER and in

the movement of goods from lower Bangladesh to Myanmar. It has access to NH-8 and is en route national highways connecting Assam and Mizoram. It has the advantage of rail and air links in Agartala and is accessible from Bangladesh and Myanmar.

Figure 5.20: Teliamura's Location Advantage as a Multimodal Logistics Park

Source: Study team analysis.

6

Urban Development

In Chapter 2, a cluster approach was used to promote outward-looking industrial development in Assam. The approach demarcated a network of economic centers, manufacturing centers, and border centers across the state as specialized activity nodes to increase the overall efficiency and competitiveness of manufacturing and services in Assam. A cluster approach to industrial development requires significant improvement of urban infrastructure at the nodal centers for absorbing rural–urban migration systematically; upgrading urban utilities (power, water supply, sanitation, public health, education, public transportation, recreation, etc.); and building capacity of urban local bodies (ULBs) to cater to the needs of the growing populations. In this chapter, urban development of these centers is analyzed in terms of challenges and interventions.

Urbanization occurs as labor shifts out of agriculture into urban production. Cities provide labor, skills, and innovation as inputs for manufacturing and services along with superior public services, cultural facilities, urban infrastructure, and education and medical services. Industries in urbanized states benefit from agglomeration economies generated by the sharing of inputs among industries with similar production processes and labor market pooling.¹

Urban Scenario in Assam

The current level of urbanization in Assam is low with only 14.1% of the state's population (4.4 million

people) living in urban areas, compared to the national average of 28%.² Apart from Guwahati which is the largest urban center with a population of nearly 1 million, the urban population is thinly spread across 213 other settlements including statutory towns, census towns, and outgrowths as defined by the Census of India.³ Even in terms of geographic spread, only about 1.6% (1,260 km²) of the state's geographical area is notified as urban.

Given the positive correlation between urbanization and industrialization, urban development in Assam needs to be both intensive and distributed across the various activity nodes (economic, manufacturing, and border centers) identified within the cluster approach for industrial growth.

Institutional Structure

The urban sector in Assam is administered by two agencies:

- i. **Urban Development Department (UDD)** covers all ULBs other than Guwahati. The additional chief secretary/principal secretary, UDD is the administrative head of all municipal boards and town committees under it. All ULBs are obligated to provide basic civic services in the urban areas.
- ii. **Guwahati Development Department (GDD)** has the administrative charge of the two

¹ Rosenthal and Strange. 2004. Evidence on the nature and sources of agglomeration economies. In V. Henderson and J.F. Thisse (eds.), *Handbook of Regional and Urban Economics 4: Cities and Geography*, pp: 2119–2171. Elsevier. Amsterdam.

² Government of India. Ministry of Home Affairs. Office of the Registrar General and Census Commissioner of India. *Census of India 2011*. New Delhi.

³ Footnote 2.

departments mentioned below that are headed by separate ministers (Table 6.1):⁴

- a. Guwahati Metropolitan Development Authority (GMDA)
- b. Guwahati Municipal Corporation (GMC) is the only municipal corporation in Assam

Table 6.1: Structure of Guwahati Development Department and the Functions of its Agencies

Entity	Key Role / Function
Guwahati Metropolitan Development Authority	<ul style="list-style-type: none"> – Preparation and implementation of Master Plan for Guwahati Metropolitan Area – Implementation of programs on request from Government of Assam – Coordination and execution of special central government sponsored programs / schemes within its jurisdiction
Guwahati Municipal Corporation	<ul style="list-style-type: none"> – Urban governance – Urban planning and development – Provision of basic civic services – Governed by the Guwahati Municipal Corporation Act, 1971

Source: Website of Guwahati Development Department, Government of Assam.

The Government of Assam has constituted district planning committees (DPCs) to consolidate the plans prepared by the panchayati raj institutions (PRIs) and ULBs in a district to prepare a draft district development plan. The DPC also monitors quantitative and qualitative progress, especially physical and financial achievements in the implementation of the approved district plan schemes and state plan relating to the district. It thus evaluates achievements and draws up action points from completed programs.

Urban Challenges for Industrialization in Assam

Structural Challenges

Skewed Industrial Distribution due to Single Large Center-led Urbanization

The urbanization pattern of Assam resembles West Bengal where Guwahati (like Kolkata) is the core urban center with the rest of the state lagging far behind (Figure 6.1). This kind of concentrated urbanization reduces the capability of the local economy to support organic and inorganic balanced industrial development.

Guwahati is the only city in Assam with a population of nearly a million followed far behind by Silchar (172,709), Dibrugarh (138,661), and Nagaon (116,355). Kamrup (Metropolitan) district is the most urbanized (83%) followed by Dima Hasao (29%), Jorhat (20%), and Tinsukia (20%).⁵

While urbanization has fueled economic growth in and around Guwahati, it has also placed a huge strain on its physical infrastructure manifesting in overcrowding, rampant growth of slums, disparities in living conditions, and inequitable access to services. In

While urbanization has fueled economic growth in and around Guwahati, it has also placed a huge strain on its physical infrastructure.

⁴ The Municipal Act of 1956 was the first urban legislation in Assam in the post-independence period which provided a strong basis for organization and administration of municipalities. The Local Self Government Department in the Assam Secretariat was entrusted with the overall control of ULBs prior to this Act. This department was changed to the Municipal Administration Department (MAD) in 1964. A unified system was established in which MAD was in charge of control of municipal agencies. But the role of the MAD was altered in the context of Guwahati with the creation of a new department under the Government of Assam in 1994, the Guwahati Development Department (GDD). Accordingly MAD was renamed Urban Development Department (UDD). Refer to, Utpal Kalita. 2015. Urban Governance and Service Delivery in Guwahati City. *IOSR Journal of Humanities and Social Science*. Volume 20, Issue 12, Ver. III (December). pp: 54–59. <https://www.satp.org/satporgtp/countries/India/document/papers/visiondoc2030.pdf>.

⁵ Footnote 2.

Figure 6.1: Urbanization Patterns Across Major Indian States

GDP = Gross Domestic Product.

MH = Maharashtra, TN = Tamil Nadu, WB = West Bengal.

Note: Size of the bubble denotes state's GDP. For example, Gujarat GDP for 2011/12 = ₹4,000 billion.

Sources: Government of India. Ministry of Home Affairs. Office of the Registrar General and Census Commissioner of India. *Census of India 2011*. New Delhi.

Economic Surveys of respective states published by their finance departments or directorates of economics and statistics as the case may be.

the other cities, critical infrastructure, including water supply, waste management, public transportation, etc., is inadequate, technologically outdated, fragile, and incapable of meeting the needs of all its residents. Uneven urban development is reflected in the pattern of industrialization in the state. All major secondary and tertiary industries are located in the two key districts of Kamrup (Rural) and Kamrup (Metro) around Guwahati.

Shortage of Land due to Brownfield Growth of Urban Centers

In Assam, existing urban centers have expanded economically, geographically, and demographically over time rather than new cities being planned and

developed from scratch. This form of organic growth has resulted in high land prices and reduced land availability in urban centers, restricting the scale of industrial development.

Inadequate Utilities Hinder Sustainable Growth of Industrial Hubs

Core civic services in and around urban centers of Assam are not provided at a scale that can support large industrial development. The Fifth Assam State Finance Commission (ASFC) report highlights that none of the ULBs achieved even the modest service standards with regard to water supply, sewerage and drainage systems, and garbage disposal set by the UDD vide an order dated 31 March 2012 (Table 6.2).⁶

⁶ Government of Assam. Fifth Assam State Finance Commission. 2016. *Report of the Fifth Assam State Finance Commission 2016–2020*. Dispur. <http://sfccassam.nic.in/5thSFC/Reportof5thASFC-F.pdf>.

Table 6.2: Status of Urban Utilities in Select Centers

Urban Area	Water Supply Scheme/System	Sewerage and Drainage System	Garbage Disposal
Kokrajhar	<ul style="list-style-type: none"> Very limited piped water supply system Dependence on ring wells and tube wells 	<ul style="list-style-type: none"> No proper system 	Dumped in low-lying areas
Dhubri	<ul style="list-style-type: none"> Regular water supply for about 30% of the municipal area by overhead tank system by lifting water from deep tube wells Rest depends mostly on ring wells and tube wells 	<ul style="list-style-type: none"> No proper system Municipality is converting some service latrines to pit latrines under the World Bank aid program 	Dumped in low-lying areas
Mangaldoi	<ul style="list-style-type: none"> Groundwater based system built and managed by PHED covering around 11% of the town Capacity only 55 liters per capita per day 	<ul style="list-style-type: none"> No proper system 	Dumped in low-lying areas
Bongaigaon	<ul style="list-style-type: none"> Very limited water supply system Dependence on ring wells and tube wells 	<ul style="list-style-type: none"> No proper system 	Dumped in low-lying areas
Karimganj	<ul style="list-style-type: none"> Water treatment plant of 5 million liters per day set up by PHED in 1967 is now insufficient Water supply schemes of Karimganj, Kamalpur, Botorshi, Mobarakpur are insufficient 	<ul style="list-style-type: none"> No proper system 	Dumped in low-lying areas
Silchar	<ul style="list-style-type: none"> Total tap water supply by Municipal Board through PHED at 3.95 million gallons per day (through two treatment plants) is currently insufficient Two new water supply and sanitation schemes at New Silchar and Rangpur Need of pricing and metering systems 	<ul style="list-style-type: none"> Drainage Master Plan prepared by Directorate of Town and Country Planning Not implemented fully 	Only one municipal dumping yard, rest dumped in low-lying areas

PHED = Public Health Engineering Department.

Source: Study team analysis based on respective master plans and secondary research.

Execution Challenges

Overlapping Developmental Roles of Agencies

While the UDD and GDD deal with the overall urban development of Assam, cumbersome budgetary overheads in governance arise from multiple line departments and boards with unclear decision rights and accountability. Fragmented institutional responsibility leads to misalignment with overall policy direction and purpose. This leads to piecemeal and ad hoc responses to growing and progressively complex urban challenges.

Disjointed Urban Planning

The DPCs suffer due to

- absence of guidelines for urban area plans and integration of these plans with the departmental plans for the district;
- limited cognizance of plans prepared at the grass roots while consolidating district plan; and

- infrequent meetings with inadequate participation from primary stakeholders.

Limited Devolution of Functions to Urban Local Bodies

Most subjects relating to urban planning are not yet transferred to the ULBs. These include, town planning, land use and construction of buildings, roads and bridges, urban forestry, ecology and environment, vital statistics including registration of births and deaths, planning for economic and social development, urban poverty alleviation, etc.

Fragmented institutional responsibility leads to misalignment with overall policy direction and purpose.

Inadequate Municipal Finances

High dependence on the state government for finances due to insufficient revenue sources restricts the scope of contribution of ULBs in overall urban development of the state. The potential of holding tax and other sources of finance in municipalities across Assam has not been fully exploited. Also, tax buoyancy of the revenue sources of ULBs is poor and does not fully capture the gains from local economic growth. This leads to low creditworthiness of these bodies and makes it difficult for them to raise funds.

Inadequate Skilled Human Resources

- **Limited organization capacity.** Municipal boards and town committees have skeletal organizational structure, strength, and capacity. Most of these ULBs do not have executive officers appointed and so the chairperson also holds charge of the executive.
- **Weak organization and institutional capacity at the local level, both in terms of structure and resource deployment.** The Fifth ASFC Report suggests that there is neither a municipal cadre system, nor defined staffing norms, service rules, recruitment rules, or job responsibilities framed the state.

Way Forward

Summary of Solution Approaches

Solution approaches are summarized in Table 6.3.

Notification of Industrial Zones

In the case of Assam, industrial land available for notification with the state government is limited. Total vacant allocable land in any industrial park is not more than 270 acres. Currently, the state government has

1. identified 526 acres of land held by 10 currently-defunct public sector undertakings for notification and
2. notified areas within 1 km on either side of the road stretches from Jalukbari to Kukurmara (30 km) on NH-37 and Jalukbari to Tihu (Nalbari district) (90 km) on NH-31 as industrial zone.

To achieve the objectives highlighted in this study following additional interventions would be useful:

1. The state should consider identifying and developing greenfield industrial clusters near

Table 6.3: Summary of Solution Approaches for Urban Development in Assam

Challenge	Solution Approach	
Structural Challenges	Balanced regional development	Cluster manufacturing approach based on a network of economic centers, manufacturing centers, and border centers may be considered.
	Single core of urbanization	<ul style="list-style-type: none"> • Public transport solutions • Energy and resource conservation through the three “Rs”—reduce, reuse, and recycle • Disaster preparedness
	Predominantly brownfield urbanization	<ul style="list-style-type: none"> • Discussed above in the subsection entitled “Notification of Industrial Zones”
	Pragmatic master planning and ensuring compliance	<ul style="list-style-type: none"> • Except for Guwahati, master plans for all urban centers are dated and require urgent and realistic revision.^a Hence fresh comprehensive master plans that are responsive to the economic and development goals (including for greenfield sites) are required. • Urban development patterns have been observed to deviate from prescribed pattern in master plans.^a • Compliance with the pattern prescribed in respective master plans is strongly recommended.
	Insufficient utilities	Efficient infrastructure systems through appropriate use of information technology solutions and applications in planning, land management, service delivery, monitoring, and communication need to be put in place.

Challenge		Solution Approach	
Execution Challenges	Overlapping developmental roles	Strong institutional structure	A strong institutional structure appropriately staffed at the state and local levels and guided by standard processes is central to achieving the desired form of urban development. Recommendations made by the State Finance Commissions and Comptroller and Auditor General should be implemented speedily. The beginning in this regard could be made by instituting a nodal project design, implementation, and monitoring unit at the state level—domiciled within the Directorate of Municipal Administration—appropriately staffed with sector specialists drawn both from internal departments or ULBs and external professionals.
	Disjointed urban planning	District coordination	Coordination between the Planning Cell attached to the deputy commissioner and the District Planning Committee for preparing district development plans that integrate the plans of PRIs and ULBs along with departmental plans.
	Limited devolution of functions to ULBs	Effective implementation of state government acts	<ul style="list-style-type: none"> Government of Assam had amended the Assam Municipal Act 1956 in 2011 for the devolution of funds, functions, and functionaries. In order to translate local self-governance to reality, detailed activity mapping should be done, ensuring simultaneous devolution of function, functionaries, and funds to PRIs and ULBs.^b
	Inadequate municipal finances	Exploiting alternate sources of revenues and project delivery	While the state government will need to pilot initial developments through state funding, alternate capital avenues such as Infrastructure Bonds, sale of development rights, strategic land monetization, and PPP route will need to be explored and tapped as the developments gain momentum.
	Inadequate availability of skilled human resources	Professionalization of municipal cadre Availing external expertise	Updating staffing norms, filling vacancies, setting up recruitment norms, and allowing lateral entry of experts and professionals for different tasks may be undertaken. Identifying institutions and professionals who can provide technical support to DPCs and other ULBs.

DPC = District Planning Committee, PPP = Public–Private Partnership, PRIs = Panchayati Raj Institutions, ULBs = Urban Local Bodies.

^a Interviews with Directorate of Town and Country Planning, Assam.

^b Government of Assam. Fifth Assam State Finance Commission. 2016. *Report of the Fifth Assam State Finance Commission 2016–2020*. Dispur. <http://sfcassam.nic.in/5thSFC/Reportof5thASFC-F.pdf>.

Source: Study team analysis.

- various centers to serve as economic nodes as the scale of existing urban centers is inadequate to accommodate, sustain, and promote enhanced economic activity.
- Pragmatic master planning and compliance with development norms for these greenfield industrial clusters will also have to be ensured.
- Land pooling framework can be adopted for developing such greenfield nodes.
- To avoid losing out on economies of scale due to linear and dispersed industrial development via land notification model, smaller stretches have to be assessed and selected to promote concentrated clusters of industry in the vicinity of urban centers.
- Development of infrastructure and support facilities has to be integrated clearly into the land notification model for large and medium-sized industries which will also avoid haphazard and inefficient urbanization and industrial development.

7

Energy Infrastructure

Background

Energy infrastructure in Assam is beleaguered with issues of high cost of power, overdependence on central generating systems (CGSs), an overloaded transmission infrastructure, and a weak distribution network. At the same time, the geostrategic location of Assam presents an opportunity for the state to emerge as a hub for international energy trade. The state, sharing its boundaries with power-rich Bhutan and power-deficit Bangladesh, can serve as the interconnection point for cross-border power trade. This chapter presents an energy vision for the state followed by an exploration of its energy challenges, current status, interventions underway, and suggested future action to strengthen and grow the sector to its full potential and allow Assam to play a key geostrategic role in energy.

An Energy Vision for Assam

Power

The study team has envisioned the following goals for the power sector in Assam:

- **Universal access.** Ensure universal access to reliable power at an affordable rate for all citizens of Assam within FY2035 so that they

may contribute to a holistic socioeconomic development of Assam.¹

- **Power infrastructure.** Develop the power infrastructure of the state, in line with international standards to cater to a demand of 13,000 MW within FY2035.
- **Improve financial viability.** Commit to improving the financial viability of the utilities so as to provide for consistent dividends to shareholders starting FY2023.

Oil and Gas

According to the Hydrocarbon Vision 2030 for North East India, Assam should work toward:²

- doubling the production of oil and natural gas (Oil Plus Oil Equivalent Gas (O+OEG) in million metric tons of oil equivalent (MMTOE)) by 2030;
- ensuring availability to support growth in per capita petroleum product consumption;
- providing pipeline connectivity by installing new lines for petroleum, oil, and lubricants (POL) and liquefied petroleum gas (LPG);
- promoting manufacturing industries related to oil and gas in the region; and

¹ “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2017 ends on 31 March 2017.

² Hydrocarbon Vision 2030 document for North East India was developed by a steering committee constituted in May 2015 of key hydrocarbon industry stakeholders—Oil and Natural Gas Corporation, Oil India Ltd, Directorate General of Hydrocarbons, GAIL India Ltd, Indian Oil Corporation Ltd, Numaligarh Refinery Ltd, Petroleum Planning & Analysis Cell, Oil Industry Development Board and Engineers India Ltd. <https://www.satp.org/satporgtp/countries/India/document/papers/visiondoc2030.pdf>.

- promoting trade between northeast region of India (NER) and neighboring countries which are members of the South Asian Association for Regional Cooperation (SAARC).

Examining Assam's Power Challenges

With less than 50% households electrified vis-à-vis target under the Saubhagya scheme until October 2018, poor access to electricity in Assam is accompanied by poor supply reliability as well, indicating the need to improve its power infrastructure.³ The state has limited state-owned power generation capacity and depends heavily on CGSs. While Assam (and the NER in general) has good generation potential for both hydropower and gas-based power, the sector will need significant improvement and strengthening to fully realize it.

Inefficiencies of state-owned generation and distribution (along with poor financial health) have led to high average tariff of more than ₹7 per unit. According to Assam Power Distribution Company Limited (APDCL), its average power procurement cost has increased by around 20% between FY2015 and FY2018. Besides obsolescence and inefficiencies in power generation which contribute to costs, the state is compelled to buy power from CGS as per the allocated capacity under power purchase agreements (PPAs). Given technical constraints, the additional

power bought (over and above the current demand) during heavy rainfall has to be sold at lower prices in energy exchanges causing a rise in the average cost of power.

The transmission and distribution functions are constrained by old and ageing assets and the lack of periodic systemic strengthening and upgrade. The state requires massive investments for reducing aggregate technical and commercial (AT&C) losses and increasing plant load factor.⁴

Power Generation

Overview

Assam draws power from a pool of power plants under its state-run utility, Assam Power Generation Corporation Limited (APGCL), CGSs under the National Thermal Power Corporation Ltd (NTPC) and North Eastern Electric Power Corporation Ltd (NEEPCO), and makes short-term energy purchase from power exchanges like Indian Energy Exchange (IEX) and PTC India Ltd (earlier, Power Trading Corporation of India Limited). Assam has the generation potential for 680 MW of hydel, out of which it operates hydropower plant capacity close to 104 MW as of 2014.⁵

The total power supply in Assam across all sources was 1,525 MW as of 31 July 2018, out of which only 401 MW was produced by the state. The peak demand estimate in FY2018 was around 1,822 MW against a supply of 1,745 MW implying a power deficit of 4.2% approximately.⁶

³ Source for percentage of households electrified: <http://saubhagya.gov.in/>). 'Saubhagya' or the Pradhan Mantri Sahaj Bijli Har Ghar Yojana was launched on 25 September 2017 to provide free electricity connections to all households (both APL and poor families) in rural areas and poor families in urban areas. The scheme targeted 40 million unelectrified households in the country to be provided electricity connections by December 2018. Electrification of 1.9 million households was targeted under this scheme in Assam, out of which 930,000 have been electrified till 31 October 2018. Reliability is measured by Customer Average Interruption Duration Index (CAIDI) (which is more than 30 minutes in Assam) and Customer Average Interruption Frequency Index (CAIFI) (more than 700 interruptions per customer per annum in Assam). Reliability data for Assam is sourced from the Assam Power Generation Corporation Limited.

⁴ Assam reported an AT&C loss of 24% in FY2018. Plant load factor was as low as 33% for Namrup plant and 64% for Lakwa plant. Data sourced from Assam Power Generation Corporation Limited.

⁵ Government of India. Ministry of Power. Central Electricity Authority. 1978-87. *Assessment Study of Hydro Power Plants from Major/Medium Schemes*. The data was quoted in Government of India. Ministry of Power. Central Electricity Authority. 2014. *Review of Performance of Hydro Power Stations 2014-15*. New Delhi. Please see <https://cea.nic.in> for more details.

⁶ Government of India. Ministry of Power. Central Electricity Authority. 2018. *Power Sector Executive Summary*. March. New Delhi. Please see <https://cea.nic.in> for more details.

Planned Generation Expansion

Based on the projected demand, Government of Assam and nodal agencies in power have planned both coal and gas-based projects in Margherita, Namrup, and Silchar with investment of about ₹11.6 billion with a focus on base load power availability, cheaper and more efficient mode of generation, and greater diversity of fuel mix.

Based on the ongoing projects, the state plans to add a cumulative capacity of 2,500 MW in the power purchase and generation portfolio vis-à-vis a projected demand of 4,200 MW by FY2025. However, the present supply of power from all sources and expected supply from the ongoing projects may still not be enough leaving the state with a power deficit of 1,000–1,500 MW by FY2025.

The state government has planned generation projects in solar and hydro too, but is facing a challenge in financial closure of some of the projects.

Power Generation: Way Forward

To mitigate the risk of power shortage, medium to long-term power procurement arrangements with surplus states or neighboring countries may be explored. In case of power surplus, power export to other nearby states and countries like Bangladesh can be considered.

Given the challenges in developing coal-based thermal stations, the state can enter into joint ventures with experienced players like NEEPCO and NTPC. Alternatively, private participation through the competitive bidding route may be explored. The state may also demand a greater share in the power imported from Bhutan under bilateral or joint venture projects with India, which envisage a capacity addition of 10,000 MW by FY2020.

Inadequate supply of gas is a major concern for gas-based projects. Demand for natural gas in the region is expected to double by 2030 to 29 million metric standard cubic meters per day (MMSCMD) leaving a potential gap of more than 30%.⁷ Increasing

exploration activities along with augmentation of the pipeline connectivity would be necessary for addressing the deficit in gas supply. Exploration of gas in Manipur, Tripura, and Mizoram can open new possibilities.

As per a survey of the National Institute of Solar Energy (NISE) conducted in FY2015, Assam has the potential of generating 13.76 gigawatts peak (GWp) of solar energy.⁸ The state needs to plan for additional sources and auxiliary sources factoring in the rise in share of renewables, assuming that the planned solar projects materialize.

Assam could also focus on other clean sources of energy like rooftop solar projects and waste-to-energy (WTE) plants. Many Tier-I and II cities in Assam receive a direct normal irradiance ranging from 4–5 kWh per m² per day which is sufficient to generate 1–5 kilowatt peak (kWp) of power from residential and commercial rooftops. Likewise, among WTE technologies, refuse-derived fuel or RDF-based plants have an average energy generation capacity of 3 MW per 100 tons per day (TPD) of fuel consumed, gasification or pyrolysis plants produce 2 MW per 100 TPD on an average, and plasma arc gasification may be used to produce 4.5 MW per 100 TPD on an average.

To tap its remaining hydro power potential, Assam may mobilize private investment through public-private partnership (PPP) models to bring in latest technology, increase project bankability, viability, and cost efficiency. Difficulties in land acquisition, rehabilitation, logistical challenges, infrastructure deficits in the hilly terrain, mitigation of environmental fall out, and engineering challenges in a flood and earthquake prone terrain will need to be simultaneously tackled.

Power Transmission

Overview

The Assam Electricity Grid Corporation Limited (AEGCL) operates and maintains a network of

⁷ Hydrocarbon Vision 2030 for North East India. <https://www.satp.org/satporgtp/countries/India/document/papers/visiondoc2030.pdf>.

⁸ National Institute of Solar Energy. 2015. *State-wise Estimated Solar Power Potential in India*. Gurugram: Haryana.

6,158 mega volt amp (MVA) transformation capacity transmitting power to load centers over 5,367 circuit kilometers (ckms) of extra-high-voltage (EHV) lines as on FY2019. Availability of transmission system is projected to be 99.5% and loss levels at 3.49% in FY2019—comparable to leading utilities in India.⁹

Transmission Plans

To match the future load growth and demand from upcoming urban hubs, the overall transformation system capacity within the state needs to increase fivefold from 7,800 MVA in FY2019 to 38,700 MVA by FY2035 as per the Perspective Infrastructure Development Plan (PIDP), Government of Assam.¹⁰

The list of projects planned under the ongoing schemes will provide a total transformation capacity of 9,000 MVA by FY2020 and help in optimal loading of existing substations in the proposed key urban centers of growth under the present study. This capacity is sufficient to meet the load only till FY2020. In order to handle the load up to FY2025, an additional transformation capacity of 6,000 MVA needs to be planned for by FY2023 to reach a cumulative capacity of 15,200 MVA.

Power Transmission: Way Forward

The transmission sector will demand planning and investments in system strengthening, modernization, and technological enhancement. With the increasing share of renewable energy which is intermittent in nature, the transmission system will not only need strengthening of the load dispatch function but also changes in grid design, technology, and operation.

Power Distribution

Overview

The state's peak demand for power has grown by over 30% between 2011 and 2017. The APDCL's present

power demand ranges between 1,200 MW and 1,750 MW. A significant increase in demand is owed to massive rural electrification under the Rajiv Gandhi Grameen Vidyutikaran Yojana and the Deen Dayal Upadhyay Gram Jyoti Yojana (RGGVY/DDUGJY) of the Government of India. With the Saubhagya scheme aiming for electrification of 100% households, it is envisaged that nearly 2.4 million consumers will be added to the states' distribution network causing sudden increase in demand and load on the existing network.

The share of high tension (HT) sales has been steadily decreasing in Assam not only due to increasing rural electrification but also because of slow industrialization, which in turn is affecting the financial performance of the distribution utility.

Power Distribution Plans

Under the Power for All (PFA) Vision for Assam, the APDCL's subtransmission infrastructure is expected to increase to 475 substations (from around 340 substations as on 31 March 2017) with nearly 4,201 MVA by FY2019. For 24×7 PFA, investment of around ₹9.6 billion would be required which the financially weak distribution company will find challenging.¹¹

The high power tariffs discourage industrial growth in Assam where cost of power comprises nearly 60% of the production cost on an average, making industrial units uncompetitive.¹² Moreover, according to the National Tariff Policy 2016, cross-subsidy surcharge (CSS) as a percentage of industrial tariff is more than 20%, which impedes the ability of industries to source cheaper power from stranded capacity of independent power plants and captive generation plants.

The proposed investments in distribution by FY2019 are envisaged to be ₹9.63 billion according to the PFA road map for Assam. However, only ₹5.87 billion is

⁹ Data sourced from Assam Electricity Grid Corporation Limited. 2019. Tariff Order for FY2020. Guwahati. <http://aerc.nic.in/TariffOrder-AEGCL-2019-20.pdf>.

¹⁰ Government of Assam. Planning and Development Department. 2015. *20-year Perspective Infrastructure Development Plan*. Dispur.

¹¹ A Joint Initiative of the Government of India and the Government of Assam. Power for All: Assam. https://www.apdcl.org/irj/go/km/docs/internet/ASSAM/webpage/PDF/24x7_Power_for_All_Govt_of_Assam.pdf.

¹² According to analysis of the study team.

tied in; ₹3.76 billion more is required to complete the distribution infrastructure.

Power Distribution: Way Forward

The addition of 2.4 million consumers would increase substantial loading at the distribution transformers and on the overall system. A rough estimate shows that each household with a 0.5 kW connection would add another 1,200 MW load on the distribution transformer. This means LT transformation capacity of 1,850 MVA will be required at 65% loading, which will demand approximately ₹3 billion of investment. Further, installing mandatory smart meters in each household would require an investment of ₹1.1 billion.¹³ Adequate investment in distribution will be central to enabling growth of the power sector in Assam.

Furthermore, the tariff needs to be rationalized with gradual reduction in CSS to promote industrial growth in the state.

Power Scenario in Border Towns

For Assam and the NER to serve as a business and trade hub along the economic corridor between India and the ASEAN countries, power accessibility, affordability, and reliability in identified border towns need to be improved significantly in response to the expected surge in demand.

Future load demand will necessitate capacity augmentation, especially in Silchar, Diphu, Barpeta, Sibsagar, Golaghat, and Dibrugarh which requires immediate actions to ease the transmission load and ensure reliability.

As per the PIDP report, the key nodes at economic hubs are expected to experience an annual power demand increase of 13.5% in Class I towns and 14.5% in Class I cities. Guwahati, Silchar, Nagaon, Karimganj, and Bongaigaon are already experiencing an increase

in excess of the anticipated demand. The growth in Guwahati, Bongaigaon, and Karimganj is primarily driven by industries. On the other hand, the border towns like Silchar, Nagaon, and Kokrajhar, have a high share of domestic demand in overall demand and the growth is primarily being driven by increase in domestic consumers and load factor. Nagaon, Mangaldoi, and Kokrajhar have the highest year-on-year growth in energy sales of over 21%, followed by Silchar at 12%, and Bongaigaon at 9.9%. This indicates a major shift in population from villages to these towns boosting the demand.

The central challenge is to finalize the source of funding for the planned distribution projects and prioritize the key development nodes for completion of work.

Oil and Gas Industry Status in Assam

The Assam Oil Company was the first to discover oil in independent India—1953 in Nahorkatia and 1956 in Moran, both in Upper Assam. After independence, the formation of entities such as Oil India Limited (OIL) and Oil and Natural Gas Corporation (ONGC) changed the landscape of the oil and gas industry in Assam as they grew to be the main stakeholders of majority of the assets. Subsequently, more than 100 oil and gas fields, including Jorajan, Kumchai, Hapjan, Shalmari, Lakwa, Lakhmani, Geleki, Amguri, Charali, Borholla, Khoraghat, Baghjan, Dirok, etc. were discovered. In addition to crude exploration and production (E&P), support activities like refining, production of petrochemicals, etc., also grew in Assam at a rapid pace.

Upstream: Oil Production

The Assam–Arakan Basin in the NER is a Category-I basin covering an area of 116,000 km². Major tectonic elements of the basin are Assam Shelf, Naga Schuppen Belt, and the Assam–Arakan Fold Belt.

¹³ Estimated at ₹4,500 per node for smart metering as per Energy Efficiency Services Limited (EESL), an energy service company (ESCO) of the Government of India.

The total estimated hydrocarbon in the Assam Shelf and Assam Arakan Fold Belt as of 2017 is 7,634 MMTOE. At present, besides the national oil companies such as ONGC and OIL, private operators viz GeoEnpro, Jubilant Energy, Assam Company of India Limited, Essar Oil, and Dart Energy are engaged in E&P activities in the NER (Figure 7.1). The ONGC has drilled a total of 516 wells in FY2019 in Assam.

Recently ONGC declared that it would invest nearly ₹130 billion in Assam between 2019 and 2024. As

per ONGC and OIL forecasts, oil production in the NER would reach 5.92 million metric tons per annum (MMTPA) and natural gas production 20.57 million metric standard cubic meters per day (MMSCMD) by FY2025. The major portion of this production is attributable to Assam.

Refining

Assam has four refineries aiding the E&P operations to cater to its demand for petroleum products (Table 7.1).

Figure 7.1: Crude Oil Production in Assam (in million metric tons)

OIL = Oil India Limited, ONGC = Oil and Natural Gas Corporation, Pvt/JV = Private players and joint ventures.

Source: Government of India. Ministry of Petroleum and Natural Gas. Various Reports.

Table 7.1: Oil Refineries in Assam

Refineries	Year	Company	Capacity (MMTPA)	Planned Expansion (MMTPA)	Remarks
Digboi	1901	IOCL	0.65	0	Digboi refinery is the oldest operating refinery in the world and produces premium wax and microcrystalline wax.
Guwahati	1962	IOCL	1.00	0.200	Guwahati refinery has “Indmax Unit” installed, developed by IOCL’s research and development center for upgrading of heavy ends to liquefied petroleum gas, motor spirit, and diesel oil.
Bongaigaon	1974	IOCL	2.35	0.350	Bongaigaon Refinery and Petrochemicals Ltd, which originally processed Assam crudes, is now capable of processing imported crudes.
Numaligarh	2000	NRL	3.00	6.000	Numaligarh Refinery is the largest refinery in NER equipped with modern units of hydrocracker and delayed coker for maximizing distillate yield.

IOCL = Indian Oil Corporation Limited, MMTPA = Million metric tons per annum, NRL = Numaligarh Refinery Limited.

Source: Government of India. Petroleum Planning and Analysis Cell. FY2019.

Oil refining capacity in Assam is expected to increase from 3.6 MMTPA to 15.9 MMTPA by FY2020 due to the expansion of three existing refineries.¹⁴ The crude pipeline at present is insufficient to cater to the expanded refining capacity.

The product pipelines, i.e. transporting products like petroleum and diesel from refineries to other locations are already running at 100% utilization. Due to capacity constraints, only 61% of the products are transported through these pipelines while the rest through costlier means such as rail and road.¹⁵

Projects proposed under the NER hydrocarbon policy to address this issue add up to 4,594 km of crude and product pipelines at an estimated capital cost of ₹157 billion.

Pipelines

Pipelines and other transport systems can be used to move crude oil from production sites to refineries and deliver various refined products to downstream distributors. The length of crude oil pipelines operating within Assam as of FY2019 adds up to 1,409 km (Table 7.2).

The major pipelines for petroleum, oils, and lubricants in Assam add up to 1,089 km (Table 7.3).

Natural Gas in Assam

Assam has an estimated natural gas reserve of 161.65 billion m³ while the production is about 9.7 MMSCMD (Figure 7.2).¹⁶ The state has an installed power generation capacity of 1,710.38 MW wherein,

Table 7.2: Crude Oil Pipelines in Assam, as of FY 2019

Pipeline	Owner	Length (kilometers)	Capacity (million metric tons)	Percentage Utilization
Lakwa–Moran (new)	ONGC	18	1.5	24.1
Lakwa–Moran (old)	ONGC	15	1.5	1.0
Geleki–Jorhat	ONGC	49	1.5	22.2
Geleki–Jorhat (new)	ONGC	48	1.5	4.1
Borholla–Jorhat	ONGC	43	0.6	24.2
Borholla–Jorhat new TPL	ONGC	43	0.6	8.5
Duliajan–Digboi–Bongaigaon–Barauni pipeline	OIL	1193	8.4	77.7

OIL = Oil India Limited, ONGC = Oil and Natural Gas Corporation.

Source: Government of India. Petroleum Planning and Analysis Cell. FY2019.

Table 7.3: Petroleum, Oils, and Lubricants Pipelines in Assam

Pipeline	Owner	Length (kilometers)	Capacity (MMT)	Percentage Utilization
Guwahati–Siliguri	IOCL	435	1.4	129.9
Numaligarh–Siliguri	OIL	654	1.7	103.1

IOCL = Indian Oil Corporation Limited; MMT = Million metric tons; OIL = Oil India Limited.

Source: Government of India. Petroleum Planning and Analysis Cell. FY2019.

¹⁴ Footnote 7.

¹⁵ Footnote 7.

¹⁶ Government of India. Ministry of Statistics and Programme Implementation. Central Statistical Office. 2019. *Energy Statistics 2019*. New Delhi. http://mospi.nic.in/sites/default/files/publication_reports/Energy%20Statistics%202019-final.pdf.

gas-based generation contributes to 788.27 MW. Domestically produced gas in Assam is consumed in sectors like power, refineries, petrochemicals, fertilizer industries, etc. (Figure 7.3). The volume of gas that is flared or lost can support production of 150 MW of power.

Examining Assam's Oil and Gas Challenges

Due to the challenges of topography, cost of oil and gas exploration in NER is higher than rest of India as are the administrative and operating costs. There is a dearth of service providers due to complexities of required paperwork, difficulties with obtaining environmental and forest clearances, law and order problems, low acreage, poor connectivity, and the absence of ancillary fabricating and manufacturing industries. Pipeline connectivity to transport excess refining capacity and natural gas in the region is limited. Often, differential tariff is charged for transport of same content and volume of products across same distances due to topographical challenges.

The development of the proposed Jagadishpur–Haldia/Bokaro–Dhamra (JHBD) pipeline project will

enable its integration with the Barauni–Guwahati pipeline. This will help in connecting Assam to the national gas grid.

Key Opportunities in Energy

Opportunities in Cross-Border Power Trading

India's proximity to hydropower-rich Bhutan and Nepal and power-hungry Bangladesh provides a win-win opportunity for bilateral and trilateral trade in the future. India shares a 4,000 km border with Bangladesh, 1,750 km with Nepal, and nearly 700 km with Bhutan, making the idea of building

Assam has an estimated natural gas reserve of 161.65 billion m³ while the production is about 9.7 MMSCMD.

Figure 7.2: Natural Gas Production in Assam (in million metric standard cubic meters)

OIL = Oil India Limited; ONGC = Oil and Natural Gas Corporation; Pvt/JV = Private players and joint ventures.

Source: Government of India. Ministry of Petroleum and Natural Gas. Various Reports.

Figure 7.3: Natural Gas Utilization in Assam (million metric standard cubic meters)

Source: Government of India. Ministry of Petroleum and Natural Gas. Economic and Statistics Division. 2018. *Indian Petroleum & Natural Gas Statistics 2017-18*. New Delhi. http://petroleum.nic.in/sites/default/files/ipngstat_0.pdf.

power evacuation corridors across these countries via NER a feasible one.

Assam sharing borders with power-rich Bhutan and power-deficit Bangladesh makes it a suitable candidate for cross-border power trade.

The bilateral and trilateral agreements in the offing on cross-border power trade are listed below.

- Government of Bangladesh has signed a memorandum of understanding with GMR Energy for import of 500 MW of power from two hydropower projects (Upper Karnali and Upper Marsyangdi) in Nepal.
- A leading player in power generation is planning a coal-based 1,600 MW power plant in Jharkhand (India) for power export to Bangladesh.
- At the Bangladesh–Bhutan–India–Nepal (BBIN) Summit in January 2016, three hydropower plants (total capacity of 2,771 MW) were considered for joint development.

The major generation projects that could facilitate cross-border power supply within a decade include

- Upper Karnali Hydroelectric Power (HEP), 900 MW, Nepal
- Upper Marsyangdi HEP, 600 MW, Nepal
- Arun 3 HEP, 900 MW, Nepal
- Punatsangchu-II, 1,020 MW, Bhutan
- Kuri HEP, 1,800 MW, Bhutan

In order to evacuate the power from the upcoming hydropower projects and strengthen the export–import points, eight major routes have been identified within the BBIN region facilitating evacuation of approximately 5,000 MW to 8,000 MW power in future.

The major existing grid interconnections and an illustrative representation of the future EHV network in the BBIN region is shown in Figure 7.4.

Figure 7.4: Future Extra High Voltage Network in the Bangladesh, Bhutan, India, and Nepal Region

HVAC = High voltage alternating current, HVDC = High voltage direct current, kV = kilovolts; S/s = Substation, UC = Under construction.

Sources:

- Government of India. Central Electricity Authority. 2016. *Report on the Feasibility of Additional Interconnection between India and Bangladesh*. Joint Technical Team (JTT) of India and Bangladesh. July. http://www.cea.nic.in/reports/committee/scm/ner/agenda_note/annex3.pdf.
- Mahendra Lama. 2016. BBIN Initiatives: Options for Cross-Border Power Exchange. *ORF Issue Brief*. Issue 137. April. https://www.orfonline.org/wp-content/uploads/2016/04/Issue-Brief_137_MLama.pdf.

Hydrocarbon Trading

For trading of hydrocarbons, the energy highway is proposed in two phases that will bring imported crude oil and natural gas into the region and derive petroleum products, which can then be exported to the neighboring countries:

- Phase I: Linking Paradip to the Northeast Barauni–Guwahati–Numaligarh route (common to the extended national gas grid)
 - Build a 1,400 km crude pipeline from Paradip to Numaligarh and intersect the national gas grid at Burdwan in West Bengal.
 - Enable two-way movement of hydrocarbon energy along the corridor.

- Phase II: Linking Chattogram (Bangladesh) to NER (India)
 - Chattogram to Agartala: 234 km; Agartala to Numaligarh: 800 km; the energy highway will pass through Tripura and Meghalaya and connect Numaligarh.
 - Extension from Dibrugarh (via Tinsukia) to Ledo and then further eastward using the “Stilwell Route” to Myanmar is planned.
 - Western extension from Guwahati toward Burdwan (West Bengal) is also planned to connect to the proposed national gas grid.

As Numaligarh Refinery Limited (NRL) expands its capacity to 9 MMTPA, the incremental quantity will need to be transported to the rest of the NER as well as neighboring countries. The Numaligarh–

Siliguri pipeline's capacity needs to be accordingly enhanced to 7.7 MMTPA from the existing 1.7 MMTPA. A new pipeline which is being laid from Siliguri (India) to Parbatipur (Bangladesh) will extend the existing Numaligarh–Siliguri line. Currently, petroleum products such as high speed diesel (HSD) reach Parbatipur by rail via Rangapani, Singabad, and Rohanpur.

A priority for the Government of Assam is the downstream industries from petroleum by-products

such as plastics (see Chapter 3). Crude oil produced in NER has high wax content; hence, the region has evolved as a major producer of wax. Two paraffin wax producing units are operating in Digboi and Numaligarh refineries with an aggregate capacity of 110,000 TPA. In the future, small scale cosmetics, candles, and tire manufacturing units may be set up to use paraffin wax as raw material. Such other by-products of petroleum may also be traded across the BBIN region.

8

The Investment Climate in Assam

Assessment of Ease of Doing Business in Assam

The study team reviewed the Business Reform Action Plan (BRAP) 2017 formulated by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India to assess the road map of reforms to improve the investment climate in states and cities within states across India.

Assam has been ranked 18th in the 2017 ease of doing business scoring conducted by the DIPP, with an overall score of 84.75% vis-à-vis the best state, Andhra Pradesh, which had an overall score of 98.42%.¹ In line with the methodology used by DIPP, Assam secured 92.41% as reform implementation score based on self-submission and a score of 17.21% based on feedback from investors, with the weights assigned to each leading to a cumulative score of 84.75% (Figure 8.1).

Out of the 10 reform areas, the state is better than the national average on nine, and needs improvement on the remaining one, viz. enforcing contracts.

Recommendations for Improving Ease of Doing Business

Based on investors' feedback, the 2017 scoring criteria of the DIPP, and leveraging the study team's experience in working with other states, the areas

recommended as quick-win opportunities to further improve the ease of doing business in Assam are presented in Table 8.1.

In addition to the above, the state would need to address the relative low score received in investor feedback (17.21%) by addressing the implementation

Figure 8.1: Ease of Doing Business: Reform Scorecard

Source: Government of India. Ministry of Commerce and Industry. Department of Industrial Policy and Promotion. Assam Ease of Doing Business Assessment. <https://eodb.dipp.gov.in/StateReport/Index?year=0&state=4>.

¹ Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India initiated a dynamic ranking all the states and union territories on relative ease of doing business from 2015 onward. The ranking highlighted here is as on 2 August 2018.

Table 8.1: Key Interventions for Improving Ease of Doing Business in Assam

Inspection enablers	<ul style="list-style-type: none"> Exemption to green industries with a history of satisfactory compliance Setting up of a computerized system for identifying the building or area that needs to be inspected based on risk assessment
Construction permit	<ul style="list-style-type: none"> Introduction of uniform building code or building by-law for the state Design and development of online system for building approval (AutoDCR or equivalent) integrated with other state departments and agencies and applicable to central government departments and agencies
Payment of taxes	<ul style="list-style-type: none"> Defining clear timelines mandated through legislation regarding all levies imposed by state and local bodies Implementation of a process for allowing third parties to easily verify the validity of registration or re-registration certificate in the public domain
Property registration	<ul style="list-style-type: none"> Digitization of cadastral maps of all rural areas Integration of registration and mutation process of properties Integration of land record database with judicial databases that have details of land disputes in public domain
Others	<ul style="list-style-type: none"> Provision of self or third-party certification of boilers during use Reduction of the number of documents required for obtaining trade license to only two Design and implementation of a system that allows e-filing of commercial disputes in commercial courts

Note: AutoDCR is an innovative architecture engineering software designed to automate building plan scrutiny and approval processes.

Source: Study team analysis.

issues impacting the investor perception. It should also focus on new reform areas indicated in the guidelines under the BRAP 2018 (Table 8.2).²

Table 8.2: Interventions for Improving Ease of Doing Business Reforms

Single window system	<ul style="list-style-type: none"> Integrate registration of partnership firms and societies and registration under professional tax through a single window system and provide investors with a DigiLocker facility to store all data at one place.
Land administration and transfer of land and property	<ul style="list-style-type: none"> Digitize property tax payment records of last 5 years at local municipality or municipal corporation office and publish these records online in public domain. Implement an online application system for (i) mutation of land records, (ii) mutation in property tax register, (iii) change in land use (CLU) for conversion to industrial use for land outside of industrial parks and Industrial Development Corporations (IDC), (iv) obtaining encumbrance certificates, and (v) obtaining permission for purchasing land in excess of ceiling (for industries) defined in the state's Land Ceiling Act for agricultural land. Discontinue the need for CLU permission for conversion of nonindustrial land to industrial land if it falls in an industrial zone. Establish an Urban Title Certification Authority and offer indemnity against losses incurred due to errors in title.
Construction permit	<ul style="list-style-type: none"> Develop an accreditation program for construction professionals including architects and structural engineers, whereby an online system allows for application, document submission, payment and approval of accreditations, as well as verification of accreditations issued online. Establish an independent grievance redressal mechanism for land and construction permits. Design a computerized system for filing applications and obtaining certificates for plinth level and lift-related inspections for construction permits with enabling regulation to submit inspection reports within 48 hours
Obtaining utility permits	<ul style="list-style-type: none"> Shift authority to provide CEIG approval from State Regulatory Commission to Discoms. Ensure issuing of permissions for gas connections (i) within 1 month in case it requires road cutting for laying City Gas Distribution pipelines or (ii) within 15 days in case it involves only last mile connectivity. Modify the building regulations/bylaws to incorporate Piped Natural Gas (PNG) as a utility service.
Others	<ul style="list-style-type: none"> Constitute an authority and an appellate for advance tax ruling under the Assam Goods and Services Tax Act (AGST Act), 2017. Constitute Commercial Appellate Division having one or more Division Benches for the purpose of exercising jurisdiction and powers conferred under the AGST Act. Design an online application system for the Department of Agriculture in order to (i) license selling and storage of seed, (ii) issue/renew license for fertilizers, (iii) issue certificate of registration for manufacturing of organic fertilizers and biofertilizers, and (iv) renew license to manufacture / sell / store pesticides / insecticide / fertilizer. Establish a Regulatory Authority and an Appellate Tribunal for the real estate sector and implement related regulations as mandated under the Real Estate Regulation Act.

CEIG = Chief Electrical Inspector to Government; Discom = Distribution company.

Source: Study team analysis.

² Areas have been identified based on Government of India. Ministry of Commerce and Industry. Department for Promotion of Industry and Internal Trade. Business Reform Action Plan 2018. <https://eodbdipp.gov.in/>.

9

Assessment of Cross-Border Trade Potential for Assam

Overview of Key Transport Networks and Trading Gateways

The state of Assam, regarded as India's "Gateway to the East", shares international borders with Bhutan (265.8 km) and Bangladesh (267.5 km). Assam also shares interstate borders with Meghalaya (884.9 km), Nagaland (512.1 km), Manipur (204.1 km), Mizoram (164.6 km), West Bengal (127.0 km), and Tripura (46.3 km).¹ Given its strategic location, the state can emerge as an export-led manufacturing base leveraging existing trade agreements to cater to Bangladesh–Bhutan–Nepal and Association of Southeast Asian Nations (ASEAN), while also meeting the demand from large centers in the

northeast region (NER) as well as trading with the rest of India (ROI).

In spite of the presence of 39 Land Customs Stations (LCSs) and Integrated Check Posts (ICPs) in the NER and agreements for trade with neighboring countries, including BBN and Myanmar, it is observed that Assam's trade volumes with neighbors are still relatively low.²

This section presents an overview of existing and proposed transport networks (i.e., roads, railways, and waterways) across Assam, aimed at facilitating trade and commerce with ASEAN, BBN, and ROI.

To develop an understanding of key regulatory issues impacting cross border trade in Assam, the study team reviewed relevant agreements governing border trade and transport with neighboring countries and studies detailing status of physical connectivity in the NER.³

¹ <https://dbpd.assam.gov.in/portlets/boundaries-of-assam>.

² Government of India. Land Ports Authority of India. <http://www.lpai.gov.in/content/>. Also, Government of India. Ministry of Finance (Department of Revenue). Commissionerate of Customs (Preventive). North Eastern Region. Jurisdictional Map. Shillong. <http://shillongcustoms.gov.in/english/jurisdictional-map/>.

³ Bilateral / Multilateral Agreements:

- Government of India. Ministry of External Affairs. 2015. Protocol on Inland Water Transit & Trade. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2421.pdf>.
- Government of India. Ministry of Shipping. Inland Waterways Authority of India. 2017. Memorandum of Understanding on Development of Fairway from Sirajganj to Daikhowa and Ashuganj to Zakiganj on Indo-Bangladesh Protocol Route. <http://iwai.nic.in/sites/default/files/8653640986MoU.pdf>.
- Government of India. Ministry of External Affairs. 2015. Agreement on Coastal Shipping between the Government of India and the Government of the People's Republic of Bangladesh. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2420.pdf>.
- Government of India. Ministry of External Affairs. 2015. The MOU between Ministry of Shipping, Road Transport and Highways, Government of India and Ministry of Shipping, Government of the People's Republic of Bangladesh relating to the use of Chittagong and Mongla Ports for movement of goods to and from India. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2423.pdf>.
- United Nations Economic and Social Commission for Asia and the Pacific. 2004. Intergovernmental Agreement on the Asian Highway Network. https://www.unescap.org/sites/default/files/AH%20Agreement%20with%20Amended%20Annex%20I-%202018_En.pdf.
- United Nations Economic and Social Commission for Asia and the Pacific. 2006. Intergovernmental Agreement on the Trans-Asian Railway Network. https://www.unescap.org/sites/default/files/TAR%20Agreement-Consolidated-14June2017-En_0.pdf.

Road Network and Trading Gateways

Assam has 3,834 km of national highways, 2,530 km of state highways, 4,413 km of major district roads, and 36,544 km of rural roads.⁴ Between 2014 and 2018, 824 km of national highway has been developed in Assam at a cost of ₹134.11 billion, under various schemes like, Special Accelerated Road Development Programme for North-East (SARDP-NE), National Highways Development Project (NHDP-II), and National Highways Annual Plans⁵. Ongoing road development projects across the NER aim to not only increase interstate connectivity in the region but also integrate Assam's road network to ASEAN, BBN, and ROI. Select projects of regional importance which aim to augment the region's trade and commerce are

- Trans-Asian Highway
- India–Myanmar–Thailand Trilateral Highway
- East–West Corridor
- Kaladan Multimodal Transit Project
- Bangladesh–China–India–Myanmar Economic Corridor (BCIMEC)
- SAARC Corridor 5

To enable international trade, Government of India has notified 32 LCSs and 7 ICPs in the NER.⁶ Figure 9.1 depicts select LCSs and ICPs deemed important to facilitate trade between Assam and Bangladesh/

Bhutan/Myanmar/ASEAN/ROI. These LCSs and ICPs have been selected on account of their locational and commercial importance to the region. Their development needs to be prioritized to enhance trade and transport.

Rail Network

Expansion of railway network in the NER by connecting all state capitals with broad gauge lines has been a key mandate for the Government of India. There has also been increased focus on establishing intercountry rail communication with neighboring countries like Bhutan, Bangladesh and Myanmar. In this respect, a major initiative has been Trans-Asian Railways of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). Cargo transportation and transit from the NER will mostly benefit from the rail route connecting Myanmar to India via Moreh–Tamu and all the inter-country linkages of the Trans-Asian Network (Figure 9.2).

The present status of rail links being developed or revived between India and Bangladesh/Bhutan/Myanmar is presented in Figure 9.3.

To enable international trade, Government of India has notified 32 LCSs and 7 ICPs in the NER.

Prior trade related studies conducted by ADB and others:

- Prabir De, Sunetra Ghatak, and Durairaj Kumarasamy. 2018. Assessing Economic Impacts of Connectivity Corridors: An Empirical Investigation. ASEAN–India Centre at RIS and Research and Information System for Developing Countries. New Delhi. https://www.ris.org.in/sites/default/files/Assessing%20Economic%20Impacts%20of%20Connectivity%20Corridors_Report-5%20July-min.pdf.
- ADB. 2018. BIMSTEC II Draft Master Plan for Transport Connectivity. Unpublished.
- ADB. 2018. Updating and Enhancement of the BIMSTEC Transport Infrastructure and Logistics Study: Final Report. Manila, the Philippines. <https://www.adb.org/sites/default/files/publication/439106/updating-bimstec-transport-logistics-study.pdf>.

⁴ <https://advantageassam.com/assets/front/pdf/State-Profile.pdf>.

⁵ <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1513640>.

⁶ Government of India. Land Ports Authority of India. <http://www.lpai.gov.in/content/>. Also, Government of India. Ministry of Finance (Department of Revenue). Commissionerate of Customs (Preventive). North Eastern Region. Jurisdictional Map. Shillong. <http://shillongcustoms.gov.in/english/jurisdictional-map/>.

Figure 9.1: Key Land Customs Stations and Integrated Check Posts for Assam's Trade Facilitation

ASEAN = Association of Southeast Asian Nations, ICP = Integrated Check Post, LCS = Land Customs Station, NW-2 = National Waterway 2, SAARC = South Asian Association for Regional Cooperation.

Source: Data from Land Ports Authority of India website.

Figure 9.2: Trans-Asian Railway Network

Source: UNESCAP - Trans-Asian Railway Network Map. https://www.unescap.org/sites/default/files/TAR%20map_0.pdf.

Figure 9.3: Rail Links being Developed/Revived between India and Bangladesh/Bhutan/Myanmar

Source: Study team analysis.

Waterway Network and Coastal Shipping

About 891 km of NW-2 (Brahmaputra river) and 121 km of NW-16 (Barak river) flow through Assam.⁷ With 12 national waterways, Assam has nearly 10% of cumulative navigable length of all 111 national waterways in India.

Governments of India and Bangladesh renewed the Indo-Bangladesh Protocol on Inland Water Transit & Trade (PIWTT) on June 2015 to facilitate passage of goods between the two countries and to third

countries through the other's territory. As part of this protocol, the designated routes that facilitate transport of cargo from NER are shown in Figure 9.4.

India and Bangladesh have also signed a memorandum of understanding (MOU) for Fairway Development of Ashuganj–Zakiganj stretch of Kushiya River and Sirajganj–Daikhawa stretch of Jamuna River in the Indo-Bangladesh protocol route by jointly undertaking necessary dredging.⁸

⁷ The Third Pole. 2017. Connectivity gains for India's North East via waterways. <https://www.thethirdpole.net/en/regional-cooperation/connectivity-gains-for-indias-north-east-via-waterways/>.

⁸ Government of India. Ministry of Shipping. Inland Waterways Authority of India. 2017. Memorandum of Understanding on development of fairway from Sirajganj to Daikhawa and Ashuganj to Zakiganj on Indo-Bangladesh Protocol Route. <http://iwai.nic.in/sites/default/files/8653640986MoU.pdf>.

Figure 9.4: Inland Waterway Protocol Routes between India and Bangladesh

Source: Indian and Bangladesh Protocol on Inland Water Transit and Trade.

In a bid to revive and facilitate coastal shipping between the two countries, an Agreement on Coastal Shipping was signed in 2015. The MOU enables shipping companies from India and Bangladesh to operate river-sea vessels (RSVs) to carry cargo making short trips between their ports. This significantly reduces time and cost associated with transporting cargo to Bangladesh or NER.⁹

India and Bangladesh also signed an MOU relating to “The Use of Chittagong and Mongla Ports for Movement of Goods to and from India”. The MoU further envisages multimodal routes for cargo movement from Chattogram (erstwhile Chittagong) and Mongla in Bangladesh to Sutarkandi (Assam), Agartala (Tripura), and Dawki (Meghalaya).¹⁰

⁹ Government of India. Ministry of External Affairs. 2015. Agreement on Coastal Shipping between the Government of the Republic of India and the Government of the People's Republic of Bangladesh. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2420.pdf>.

¹⁰ Government of India. Ministry of External Affairs. 2015. Memorandum of Understanding between Ministry of Shipping, Road Transport and Highways, Government of the Republic of India and Ministry of Shipping, Government of the People's Republic of Bangladesh Relating to The Use of Chittagong and Mongla Ports for Movement of Goods to and from India. <https://www.mea.gov.in/Portal/LegalTreatiesDoc/BG15B2423.pdf>.

Figure 9.5: Framework for Assessing Cross-Border Trade Issues

ICT = Information and Communication Technology, NSW = National Single Window, NTM = Nontariff Measure, SPS = Sanitary and Phytosanitary, TBT = Technical Barriers to Trade.

Source: Study team analysis.

Framework for Assessing Cross-Border Trade Issues

In order to examine cross-border trade issues which impact movement of goods between Assam and the neighboring countries for bilateral and transit trade,

the study applied an assessment framework focusing on four thrust areas (Figure 9.5).

To undertake the subsequent assessment in line with the framework adopted by the study team, relevant agreements governing border trade and transport, studies aimed at highlighting existing trade and transport issues, and trade databases were reviewed.¹¹ The key issues and constraints related to cross-

¹¹ Bilateral and Multilateral Agreements :

- Meeting of the Ministers of Transport of Bangladesh, Bhutan, India, and Nepal. 2015. Motor Vehicles Agreement for the Regulation of Passenger, Personal and Cargo Vehicular Traffic Between Bangladesh, Bhutan, India, and Nepal Motor Vehicles Agreement for the Regulation of Passenger, Personal and Cargo Vehicular Traffic between Bangladesh, Bhutan, India, and Nepal. June 15. Thimphu, Bhutan. <http://nepalforeignaffairs.com/bbin-agreement-on-motor-vehicles-agreement/>.

Prior trade-related studies conducted by ADB and others :

- India, Bangladesh and Bhutan national studies on 'Identification of Potential Exports Facing Sanitary-phytosanitary and Technical Barriers to Trade Measures in the SASEC Sub region'.
- Feasibility Study on Pilot Implementation of ESCAP Secure Cross Border Transport Model along Kolkata-Jaigaon-Phuentsholing route on the India-Bhutan Transit Corridor.
- United Nations Economic and Social Commission for Asia and the Pacific. 2017. Time Release Study of Burimari Land Border Crossing Station, Bangladesh. Bangkok. <https://www.unescap.org/sites/default/files/03%20TRS%20Burimari.pdf>.
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Table 9.1: Status of India, Bangladesh, and Bhutan with Respect to Adopting Trade Facilitation Enablers

	India	Bangladesh	Bhutan
Facilitating Advanced Filing of Bill of Entry	<p>Advance filing of BOE has been implemented but take-off is slow on account of</p> <ul style="list-style-type: none"> delays in receipt of original documents and COO and amendment to BOE which adds to cost and time. 	<ul style="list-style-type: none"> Advance filing of BOE is not permitted. Procedures are repetitive. The Assistant Revenue Officer refers BOE to the Revenue Officer at each step of the release and clearance process. 	<ul style="list-style-type: none"> Advance filing of BOE is not permitted. For third country import by Bhutan via India: <ul style="list-style-type: none"> the importer from Bhutan has to present five copies of the BOE at the place of entry (in India) at the Indo-Bhutan border and goods are examined on both sides of the border adding to cost and time.
Risk Management System	<ul style="list-style-type: none"> The online risk management system covers all EDI-enabled LCSs. However, most LCSs in the NER are non-EDI, hence not covered. The share of fully facilitated BOE needs to be increased. 	<ul style="list-style-type: none"> A robust risk management system is absent. All BOEs and Bills of Export are subject to full documentary checks and full examination by Customs and other border agencies. 	<ul style="list-style-type: none"> There is a felt need for a robust online risk management system as also a system of self-assessment by importers.

BOE = Bills of Entry, COO = Certificate of Origin, EDI = Electronic Data Interchange, LCS = Land Customs Station, NER = Northeast Region.
Source: Study team analysis.

border trade were thus identified (presented in the subsequent subsections).

Assessment of Customs

A. Electronic Data Interchange is not functional at most land customs stations. India introduced Electronic Data Interchange (EDI) in the form of an electronic customs commerce gateway known as ICEGATE. It provides options for electronic filing of entry documents (import goods declarations) and shipping bills (export goods declarations), calculation of duty rates, electronic payment, and online verification of import and export licenses. However, the EDI system is not accessible at 14 of the 17 LCSs in NER, since they lack basic infrastructure like computers or power supply.

B. Customs procedures are cumbersome. Customs procedures followed in India, Bangladesh, and Bhutan tend to be cumbersome for the traders, leading to significant time delays and sometimes requiring paper submission of signed documents even after filing of all the information in computerized systems. However, countries in the region are trying to reduce paperwork and facilitate smoother processes. Table 9.1 depicts the status of India, Bangladesh, and Bhutan with respect to adopting trade facilitation

Table 9.2: Status of Single Window Implementation

Country	Single Window for Exports	Single Window for Imports
India	Implementation in progress	Implementation in progress
Bangladesh	No single window	No single window
Bhutan	No single window	No single window
Myanmar	Implementation in progress	Implementation in progress

Source: Doing Business Dataset on Single Windows by World Bank (published in October 2017). <https://datacatalog.worldbank.org/dataset/doing-business>.

enablers, such as advanced filing of Bill of Entry and online Risk Management System.

C. Documentation requirements and country-specific standards are not clear and easily accessible. Another common problem faced at the time of trade between India and neighboring countries is lack of transparency with respect to forms, notifications, and regulations, as they are not available in any common language, such as English.

D. All countries have not migrated to National Single Window for exports and imports. India and its

neighboring South Asian countries (that share borders with the NER) are at various stages of developing and implementing National Single Windows for trade-related aspects. The status of single window implementation for each country has been highlighted in Table 9.2.

E. Physical inspections are still the norm. As none of these countries have functional e-customs accessible across all LCSs, physical control is still the basis of customs clearance wherein consignments are manually examined in order to impose various types of export duties.

Assessment of Nontariff Measures

While countries have reduced tariff levels in an effort to liberalize trade, imposition of nontariff measures

(NTMs) have increased significantly to protect domestic industries and increase consumer demand for safe and environment-friendly products.¹² The NTMs include sanitary and phytosanitary (SPS) measures, technical regulations and standards (technical barriers to trade or TBT), price control measures, licensing, quotas, prohibitions etc.

All products identified as part of this study for manufacturing in Assam to meet export demand in neighboring markets (like Nepal, Bhutan, Bangladesh, Myanmar, and Thailand), are currently subjected to multiple NTMs (Figure 9.6). Traders are faced with restrictions on trade of select commodities, labeling, and packaging instructions in multiple languages, conflicting information disclosure and conformity requirements, and inadequate testing facilities and

Figure 9.6: Key Nontariff Measures (by Sector) to Be Tackled in Exporting to South Asia and Southeast Asia

Source: Study team analysis.

¹² In 1947, 23 countries signed the General Agreement on Tariffs and Trade (GATT), which helped eliminate trade restrictions affecting a fifth of global trade. Over the next 50 years, further rounds of negotiations on GATT continued with the main goal of reducing tariffs. This boosted global trade by 8% a year during the 1950s and 1960s, which was higher than the world's economic growth. Trade grew from \$332 billion in 1970 to \$3.7 trillion in 1993. By 1995, GATT had 128 members generating at least 80% of world trade. The last and largest GATT round was the Uruguay Round, which lasted from 1986 to 1994 and led to the World Trade Organization's (WTO) creation.

quarantine offices at trade gateways to meet the requirements under NTMs.

Some of the key interventions required to reduce NTM barriers include

- i) removal of permissible–restricted list of trading commodities for all India–Bangladesh trade gateways to reduce cost of trade and delays;
- ii) adherence to global standards on SPS and TBT for priority sectors identified for NER as well as mutual recognition agreements with South and Southeast Asian trading partners to ensure harmonization of labeling, standards, and specifications across trading economies; and

- iii) strengthening of institutional arrangements and deployment of trained staff to ensure smooth coordination across public and private agencies administering the NTM regime.

Policy-Related Issues

- A. **Lists of permitted and restricted trading commodities across India–Bangladesh trade gateways add to delays and cost.** Lists of commodities permitted to be exported by India via various land ports in Bangladesh are published by the Bangladesh Land Port Authority. Currently in the NER, only Tamabil Land Port allows export access to most commodities from India. Others like Akhaura, Ramgarh, and Sheola allow only select

Table 9.3: Assam Vision 2025 Industrial Segments Impacted by Permissible or Restricted List

Land Port in Bangladesh (Corresponding LCS / ICP in India)	List of Commodities Permitted or Restricted	Impact on Industrial Segments Identified for Achieving Vision 2025
Akhaura (Agartala)	<p>Permitted commodities. Export of cattle, fresh fruits, plants, seeds, wheat, stones, coal, chemical fertilizers, china clay, wood and timber, limestone, onion, pepper, garlic, ginger, ball clay, quartz, dry fish, incense sticks, and cumin is permitted from India.</p> <p>Restricted commodities. No other commodity can be exported from India.</p>	<p>Select value chains across agriculture and food processing, wood, fertilizers, and medicinal plants are permitted to export their products to Bangladesh through these land ports.</p> <p>Value chains under cement, base chemicals (excluding fertilizers), apparel and textile, automobile, engineering goods, medicinal plants, metal-based products, paper and paper products, petrochemicals, pharmaceuticals, plastic, tea, and glass are restricted from exporting their products to Bangladesh through these land ports.</p>
Ramgarh (Sabroom)	<p>Permitted commodities. Export of cattle, fresh fruits, plants, seeds, wheat, stones, coal, chemical fertilizers, china clay, wood and timber, limestone, onion, pepper, garlic, ginger, ball clay, and quartz is permitted from India.</p> <p>Restricted commodities. No other commodity can be exported from India.</p>	
Sheola (Sutarkandi)	<p>Permitted commodities. Export of cattle, fresh fruits, plants, seeds, wheat, stones, coal, chemical fertilizers, china clay, wood and timber, limestone, onion, pepper, garlic, ginger, ball clay, quartz, and fresh flowers is permitted from India.</p> <p>Restricted commodities. No other commodity can be exported from India.</p>	
Tamabil (Dawki)	<p>Permitted commodities. All commodities other than those in the “restricted” list (below) may be exported from India.</p> <p>Restricted commodities. Export of fish, thread, powder milk, sugar, and potato from India is not permitted.</p>	<p>Value chains under cement, base chemicals, apparel and textile, automobile, engineering goods, medicinal plants, metal based products, paper and paper products, petrochemicals, pharmaceuticals, plastic, tea, wood, and glass are permitted to export their products to Bangladesh through Dawki land port.</p> <p>Select value chains across agriculture and food processing industry are restricted from exporting their products to Bangladesh through Dawki land port.</p>

ICP = Integrated Check Post, LCS = Land Customs Station.

Source: Bangladesh Land Port Authority.

commodities to be exported to Bangladesh. Table 9.3 identifies the industrial segments (promoted under Assam 2025 Vision) impacted by this prevailing practice. These industries, if present in the NER and targeting export markets in Bangladesh, have to export their products either via Dawki–Tamabil gateway or via trade gateways present in West Bengal, adding to cost and delays.

- B. Labeling requirements are not harmonized.** Labeling and packaging regulations mandate different languages and conflicting information disclosure requirements across the region as there are no common criteria and parameters. Additionally, information available for consumers is inadequate.
- C. Divergent standards and specifications are imposed in the absence of harmonized conformity requirements.** Most standards and specifications adopted by countries like, Bangladesh, Bhutan, and Myanmar are not harmonized. This leads to additional burden on exporters who have to adhere to separate standards and specifications for domestic markets and foreign markets.

Institution-Related Issues

Limited institutional arrangements and suboptimal human resources hinder smooth coordination across public and private agencies administering NTMs. Various public and private agencies have been designated across each country to administer SPS and TBT regulations. This has led to divergence between the agency-specific rules, regulations, practices, and inconsistency of approaches. Additionally, skilled laboratory personnel are in short supply in this region.

Infrastructure-Related Issues

Laboratory facilities for testing NTMs are not close to the land ports. Each country has adopted mandatory regulations regarding SPS, plant and animal quarantine, and technical standards etc. which are not harmonized. Conformity testing is therefore needed during cross-border trade. However, testing facilities and quarantine offices are often located far

away from the trade gateways and LCSs. This makes sample testing more expensive and time consuming for traders.

Assessment of Border Infrastructure

Adequacy of infrastructure “at the border” and “behind the border” is critical to ensure seamless movement of cargo and clearance processes at the border. This entails (i) physical infrastructure like storage, warehouses, cargo yard, truck parking yards, etc., (ii) certification and testing facilities in border vicinity, (iii) material handling equipment and IT systems, and (iv) communication and banking facilities.

Most border gateways in the NER and their counterparts in Bangladesh, Bhutan, and Myanmar are constrained by inadequate infrastructure and facilities. There is limited space at the warehouses, congestion at the approach roads, frequent failure of the EDI systems, lack of testing laboratories in the vicinity, absence of sanitized parking zones, prevalence of manual trans-loading, and many other issues.

Assessment of Transport Facilitation

In recent years, South Asian economies like India, Bangladesh, Bhutan, Nepal, etc., have focused on developing multimodal cross-country transport corridors to augment integration of regional transport infrastructure. However, to ensure optimal use of transport infrastructure, supporting legal frameworks and agreements have to be designed, that will harmonize border formalities, cabotage, etc., and enable hassle-free movement of cargo and passengers, without the need for transshipment. In this regard, key bilateral or regional cargo transit agreements that India is currently party to (or negotiating) include the Agreement on South Asian Free Trade Area 2006, India–Myanmar–Thailand Motor Vehicle Agreement, the Bangladesh–Bhutan–India Motor Vehicles Agreement, the India–Bangladesh Trade Agreement 2015, the India–Bangladesh Protocol for Inland Water Transit and Trade 2015, and the Memorandum of Understanding for the Use of Chittagong and Mongla Ports for the Movement of Goods to and from India 2015.

While India has either signed or is negotiating the abovementioned agreements, most of the underlying protocols required for operationalizing these arrangements have not been agreed upon. For instance, the protocols to the motor vehicle agreements still have to contend with diverse transit documentary requirements, varying road-wise axle load limits, and congestion at the borders in the absence of off-border clearances.

Case Studies on Role of Cross-Border Economic Zones in Facilitating Cross-Border Trade

A Cross-Border Economic Zone (CBEZ) is a transnational economic zone in a border area, supported by special policies on finance, taxation, investment, trade, customs regulation, and industrial development, and where the flow of persons, goods, funds, and technology are concentrated and interactive. The establishment of CBEZs has emerged as a growth strategy of transitional regions for exploiting the locational advantages of border areas. Suitable factor inputs–finished good linkages tend to boost economic and trade cooperation in the area. These economic zones derive their competitiveness from complementary factor endowments, cross-border infrastructure services, and reduced border barriers. There are three major stages for developing a CBEZ (Figure 9.7).

Stage 1 countries experience weak integration across their border regions, with the border areas being characterized by:

- absence of adequate border infrastructure to facilitate cross-border trade and transit resulting in high transportation costs;
- closed-door labor policies that restrict the movement of cheap surplus labor from across borders; and

- poor focus on industries that may utilize complementary factor endowments present across the border.

India along with other South Asian countries is mapped to Stage 1, as it has not yet prioritized border development. In order to stimulate growth in the border states, especially in the NER, India may promote regional integration through CBEZs in cooperation with the neighboring countries, along key border gateways (Stage 2) characterized by:

- presence of customs infrastructure and customs bonded warehouses;
- temporary passes allowing workers and traders to move between the economic zones and industrial parks; and
- relaxation of movement of cargo vehicles between the two border economic zones and industrial parks.

Subsequently, the countries may enter into mutually beneficial agreements and identify well-developed border economic zones and industrial parks, governed by common laws regulating business, trade, and transport (Stage 3).

The chapter presents two case studies on attempts by Thailand and the People's Republic of China (PRC) at border integration. While Thailand's Special Economic Zones (SEZs) along its border provinces can be categorized as Stage 2 of CBEZ development, the PRC's attempts at developing CBEZs are aligned with Stage 3.

Case Study: Special Economic Zones Developed by Thailand along its Border Provinces (Stage 2)

In 2015, Thailand commenced the establishment of SEZs across 10 border provinces with budgetary support and deployment of land owned by the state. The following sections detail the institutional and regulatory enablers adopted by Thailand to develop the SEZs.

Figure 9.7: Stages Observed in the Development of a Cross-Border Economic Zone

ASEAN = Association of Southeast Asian Nations, CBEZ = Cross-Border Economic Zone, NC-SEZ = National Committee on Special Economic Zone Development, PRC = People's Republic of China, SEZ = Special Economic Zone.

Source: Study team analysis.

Institutional Structure

The management structure has the Prime Minister's Office of the Government of Thailand overseeing the development of SEZs at the highest level (Figure 9.8). The National Committee on Special Economic Zone (NC-SEZ) Development has been

created and is assisted in discharging its functions by the Office of the National Economic and Social Development Board (NESDB). Implementation is undertaken by subcommittees for land acquisition, designing and developing infrastructure, ease of doing business, marketing, etc.

India may promote regional integration through CBEZs in cooperation with the neighboring countries.

Regulatory Enablers for Special Economic Zones in Thailand

Various regulatory enablers have been adopted by the Government of Thailand to attract industries to the SEZs. These are (i) fiscal incentives, (ii) facilitating ease of doing business via 'One-Stop-Shops', (iii) facilitating workforce movement across borders, and (iv) facilitating trade processes (Figure 9.9).

Figure 9.8: Institutional Structure for Developing Special Economic Zones in Thailand

Government of Thailand entities: DOE = Department of Education, FPO = Fiscal Policy Office, MOI = Ministry of Interiors, OIE = Office of Industrial Economics, OSS = One Stop Service, OTP = Office of Transport and Traffic Policy and Planning, PMO = Prime Minister's Office
SEZ = Special Economic Zone.

Source: Website of the Office of the National Economic and Social Development Board (NESDB), Government of Thailand. Study team analysis.

Impact

The 10 SEZs have attracted 51 projects with investments worth B9,042.40 million (as on 31 May 2018). Apart from Thailand, countries like Malaysia, the PRC, Japan, Australia, India, and the Republic of Korea have invested in the SEZs.

Case Study: Cross-Border Economic Zones Developed by the People's Republic of China with Viet Nam, the Lao People's Democratic Republic, and Myanmar (Stage 3)

The Government of the PRC adopted policy measures for developing its western provinces in

Figure 9.9: Fiscal and Regulatory Enablers for Special Economic Zones in Thailand

Fiscal Incentives																											
<ul style="list-style-type: none">• The Office of the Board of Investment (BOI) will provide incentives like (a) exemption of import duties on machinery, (b) exemption of import duties on raw or essential materials used in manufacturing of export products, (c) 25% deduction of the project infrastructure installation construction costs from the project capital, (d) double deduction from the costs of transportation, electricity and water supply, etc., to BOI-promoted projects.• The NC-SEZ has stipulated 13 target industries for the SEZs which will receive additional benefits like (a) 8 years corporate income tax exemption, and (b) 50% reduction on corporate income tax for 5 years.• The Industrial Estate Authority of Thailand (IEAT) offers incentives to promote business development in IEAT free zones: exemptions from import duties, export duties, VAT and excise taxes, as well as relaxation of import restrictions for goods or materials that are intended for export.• For non-BOI projects, the Revenue Department has reduced corporate income tax from 20% to 10% for 10 accounting periods.																											
EODB Facilitation	Facilitating Workforce Movement	Facilitating Customs																									
Every SEZ will have a One-Stop Service (OSS) center providing the following services:	<ul style="list-style-type: none">• Permission is granted to foreign labor to temporarily enter for work, not exceeding 7 days.• Training is provided to Thai and foreign labor.• For BOI-promoted projects in the SEZ, both skilled and unskilled legal foreign labor is permitted.• The IEAT grants foreigners the right to own land in the industrial estate, visa and work permits for technicians and experts, and has relaxed requirements for remitting currency abroad.	<ul style="list-style-type: none">• Incentives provided by the Customs Department for Free Zone and Bonded Warehouse:																									
<ul style="list-style-type: none">• providing regulation related information, database for carrying out business in the district, and contacts of related government agencies;• acceptance of matter, submission to concerned agencies, and follow up; and• approval and permission (only where the stationed official has complete authority).		<table><tr><th>Incentives</th><th>Free Zone</th><th>Bonded Warehouse</th></tr><tr><td>Import duty exemption on machinery</td><td>✓</td><td>✓</td></tr><tr><td>Import duty exemption on raw materials used in manufacturing export products</td><td>✓</td><td>✓</td></tr><tr><td>Export duty exemption</td><td>✓</td><td>✓</td></tr><tr><td>Duty exemption on waste disposal</td><td>✓</td><td>✓</td></tr><tr><td>VAT exemption on raw materials used in manufacturing export products</td><td>✓</td><td>✓</td></tr><tr><td>VAT exemption on import and export products</td><td>✓</td><td>✓</td></tr><tr><td>No limitation on period of storing of products</td><td>✓</td><td><=2 years</td></tr></table>	Incentives	Free Zone	Bonded Warehouse	Import duty exemption on machinery	✓	✓	Import duty exemption on raw materials used in manufacturing export products	✓	✓	Export duty exemption	✓	✓	Duty exemption on waste disposal	✓	✓	VAT exemption on raw materials used in manufacturing export products	✓	✓	VAT exemption on import and export products	✓	✓	No limitation on period of storing of products	✓	<=2 years	
Incentives	Free Zone	Bonded Warehouse																									
Import duty exemption on machinery	✓	✓																									
Import duty exemption on raw materials used in manufacturing export products	✓	✓																									
Export duty exemption	✓	✓																									
Duty exemption on waste disposal	✓	✓																									
VAT exemption on raw materials used in manufacturing export products	✓	✓																									
VAT exemption on import and export products	✓	✓																									
No limitation on period of storing of products	✓	<=2 years																									

EODB = Ease of Doing Business, NC-SEZ = National Committee on Special Economic Zone Development, SEZ = Special Economic Zone, VAT = Value Added Tax.

Sources:

- Website of the Office of the National Economic and Social Development Board (NESDB), Government of Thailand.
- Website of The Office of the Board of Investment (BOI), Government of Thailand.
- Study team analysis.

the early 2000s. A key priority was the opening up of border areas, increasing border trade, and encouraging economic and technical cooperation with neighboring countries. Accordingly, Yunnan Province and Guangxi Zhuang Autonomous Region, initiated development of CBEZs in cooperation with Viet Nam, the Lao PDR, and Myanmar, based on their existing border economic zones.

Key Institutional and Regulatory Enablers

A three-tier institutional structure with government representation from the PRC and Viet Nam was proposed to develop the CBEZs (Figure 9.10).

Various regulatory enablers have been adopted by the Government of the PRC to attract industries to the CBEZs in the form of (i) trade facilitation initiatives,

Figure 9.10: Institutional Structure for Developing Cross-Border Economic Zones

CBEZ = Cross-Border Economic Zone, PRC = People's Republic of China.

Source: ADB. 2011. Developing Cross-border Economic Zones Between the People's Republic of China and Viet Nam: Institutional Development and Capacity Building. Manila, the Philippines.

(ii) fiscal incentives, (iii) people workforce movement facilitation across borders, and (iv) simplifying customs procedures (Figure 9.11).

A three-tier institutional structure with government representation from the PRC and Viet Nam was proposed.

Impact

Guangxi Zhuang Autonomous Region (GZAR) is becoming the epicenter of regional and global trade as multinationals are shifting manufacturing from southern PRC to Southeast Asian countries to lower cost. Established local logistics companies in Viet Nam are partnering with international firms or are a party to merger and acquisition as cross-border container traffic is growing for garments, footwear, electronics, high technology goods, and agricultural products.

Figure 9.11: Fiscal and Regulatory Enablers Adopted by the People's Republic of China to Develop Cross-Border Economic Zones

CNY = Chinese Yuan, PRC = People's Republic of China, VND = Vietnamese Dong.

Source: Study team analysis.

Cargo throughput at Pingxiang and Huu Nghi rose from 1.1 million tons in 2013 to 1.5 million tons in 2015.¹³ It is estimated that 1,500 trucks per day cross the PRC–Viet Nam border. Overall Viet Nam's export turnover increased 20.3% to \$126.09 billion in the first four months of 2017 compared to the previous year, while its import value reached \$63.99 billion, according to the General Department of Viet Nam Customs. Major users of cross-border transport services are multinationals like, Samsung Electronics, LG Electronics, Foxconn, and Canon as well as garment brands such as Adidas, Nike, and Levi's, and automotive firms like Honda, Toyota and Yamaha.

Recommendations for Improving Cross-Border Trade in Assam

Key recommendations facilitating cross-border trade in the NER are presented in Figure 9.12, along the four dimensions impacting cross-border trade. These recommendations have been prioritized for implementation in the short, medium, and long term.

¹³ According to *Viet Nam Investment Review*, May 2017. <https://www.vir.com.vn/>.

Figure 9.12: Recommendations for Improving Cross-Border Trade in Assam

BBIN = Bangladesh–Bhutan–India–Nepal, BPR = Business Process Reengineering, EDI = Electronic Data Interchange, ICP = Integrated Check Post, LCS = Land Customs Station, NER = Northeast Region, PIWTT = Protocol on Inland Water Transit and Trade, RMS = Risk Management System, SPS = Sanitary and Phytosanitary, TBT = Technical Barriers to Trade.

Source: Study team analysis.

10

Key Takeaways and Action Points

Connectivity Infrastructure

- **Gateways and border cities.** Assam needs to strengthen linkages to important gateways in the region including Chattogram Port (Bangladesh), Mongla Port (Bangladesh), Haldia Port (India), and Sittwe Port (Myanmar); border centers like ICP Agartala in Tripura (India–Bangladesh border), ICP Dawki (being upgraded) in Meghalaya (India–Bangladesh) and ICP in Moreh in Manipur (India–Myanmar); and airports in Guwahati and Kolkata. The most important gateway for Assam to connect to mainland India is the Siliguri corridor through West Bengal. Access through the India–Bangladesh Protocol Route via waterways is also an alternative.
- **Roads.** The study has identified national highways 27, 29, and 37 in Assam besides national highways 6 and 306 in rest of NER for upgrade, multilaning, and regular maintenance.
- **Waterways.** Inland waterways can significantly reduce traffic on the Siliguri corridor by providing alternate route for movement of goods between northeast and mainland India. Goods can move from Haldia Port (West Bengal) through Bangladesh connecting to NW-2 in upper Assam and also to Bhutan. National Waterway 16 in southern Assam can help in movement of goods in southern Assam, Manipur, Mizoram and Tripura.
- **Aviation.** Direct services to capitals of neighboring countries are of vital importance for Guwahati. The analysis shows that Guwahati and Silchar airports are overutilized and need expansion to reduce delays in operations and Jorhat airport is also reaching the maximum capacity. Silchar airport can be expanded into a hub for aggregation of traffic from the southern parts of Assam and adjoining states. To ensure sufficiently high load factor small aircrafts can be used initially.
- **Railways.**
 - From Guwahati to Silchar there is a need for alternative lines to not only connect the NER to mainland India but also to ASEAN countries. It is crucial that an alternate be developed to service the southern part of Assam.
 - Bilateral rail connectivity projects between India and Bangladesh and India and Myanmar are in various stages of planning and development.
 - Three routes have been identified for the movement of goods to Chattogram port from Guwahati: Guwahati–Karimganj–Kulaura–Akhaura–Chattogram, Guwahati–Agartala–Akhaura–Chattogram, and Guwahati–Belonia–Feni–Chattogram.
 - Rail connectivity to Myanmar is in a nascent stage. The Indian network from Jiribam to Imphal and Imphal to Tamu are critical for the rail connectivity to

Myanmar. Beyond the Indian border, the Tamu-Kalay stretch in Myanmar is critical for onward connectivity.

- **Multimodal Logistics Park.** Silchar, the second-largest city in Assam is strategically located in the NER with an industrial ecosystem, gateway and market proximity, and multimodal transport. Panchgram near Silchar is thus a natural candidate for multimodal logistics park.

Industries

A cluster-based model of industrial development has been proposed for Assam around economic centers: Amingaon, Bongaigaon, Nagaon, Guwahati, and Silchar; manufacturing centers: Kokrajhar, Dhubri, Mangaldoi, and Karimganj; and border centers: Hatisar, Mankachar, Golokganj, Darrang, and Sutarkandi.

Agribusiness

- **Horticulture.** Pineapple and ginger have high potential for commercial development in Assam. Strategic interventions include (i) strengthening of farmer producer organizations; (ii) developing collection centers to feed into storage and processing infrastructure; (iii) setting up of climate-controlled storage for horticultural and spice crops closer to farms or mandis; (iv) ensuring that storage includes grading, packing, and other processing facilities to minimize wastage; (v) meeting national and global food safety standards; (vi) establishing market infrastructure to meet growing volume and demand; (vii) creation of PPP-based cold chain; (viii) logistical connectivity to larger out-of-state markets; (ix) adherence to food safety and quality standards; and (x) integrate autonomous private market yards and other wholesale market models.
- **Bamboo.** The state needs to take following interventions for holistic development of bamboo supply chains: (i) sustainable resource management for improving raw

material supply; (ii) bamboo development network to achieve product competitiveness; and (iii) institutional and regulatory interventions for promoting attractiveness of the sector. Also, services such as branding, product design and material innovations, certifications including sustainability standards (of the Forest Stewardship Council), traceability and fair trade, and geographical indication, would need to be bundled with the manufactured product to increase product differentiation.

- **Tea.** Investments in appropriate debottlenecking infrastructure and leveraging the Small Tea Gardens (STGs) of Assam can ensure entry into high value global and Indian leaf tea market. This can be done through (i) organizing STGs into producer groups; (ii) mapping infrastructure needs of STGs (local roads, quality assurance laboratories, tea tasting and testing, and packing infrastructure); (iii) setting up a dedicated export marketing agency (outside of Tea Board), brand building, product differentiation, and positioning via Single Estate/Single Origin Tea; and (iv) incentivizing STGs to move toward organic cultivation and tea tourism.

Manufacturing Industries

- **Electrical equipment.** Assam could provide attractive fiscal incentives for capital investments in the sector, supporting small and medium-sized enterprises in technology upgrade, augmenting domestic testing facilities, promoting R&D, plugging skill gaps, and reducing delays on commissioning of power projects and transmission and distribution infrastructure development. Central government can provide support by rationalizing import duties and providing customs duty waiver for vital cold-rolled grain-oriented electrical steel.
- **Plastic.** Currently Assam has limited supply capacity in plastics and manufacturing is limited to small quantities of low-value-added

products. Important interventions include port access, incentivizing investments from infrastructure service providers, technological upgrading, plastic waste management plan, and promotion of alternate use of plastics.

Services

- **Higher education.** Four dimensions need to be addressed to promote Assam as a regional hub for higher education: (i) accessibility (though better connectivity, immigration services, internet penetration, scholarships, etc.); (ii) capability (by leveraging central government initiatives, incentivizing private investments, and faculty training); (iii) collaboration (knowledge exchanges with foreign institutions, and internships and placement programs with industry); and (iv) communication (education fairs, advertising campaigns, and social media).
- **Medical tourism.** Key interventions to promote medical tourism in Assam include enhancing connectivity with key markets,

network of advanced health-care facilities in the state through policy-led incentives for attracting hospital chains, international collaboration of state's medical institutions, and investing in brand building.

- **Information Technology and Enabled Services.** Assam needs to develop key IT infrastructure and skill development ecosystem to be able to place itself with the likes of other IT hubs of India. Some of the interventions required are creation of technology infrastructure (international internet gateway extension, optical fibre network, tier-4 certified data centers, and remote sensing and geographic information systems infrastructure), development of skilled human resources, and effective utilization of policy incentives.

Urban Development

Challenges to urban development and possible solutions are summarized in Table 10.1.

Table 10.1: Urban Development Challenges and Action Points Toward Solutions

Challenge	Solution Approach	
Structural Challenges	Single core of urbanization	<p>Balanced regional development</p> <p>Sustainability</p> <p>Cluster manufacturing approach based on a network of economic centers, manufacturing centers, and border centers</p> <ul style="list-style-type: none"> • Public transport solutions • Energy and resource conservation through the three “Rs”—reduce, reuse, and recycle • Disaster preparedness
	Predominantly brownfield urbanization	<p>Land notification as a mode of industrial development</p> <p>Pragmatic master planning and ensuring compliance</p> <ul style="list-style-type: none"> • Develop greenfield industrial clusters near various centers to serve as economic nodes Land pooling framework can be adopted for developing such greenfield nodes. • To avoid losing out on economies of scale, promote concentrated clusters of industry in the vicinity of urban centers. • Infrastructure and support facilities' development has to be integrated clearly into the land notification model. • Compliance with the pattern prescribed in respective master plans is strongly recommended.
	Insufficient utilities	<p>Smart infrastructure</p> <p>Efficient infrastructure systems through appropriate use of information technology solutions and applications in planning, land management, service delivery, monitoring, and communication</p>

Challenge		Solution Approach	
Execution Challenges	Overlapping developmental roles	Strong institutional structure	Recommendations made by the State Finance Commissions and Comptroller and Auditor General should be implemented speedily. A nodal project design, implementation and monitoring unit may be instituted at the state level—domiciled within the Directorate of Municipal Administration—appropriately staffed with sector specialists drawn both from internal departments or ULBs and external professionals
	Disjointed urban planning	District coordination	Coordination between the Planning Cell attached to the deputy commissioner and the District Planning Committee for preparing district development plans that integrate the plans of PRIs and ULBs along with departmental plans.
	Limited devolution of functions to ULBs	Effective implementation of state government acts	In order to translate local self-governance to reality, detailed activity mapping should be done, ensuring simultaneous devolution of function, functionaries, and funds to PRIs and ULBs.
	Inadequate municipal finances	Exploiting alternate sources of revenues and project delivery	While the state government will need to pilot initial developments through state funding, alternate capital avenues such as Infrastructure Bonds, sale of development rights, strategic land monetization and PPP, structures will need to be explored and tapped as the developments gain momentum.
	Inadequate availability of skilled human resources	Professionalization of municipal cadre Availing external expertise	Updating staffing norms, filling vacancies, setting up recruitment norms, allowing lateral entry of experts and professionals for different tasks Identifying institutions and professionals who can provide technical support to DPCs and other ULBs.

DPC = District Planning Committee, PPP = Public-Private Partnership, PRIs = Panchayati Raj Institutions, ULBs = Urban Local Bodies.

Source: Study team analysis.

Energy

- Exploit the untapped potential for power generation through hydro, solar, and gas in order to provide cleaner and cheaper power.
- Strengthen power transmission and distribution in the growth centers and border towns.
- Improve the efficiency in overall distribution system.
- Participate in cross-border power trade by importing surplus power from Bhutan to export to neighboring power deficit countries like Bangladesh and Myanmar and interconnecting regions with complementary seasonal power demand requirement.

Develop mutual recognition agreements for priority sectors.

Addressing Cross-Border Trade Issues

- **Short-term interventions.** Increase transparency in trade portals, SPS and TBT norms, simplify customs procedures, fast track Phase I border infrastructure projects, establish key protocols in insurance, axle loads, fitness certificates, etc.
- **Medium-term interventions.** Extend EDI facilities, adopt global SPS and TBT norms, operationalize nonfunctional LCSs and upgrade key LCSs to ICPs, and develop mechanisms for off-border clearances.
- **Long-term interventions.** Develop integrated national single window system, develop mutual recognition agreements for priority sectors, fast track Phase II border infrastructure projects, and introduce electronic cargo tracking system.

Assam as India's Gateway to ASEAN

This publication builds on a vision for Assam, the largest state in northeast India, to follow an outward-looking growth strategy and become a \$75 billion economy by 2025. It outlines the potential and key features of Assam as a geostrategic location for multimodal connectivity, regional and cross-border trade, and economic corridors between India and the Association of Southeast Asian Nations (ASEAN) as well as Bangladesh, Bhutan, and Nepal. The vision for Assam as India's gateway to ASEAN is also geared toward ensuring that both the state and the country remain committed toward achieving the Sustainable Development Goals.

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ASIAN DEVELOPMENT BANK

6 ADB Avenue, Mandaluyong City

1550 Metro Manila, Philippines

www.adb.org