ASSAM
AS INDIA’S GATEWAY TO ASEAN
MARCH 2021
## Contents

Tables, Figures, and Boxes ........................................... v

Foreword ................................................................ ix

Preface ................................................................... xi

Study Team ................................................................. xii

Abbreviations ............................................................. xiii

1 Setting the Context .................................................. 1

2 Potential Manufacturing Locations ............................ 11

3 Manufacturing and Services ....................................... 16

4 Agribusiness, Bamboo, and Tea ............................... 38

5 Multimodal Transport Corridors ............................... 51

6 Urban Development .................................................. 74

7 Energy Infrastructure ................................................ 80

8 Assessment of the Investment Climate in Assam ........... 91

9 Assessment of Cross-Border Trade Potential for Assam 93

10 Key Takeaways and Action Points ............................ 110
Tables, Figures, and Boxes

Tables

1.1 Major Industries of Assam 8
1.2 Key Barriers to Economic Development in Assam 9

2.1 Overview of Selected Economic Centers 15
2.2 Selection of Manufacturing Centers 15
2.3 Selected Economic Centers, Manufacturing Centers, and Border Centers 15

3.1 Assam’s Industries: Strengths and Opportunities 16
3.2 Selection of Industrial Sectors for Assam 18
3.3 Key Interventions for Assam in the Electrical Equipments Industry 22
3.4 Key Enablers of the Electronics Industry and their Availability in Assam 24
3.5 Key Interventions Required for Pharmaceutical Sector in Assam 28
3.6 Medical Tourism Industry Enablers and Their Availability in India and Assam 32
3.7 Key Interventions Required to Develop Maintenance, Repair, and Overhaul Industry in India (Assam) 36
3.8 Origin–Destination Analysis for Key Sectors 36

4.1 Bamboo Product Classification 42
4.2 Tea Statistics of Assam and India, 2012 to 2016 48
4.3 Area Under Tea Cultivation in Assam, 2009 to 2015: Top Districts 49
4.4 District-wise Small Tea Growers of Assam Registered with Tea Board of India, 2012/13 to 2014/15 50

5.1 Projects Identified on the Guwahati–Chattogram Routes 58
5.2 Roads in the Northeast Region to Connect with Neighbors 61

6.1 Structure of Guwahati Development Department and the Functions of its Agencies 75
6.2 Status of Urban Utilities in Select Centers 77
6.3 Summary of Solution Approaches for Urban Development in Assam 78
7.1 Oil Refineries in Assam 85
7.2 Crude Oil Pipelines in Assam, as of FY 2019 86
7.3 Petroleum, Oils, and Lubricants Pipelines in Assam 86

8.1 Key Interventions for Improving Ease of Doing Business in Assam 92
8.2 Interventions for Improving Ease of Doing Business Reforms 92

9.1 Status of India, Bangladesh, and Bhutan with Respect to Adopting Trade Facilitation Enablers 99
9.2 Status of Single Window Implementation 99
9.3 Assam Vision 2025 Industrial Segments Impacted by Permissible or Restricted List 101

10.1 Urban Development Challenges and Action Points Toward Solutions 112

**Figures**

1.1 Northeast India is at the Center of the Regional Cooperation Frameworks in Asia 2
1.2 Yunnan Shares Borders with Three Neighbors 3
B1.1 Ruili (PRC)–Muse (Myanmar) Cross-Border Economic Zone 4
1.3 International Regional Corridors across Assam 6
1.4 Gateways around Assam 6
1.5 Assam’s Exports Profile and Growth between 2008 and 2018 8
1.6 Approach for Assam to Become India’s Expressway to Southeast Asian Nations 10

2.1 Overlap of Assam’s “Network Core” with Regional Connectivity Initiatives 11
2.2 Economic Potential of Districts Along the Selected Core Network 12
2.3 Cluster Approach to Industrial Development in Assam 13
2.4 Evaluation of Potential Economic Centers 14

3.1 India’s Electrical Equipment Export to Southeast Asia and Bangladesh–Bhutan–Nepal 19
3.2 Key Demand Drivers of Electrical Equipment Industry for Assam 20
3.3 A Higher Education Strategy for Assam 31
3.4 Key Interventions for Developing Medical Tourism Industry in Assam 33
3.5 Proposed and Upcoming IT Infrastructure in Assam Along with Key Focus 34

4.1 The Horticulture, Bamboo, and Tea Promise for Assam 38
4.2 Distribution of Pineapple Production across the Northeast Region 40
4.3 Distribution of Ginger Production across the Northeast Region 41
9.1 Key Land Customs Stations and Integrated Check Posts for Assam's Trade Facilitation 95
9.2 Trans-Asian Railway Network 95
9.3 Rail Links being Developed/Revived between India and Bangladesh/Bhutan/Myanmar 96
9.4 Inland Waterway Protocol Routes between India and Bangladesh 97
9.5 Framework for Assessing Cross-Border Trade Issues 98
9.6 Key Nontariff Measures (by Sector) to Be Tackled in Exporting to South Asia and Southeast Asia 100
9.7 Stages Observed in the Development of a Cross-Border Economic Zone 104
9.8 Institutional Structure for Developing Special Economic Zones in Thailand 105
9.9 Fiscal and Regulatory Enablers for Special Economic Zones in Thailand 106
9.10 Institutional Structure for Developing Cross-Border Economic Zones 107
9.11 Fiscal and Regulatory Enablers Adopted by the People’s Republic of China to Develop Cross-Border Economic Zones 108
9.12 Recommendations for Improving Cross-Border Trade in Assam 109

Boxes

1.1 Interventions by the People's Republic of China that Positioned Yunnan as the Gateway to Southeast Asia 3

4.1 Bamboo in Anji County in the People's Republic of China 43
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 out development partnership in the coming years.

(Dr. K.K. Dwivedi)
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
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
Bhuwan Bhaskar Agrawal
Nishant Jain
Jonathan Wen
Piyush Lohia
Jyotiranjan 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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAGR</td>
<td>Average Annual Growth Rate</td>
</tr>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AEGCL</td>
<td>Assam Electricity Grid Corporation Ltd.</td>
</tr>
<tr>
<td>AEP</td>
<td>Act East Policy</td>
</tr>
<tr>
<td>ANDA</td>
<td>Abbreviated New Drugs Application</td>
</tr>
<tr>
<td>APAC</td>
<td>Asia Pacific</td>
</tr>
<tr>
<td>APDCL</td>
<td>Assam Power Distribution Company Ltd.</td>
</tr>
<tr>
<td>APGCL</td>
<td>Assam Power Generation Corporation Ltd.</td>
</tr>
<tr>
<td>API</td>
<td>Active Pharmaceutical Ingredient</td>
</tr>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>ASEB</td>
<td>Assam State Electricity Board</td>
</tr>
<tr>
<td>AT&amp;C</td>
<td>Aggregate Technical &amp; Commercial Losses</td>
</tr>
<tr>
<td>BBIN</td>
<td>Bangladesh, Bhutan, India, and Nepal</td>
</tr>
<tr>
<td>BBN</td>
<td>Bangladesh, Bhutan, and Nepal</td>
</tr>
<tr>
<td>BCIM</td>
<td>Bangladesh–China–India–Myanmar</td>
</tr>
<tr>
<td>BCPL</td>
<td>Brahmaputra Cracker and Polymer Limited</td>
</tr>
<tr>
<td>BHEL</td>
<td>Bharat Heavy Electricals Limited</td>
</tr>
<tr>
<td>BIMSTEC</td>
<td>Bay of Bengal Initiative for Multi-Sectoral and Economic Cooperation</td>
</tr>
<tr>
<td>BPM</td>
<td>Business Process Management</td>
</tr>
<tr>
<td>BPO</td>
<td>Business Process Outsourcing</td>
</tr>
<tr>
<td>CAEDCL</td>
<td>Central Assam Electricity Distribution Company Limited</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
</tr>
<tr>
<td>CBSP</td>
<td>Capacity Building for Service Providers</td>
</tr>
<tr>
<td>CEA</td>
<td>Central Electricity Authority</td>
</tr>
<tr>
<td>CGS</td>
<td>Central Generating Stations</td>
</tr>
<tr>
<td>Ckm</td>
<td>circuit kilometers</td>
</tr>
<tr>
<td>COD</td>
<td>Commercial Date of Operation</td>
</tr>
<tr>
<td>CPRI</td>
<td>Central Power Research Institute</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>CRAMS</td>
<td>Contract Research Manufacturing Services</td>
</tr>
<tr>
<td>DDUGJY</td>
<td>Deen Dayal Upadhay Gram Jyoti Yojna</td>
</tr>
<tr>
<td>DGCA</td>
<td>Director General of Civil Aviation</td>
</tr>
<tr>
<td>DGCIS</td>
<td>Directorate General of Commercial Intelligence and Statistics</td>
</tr>
<tr>
<td>DPC</td>
<td>District Planning Committee</td>
</tr>
<tr>
<td>EPI</td>
<td>Export Processing Industrial Park</td>
</tr>
<tr>
<td>ESDM</td>
<td>Electronics System Design and Manufacturing</td>
</tr>
<tr>
<td>EIBC</td>
<td>Flexible Intermediate Bulk Container</td>
</tr>
<tr>
<td>FICCI</td>
<td>Federation of Indian Chambers of Commerce and Industry</td>
</tr>
<tr>
<td>FMCG</td>
<td>Fast Moving Consumer Good</td>
</tr>
<tr>
<td>GDD</td>
<td>Guwahati Development Department</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GER</td>
<td>Gross Enrollment Ratio</td>
</tr>
<tr>
<td>GMCA</td>
<td>Guwahati Municipal Corporation Area</td>
</tr>
<tr>
<td>GMP</td>
<td>Good Manufacturing Practices</td>
</tr>
<tr>
<td>GMS</td>
<td>Greater Mekong Subregion</td>
</tr>
<tr>
<td>GSDP</td>
<td>Gross State Domestic Product</td>
</tr>
<tr>
<td>GST</td>
<td>Goods and Services Tax</td>
</tr>
<tr>
<td>GW</td>
<td>gigawatt</td>
</tr>
<tr>
<td>HSR</td>
<td>High Speed Railway</td>
</tr>
<tr>
<td>IBEF</td>
<td>India Brand Equity Foundation</td>
</tr>
<tr>
<td>ICC</td>
<td>International Chamber of Commerce</td>
</tr>
<tr>
<td>ICCCR</td>
<td>Indian Council for Cultural Relations</td>
</tr>
<tr>
<td>ICD</td>
<td>Inland Container Depot</td>
</tr>
<tr>
<td>ICP</td>
<td>Integrated Check Post</td>
</tr>
<tr>
<td>IEX</td>
<td>Indian Energy Exchange</td>
</tr>
<tr>
<td>IIDC</td>
<td>Industrial Infrastructure Development Center</td>
</tr>
<tr>
<td>ITeS</td>
<td>Information Technology Enabled Services</td>
</tr>
<tr>
<td>JCCCN</td>
<td>Joint Committee on Coordination of Commercial Navigation</td>
</tr>
<tr>
<td>JCI</td>
<td>Joint Commission International</td>
</tr>
<tr>
<td>kV</td>
<td>kilovolt</td>
</tr>
<tr>
<td>kWh</td>
<td>kilowatt hour</td>
</tr>
<tr>
<td>LAEDCL</td>
<td>Lower Assam Electricity Distribution Company Limited</td>
</tr>
<tr>
<td>LCS</td>
<td>Land Customs Station</td>
</tr>
<tr>
<td>LPI</td>
<td>Logistics Performance Index</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MDF</td>
<td>Medium Density Fiber</td>
</tr>
<tr>
<td>MMSCMD</td>
<td>million metric standard cubic meters per day</td>
</tr>
<tr>
<td>MMTPA</td>
<td>million metric tons per annum</td>
</tr>
<tr>
<td>MNRE</td>
<td>Ministry of New and Renewable Energy</td>
</tr>
<tr>
<td>MOOCs</td>
<td>Massive Open Online Courses</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MRO</td>
<td>Maintenance, Repair, and Overhaul</td>
</tr>
<tr>
<td>MSMEs</td>
<td>Micro, Small, and Medium-Sized Enterprises</td>
</tr>
<tr>
<td>MW</td>
<td>megawatt</td>
</tr>
<tr>
<td>NAAC</td>
<td>National Assessment and Accreditation Council</td>
</tr>
<tr>
<td>NCR</td>
<td>National Capital Region</td>
</tr>
<tr>
<td>NEDFi</td>
<td>North Eastern Development Finance Corporation</td>
</tr>
<tr>
<td>NER</td>
<td>Northeast Region</td>
</tr>
<tr>
<td>NHESP</td>
<td>National Higher Education Strategic Plan</td>
</tr>
<tr>
<td>NSDP</td>
<td>National State Domestic Product</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>PGCIL</td>
<td>Power Grid Corporation of India Limited</td>
</tr>
<tr>
<td>PMP</td>
<td>Phased Manufacturing Plan</td>
</tr>
<tr>
<td>PPDS</td>
<td>Pharmaceutical Promotion Development Scheme</td>
</tr>
<tr>
<td>PPP</td>
<td>Public–Private Partnership</td>
</tr>
<tr>
<td>PRC</td>
<td>People's Republic of China</td>
</tr>
<tr>
<td>PRI</td>
<td>Panchayati Raj Institution</td>
</tr>
<tr>
<td>PSU</td>
<td>Public Sector Unit</td>
</tr>
<tr>
<td>PTC</td>
<td>Power Trade Corporation</td>
</tr>
<tr>
<td>PTUAS</td>
<td>Pharmaceuticals Technology Upgradation Assistance Scheme</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
</tr>
<tr>
<td>PWD</td>
<td>Public Works Department</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RGGVY</td>
<td>Rajiv Gandhi Grameen Vidyutikaran Yojna</td>
</tr>
<tr>
<td>RISE</td>
<td>Revitalizing Infrastructure and Systems in Education</td>
</tr>
<tr>
<td>SAARC</td>
<td>South Asian Association for Regional Cooperation</td>
</tr>
<tr>
<td>SARI</td>
<td>South Asia Regional Initiative</td>
</tr>
<tr>
<td>SASEC</td>
<td>South Asia Subregional Economic Cooperation</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
</tr>
<tr>
<td>SHC</td>
<td>SAARC Highway Corridor</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>SKRL</td>
<td>Singapore-Kunming Rail Link</td>
</tr>
<tr>
<td>SMEs</td>
<td>Small and Medium-Sized Enterprises</td>
</tr>
<tr>
<td>SPTF</td>
<td>Special Purpose Tea Fund</td>
</tr>
<tr>
<td>T&amp;D</td>
<td>Transmission and Distribution</td>
</tr>
<tr>
<td>TARN</td>
<td>Trans-Asian Railway Network</td>
</tr>
<tr>
<td>TPD</td>
<td>tons per day</td>
</tr>
<tr>
<td>TUFS</td>
<td>Technology Upgradation Fund Scheme</td>
</tr>
<tr>
<td>UAE</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td>UAEDCL</td>
<td>Upper Assam Electricity Distribution Company Limited</td>
</tr>
<tr>
<td>UDD</td>
<td>Urban Development Department</td>
</tr>
<tr>
<td>ULB</td>
<td>Urban Local Body</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
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. 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.

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), Bay of Bengal Initiative for Multi Sectoral Economic Cooperation (BIMSTEC), 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.
Assam as India’s Gateway to ASEAN

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. 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.

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%.

Source: Study team analysis.

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.

---

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

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.

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

---

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

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.

---

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


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

<table>
<thead>
<tr>
<th>Area</th>
<th>Trade enabling infrastructure</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Ruili (PRC)     | Jiegao Border Trade Economic Zone  
• Industrial parks  
• Trading centers | • Diffusion of investments from congested metropolises—more profits and reduction of regional imbalance  
• Strengthening market presence in South and Southeast Asia  
• Transnational transport hub |
| Muse (Myanmar)  | Free trade zone  
• “One-stop service” border gate            | • Ease of trade with the PRC  
• Inflow of Chinese tourists  
• Promotion of traditional industries |

PRC = People’s Republic of China.

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

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. 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.

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.

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.

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. In FY2017, Assam’s Gross State Domestic Product (GSDP) at constant prices was ₹1,955 billion, contributing 61% of the GDP for the region.

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. 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.

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).

---

9 Footnote 8.
10 Footnote 8.
11 Footnote 8.
13 GSDP data sourced from https://des.assam.gov.in/portlets/state-income.
14 Footnote 12.
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).
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).

---


Exports from Assam were valued around ₹25 billion in FY2018, which was less than 1% of India’s exports (Figure 1.5). 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.

### Table 1.1: Major Industries of Assam

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

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

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

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Barrier</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Regionally concentrated economic development</strong></td>
<td>- Concentration of industrial and urban development in and around Guwahati</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Economic and urban backwardness of Barak Valley area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Inadequate urban development in upper Assam region leading to industrial dependence on petroleum sector</td>
</tr>
<tr>
<td>2</td>
<td><strong>Small industrial base with low output and value addition</strong></td>
<td>- Narrow manufacturing product portfolio mainly dependent on locally available raw materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low capital investment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low value addition in overall output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Limited value chain backward linkages with other states of India</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of industrial diversification</td>
</tr>
<tr>
<td>3</td>
<td><strong>Inadequate transport connectivity across the state</strong></td>
<td>- Difficult terrain reducing effective economic access of the entire state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Inadequate penetration of railways</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Poor utilization of waterways for movement of people and goods</td>
</tr>
<tr>
<td>4</td>
<td><strong>Inadequate provisioning of utility infrastructure</strong></td>
<td>- Inefficient power transmission and distribution infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low scale of water supply network development and penetration across the state</td>
</tr>
<tr>
<td>5</td>
<td><strong>Negligible exports share in India</strong></td>
<td>- Less than 1% share in India’s exports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Less than 1% of exports to output ratio of the state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High dependence on tea and petroleum products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of success in capitalizing on India’s export competitiveness in other products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Negligible presence in import profile of ASEAN and BBN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of industrial diversification</td>
</tr>
<tr>
<td>6</td>
<td><strong>Logistical disadvantages</strong></td>
<td>- Lack of success in recovering from post-partition loss of economic access to gateways</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The compulsion of using ports of West Bengal for tea exports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of capacity of roads connecting border towns to take heavy-duty trucks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Inadequate railway siding capacity</td>
</tr>
<tr>
<td>7</td>
<td><strong>Outflow of talent from the state</strong></td>
<td>Long-standing subpar socioeconomic prospects have:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- set the trend for out migration for education and livelihood opportunities and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- resulted in a loss of talent for manufacturing and services in Assam</td>
</tr>
</tbody>
</table>

**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).

Achievement. 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


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.
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...
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).

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. 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**

### Economic Centers
- Key nodes with high levels of urban and industrial development
- Can build upon existing capability to meet regional and industrial demand
- High potential for absorbing service sector demand

### Manufacturing Centers
- Capable of housing industrial clusters of mapped industries
- Cheaper alternatives than economic centers
- Good connectivity with both economic centers and border centers

### Border Centers
- Trading points with neighboring countries
- Good connectivity with manufacturing centers
- Capable of housing trade enabling administrative and commercial infrastructure

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

<table>
<thead>
<tr>
<th>District</th>
<th>Aggregate Scores</th>
<th>Economic Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamrup Metro</td>
<td></td>
<td>Guwahati</td>
</tr>
<tr>
<td>Kamrup Rural</td>
<td></td>
<td>Amingaon</td>
</tr>
<tr>
<td>Bongaigaon</td>
<td></td>
<td>Bongaigaon</td>
</tr>
<tr>
<td>Cachar</td>
<td></td>
<td>Silchar</td>
</tr>
<tr>
<td>Nagaon</td>
<td></td>
<td>Nagaon</td>
</tr>
<tr>
<td>Nalbari</td>
<td></td>
<td>Nalbari</td>
</tr>
<tr>
<td>Darrang</td>
<td></td>
<td>Mangaldoi</td>
</tr>
<tr>
<td>Barpeta</td>
<td></td>
<td>Barpeta</td>
</tr>
<tr>
<td>Dhubri</td>
<td></td>
<td>Dhubri</td>
</tr>
<tr>
<td>Morigaon</td>
<td></td>
<td>Morigaon</td>
</tr>
<tr>
<td>Kokrajhar</td>
<td></td>
<td>Kokrajhar</td>
</tr>
<tr>
<td>Karbi Anglong</td>
<td></td>
<td>Diphu</td>
</tr>
<tr>
<td>Dima Hasao</td>
<td></td>
<td>Haflong</td>
</tr>
<tr>
<td>Chirang</td>
<td></td>
<td>Kajalgaon</td>
</tr>
<tr>
<td>Baksas</td>
<td></td>
<td>Mushalpur</td>
</tr>
</tbody>
</table>

Source: Study team analysis.
Table 2.1: Overview of Selected Economic Centers

<table>
<thead>
<tr>
<th>Economic Centers</th>
<th>Guwahati and Amingaon</th>
<th>Bongaigaon</th>
<th>Silchar</th>
<th>Nagaon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Highly industrialized</td>
<td>High potential for inland water transport</td>
<td>High potential for inland water transport</td>
<td>Heavily industrialized</td>
</tr>
<tr>
<td></td>
<td>Close to international airport</td>
<td>MMLP proposed</td>
<td>MMLP proposed</td>
<td>Close to both inland waterway terminal and airport</td>
</tr>
<tr>
<td></td>
<td>Well connected both within and across state(s)</td>
<td>Close to Nepal and Bhutan</td>
<td>Close to Bangladesh and Myanmar</td>
<td>Four-laned connectivity with Guwahati</td>
</tr>
</tbody>
</table>

Other Potential Centers

<table>
<thead>
<tr>
<th>Morigaon</th>
<th>Labor is easily available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darrang</td>
<td>Low potential to support large scale development</td>
</tr>
</tbody>
</table>

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 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

<table>
<thead>
<tr>
<th>Connected Economic Centers</th>
<th>Nearest Border Centers</th>
<th>Selected Manufacturing Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bongaigaon, Guwahati, and Amingaon</td>
<td>Hatisar</td>
<td>Kokrajhar</td>
</tr>
<tr>
<td>Bongaigaon</td>
<td>Mankachar and Golokganj</td>
<td>Dhubri</td>
</tr>
<tr>
<td>Nagaon</td>
<td>Darrang</td>
<td>Mangaldoi</td>
</tr>
<tr>
<td>Silchar</td>
<td>Sutarkandi and Karimganj steamer ghat</td>
<td>Karimganj</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Economic Centers</th>
<th>Manufacturing Centers</th>
<th>Border Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guwahati and Amingaon</td>
<td>Kokrajhar</td>
<td>Hatisar</td>
</tr>
<tr>
<td>Bongaigaon</td>
<td>Dhubri</td>
<td>Mankachar and Golokganj</td>
</tr>
<tr>
<td>Nagaon</td>
<td>Mangaldoi</td>
<td>Darrang</td>
</tr>
<tr>
<td>Silchar</td>
<td>Karimganj</td>
<td>Sutarkandi</td>
</tr>
</tbody>
</table>

Source: Study team analysis.

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).

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

<table>
<thead>
<tr>
<th>Thrust Areas</th>
<th>Strengths and Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td></td>
</tr>
<tr>
<td>1 Tea</td>
<td>• Comprising nearly half of India’s production, Assam tea is a historical stronghold.</td>
</tr>
<tr>
<td></td>
<td>• All major tea players have presence in Assam.</td>
</tr>
<tr>
<td></td>
<td>• Assam tea is in high demand in western countries.</td>
</tr>
<tr>
<td></td>
<td>• The world’s second-largest tea auction center is located in Guwahati.</td>
</tr>
<tr>
<td></td>
<td>• Assam tea has a Geographical Indication (GI) tag.</td>
</tr>
<tr>
<td></td>
<td>• A Special Purpose Tea Fund (SPTF) has been instituted for rejuvenation of tea bushes.</td>
</tr>
<tr>
<td>2 Agriculture and agro-based</td>
<td>• Agriculture is a major contributor to state’s economy.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>• Over 600 varieties of orchids naturally grow in Assam.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td>3 Bamboo-based</td>
<td>• Indian bamboo production is concentrated in the NER.</td>
</tr>
<tr>
<td></td>
<td>• Climatic conditions in Assam (and rest of NER) are very favorable for bamboo cultivation.</td>
</tr>
<tr>
<td>4 Mineral-based</td>
<td>• Assam accounts for a substantial proportion of the crude output in India.</td>
</tr>
<tr>
<td></td>
<td>• The wells at Digboi, Dhubri, and Sivasagar also produce natural gas.</td>
</tr>
<tr>
<td></td>
<td>• Limestone reserves of about 500 million tons are estimated in the state.</td>
</tr>
<tr>
<td></td>
<td>• The China clay available in the Karbi–Anglong district is a vital input for the ceramics industry.</td>
</tr>
<tr>
<td></td>
<td>• Deposits of decorative stones like granite are also present.</td>
</tr>
</tbody>
</table>

1 Recent publications reviewed for this study are
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 here.

### Selection of Manufacturing Sectors

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

### Thrust Areas

<table>
<thead>
<tr>
<th>Thrust Area</th>
<th>Strengths and Opportunities</th>
</tr>
</thead>
</table>
| 5 Plastics  | - 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   | - 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 | - 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 | - 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 | - 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 | - 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. |
| 11 Tourism | - 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 | - 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 | - 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.

### Services

- Tourism
- Information technology
- Higher education

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 here.

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%. The state primarily manufactures transformers, wires, and cables in

---

### Table 3.2: Selection of Industrial Sectors for Assam

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Significance</th>
<th>Short list of sectors which Assam can target to increase its share in India’s exports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strong</td>
</tr>
<tr>
<td>Industrial output from the northeastern region of India</td>
<td>Preference to such sectors which can benefit from regional/local synergies with upstream and downstream value chain entities</td>
<td>Cement</td>
</tr>
<tr>
<td>Share of Assam in industrial output from northeastern region of India</td>
<td></td>
<td>Petrochemicals</td>
</tr>
<tr>
<td>Competitiveness of India’s exports (Revealed Comparative Advantage calculated using Lafay Index)</td>
<td>Preference to such sectors which have high export potential from India</td>
<td>Apparel and textile</td>
</tr>
<tr>
<td>Share of India in import basket of target market</td>
<td></td>
<td>Tea</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>Engineering goods (electrical equipment and accessories)</td>
<td>Paper and paper products</td>
</tr>
<tr>
<td>Agriculture and food processing</td>
<td>Chemicals (including fertilizers and paints)</td>
<td>Electronics System Design and Manufacturing</td>
</tr>
</tbody>
</table>

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](image)

<table>
<thead>
<tr>
<th>Key imports from India</th>
<th>Transformers, switch gears, and apparatus</th>
<th>Transformers, switch gears, and apparatus</th>
<th>Motors and generators, switch apparatus</th>
<th>Motors and generators, transformers</th>
<th>Accumulators, transformers, generators</th>
</tr>
</thead>
<tbody>
<tr>
<td>India’s exports in 2017 (in $ million)</td>
<td>$578m</td>
<td>$164m</td>
<td>$88m</td>
<td>$22m</td>
<td></td>
</tr>
<tr>
<td>CAGR 2013–2017</td>
<td>15%</td>
<td>21%</td>
<td>25%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>India’s share in country’s imports in 2017</td>
<td>64%</td>
<td>70%</td>
<td>1%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

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.
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).
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.

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:

- Central Electricity Authority.
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 toehold, 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. 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.

**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.
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%.

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.

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

---

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

<table>
<thead>
<tr>
<th>State Government’s Domain</th>
<th>Central Government’s Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry competitiveness</strong></td>
<td></td>
</tr>
<tr>
<td>- Subsidies on raw materials</td>
<td>- Import duty rationalization</td>
</tr>
<tr>
<td>- Incentives for exports</td>
<td>- Customs duty waiver on import of vital cold rolled grain oriented electrical steel</td>
</tr>
<tr>
<td>- Supporting SMEs in technology upgrade and testing</td>
<td>- Negotiating with countries that do not recognize the test certificates issued by the Central Power Research Institute</td>
</tr>
<tr>
<td>- Augmenting domestic testing facilities to cover the type testing of all equipment</td>
<td>- Standardization of product ratings and specifications</td>
</tr>
<tr>
<td>- Incentivizing foreign suppliers of heavy equipment to set up phased manufacturing facilities in the state</td>
<td></td>
</tr>
<tr>
<td><strong>Technology upgrade</strong></td>
<td>Promoting public–private partnership based models for fast development of new technology / systems</td>
</tr>
<tr>
<td>- Promotion of research and development in areas like</td>
<td></td>
</tr>
<tr>
<td>- High surge impedance loading lines</td>
<td></td>
</tr>
<tr>
<td>- High temperature log sag carbon core conductors</td>
<td></td>
</tr>
<tr>
<td>Supporting and promoting established players in boiler turbine generators and transmission and distribution (T&amp;D) like Bharat Heavy Electricals Limited and Power Grid Corporation of India Limited</td>
<td></td>
</tr>
<tr>
<td><strong>Skill development</strong></td>
<td></td>
</tr>
<tr>
<td>- Plugging skill gap at graduate and diploma levels</td>
<td></td>
</tr>
<tr>
<td>- Modernizing training facilities</td>
<td></td>
</tr>
<tr>
<td>- Industry-relevant curriculum upgrade</td>
<td></td>
</tr>
<tr>
<td>Accreditation of training institutions led by the National Skill Development Corporation and certification of students by Sector Skill Councils</td>
<td></td>
</tr>
<tr>
<td><strong>Conversion of latent demand</strong></td>
<td></td>
</tr>
<tr>
<td>- Reducing delays in commissioning of power projects and T&amp;D infrastructure development leading to spillover effects on manufacturing schedules and capacity utilization</td>
<td></td>
</tr>
</tbody>
</table>

Source: Study team analysis.

---

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=aHdtZC9TV0fMjAxNi5wZGY=

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).\(^9\)

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>
<thead>
<tr>
<th>Table 3.4: Key Enablers of the Electronics Industry and Their Availability in Assam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enabler</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>Urban proximity</strong></td>
</tr>
<tr>
<td><strong>Gateway proximity</strong></td>
</tr>
<tr>
<td><strong>Industrial area proximity</strong></td>
</tr>
<tr>
<td><strong>Manufacturing policy</strong></td>
</tr>
<tr>
<td><strong>Resource proximity</strong></td>
</tr>
<tr>
<td><strong>Land availability</strong></td>
</tr>
</tbody>
</table>

R&D = Research and Development.

Source: Study team analysis.


\(^{21}\) 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.

**Pharmaceuticals (including Medicinal Plants)**

Health care in India is a global high growth sector, which is expected to cross $372 billion by 2022. 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. About 35% of the

---

23 At the exchange rate of $1 = ₹70.
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

---


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 BBN countries along with industrialists and business leaders of India and around the world are invited in this summit.


30 Footnote 29.


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.

---


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 $8 billion (₹560 billion) by FY2038.42

<table>
<thead>
<tr>
<th>Key Levers of Growth for Pharmaceuticals in India</th>
<th>Support by Government of India</th>
<th>Support required from Government of Assam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing manufacturing capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Expansion of cold chain and packaging industry</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Increasing availability of trained personnel</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Upskilling</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>R&amp;D investments to win new drug categories</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Increasing automation and technology transfer</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Forward movement in the supply chain</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

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). Nevertheless, India is a net importer of higher education services spending approximately $16 billion annually for its near 250,000 students in the US alone as compared to a little over 46,000 international students studying in Indian institutions.

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).

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.

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

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. 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

---

46) Footnote 45.
47) Footnote 45.
48) Footnote 45.
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.

---


51 Footnote 45.

52 Footnote 45.

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.

Key Interventions for Assam

To address 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

---

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.\(^\text{55}\)

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

\[\text{Table 3.6: Medical Tourism Industry Enablers and Their Availability in India and Assam}\]

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

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.

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**

- Policy incentives for attracting big hospital chains to Assam
- Working with the central government to enhance air connectivity of Assam with South and Southeast Asia
- Promoting international collaboration with the state’s medical institutions
- Developing a network of advanced health-care facilities across the state to serve the proximate demand
- Collaborating with the central government for market development initiatives via campaigns like Incredible India

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

---


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)

- 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**

Assam is in the process of creating basic enabling infrastructure for IT industry to meet demands of both trained human resources and technological capability.

**Key focus areas**

- IT services, BPM, software product companies, and shared service centers
- BPM domain: Knowledge services, data analytics, legal services, Business Process as a Service (BPaaS), and cloud-based services
- IT Services: Solutions and services around SMAC, IT Services outsourcing, IT consulting, and software testing
- Engineering and R&D: Telecom and semiconductors (mainly wafers fab)

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


---

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.

---


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

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

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

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

Assam as India’s Gateway to ASEAN
<table>
<thead>
<tr>
<th>Priority Industries</th>
<th>Proposed Development Location</th>
<th>Sources</th>
<th>Markets</th>
<th>Mode Choice</th>
<th>Key Routes</th>
<th>Key Border Cities/Towns</th>
<th>Gateways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics</td>
<td>Guwahati</td>
<td>Gateways</td>
<td>Indian hinterland</td>
<td>Air</td>
<td>Guwahati Airport</td>
<td>Guwahati, Chattogram, Dhaka, and Silchar</td>
<td></td>
</tr>
<tr>
<td>IT/ITEs</td>
<td>Guwahati and Silchar</td>
<td>Local educational institutions and NER</td>
<td>ASEAN – LMICS</td>
<td>Air</td>
<td>Guwahati, Silchar Airports</td>
<td>Guwahati and Silchar</td>
<td></td>
</tr>
<tr>
<td>Medical tourism</td>
<td>Guwahati</td>
<td>Bangladesh, Myanmar, and NER</td>
<td>BBN and ASEAN</td>
<td>Air, rail, road</td>
<td>NH-29, NH-37, NH-27, NH-6, Guwahati and Silchar Airport</td>
<td>Dawki, Karimganj, and Golakganj</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Guwahati, Silchar</td>
<td>Bhutan, Bangladesh, Myanmar, and NER</td>
<td>BBN</td>
<td>Air, rail, road</td>
<td>NH-29, NH-37, NH-27, NH-6, Guwahati and Silchar Airport</td>
<td>Dawki, Karimganj, and Golakganj</td>
<td></td>
</tr>
</tbody>
</table>

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.
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.

NER, particularly Assam, has huge potential for exports of agriculture and horticulture products.

Marketable surplus of agricultural and horticultural produce in NER as % of total production

- Orange: 85%
- Pineapple: 95%
- Rice: 5%
- Chili: 27%
- Ginger: 86%
- Lemon: 82%
- Banana: 80%
- Jackfruit: 83%

As a region, Europe is the biggest import market ($0.5 billion in 2015), while the US is the biggest importer as a country ($0.3 billion).

Bamboo has a lucrative domestic and international market.

NER is the leading producer.

There is potential to increase GDP while adapting to climate change.

Potential: Doubling farmers’ income, increased GSDP, green industrialization.

Cultivation of bamboo in Anji county (the PRC) led to:
- Value of bamboo shoots at $2 billion
- 7.74 million tourists
- Farmers annual income increase to CNY1,000

Bamboo has a lucrative domestic and international market.

NER is the leading producer.

There is potential to increase GDP while adapting to climate change.

Leadership in tea can be sustained by adopting the right strategy

- Assam alone produces more than half of India’s tea.
- The total tea production in India was 1,208,780 metric tons in 2014. Assam’s production accounted for over 50% at 610,970 metric tons produced over 304 thousand hectare of land.


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

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. Rice is the main food grain cultivated in Assam, occupying about 91% of the total cropped area followed by pulses, maize, and wheat. 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;
- 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 Institute.

---

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.


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;
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.**

NER = Northeast Region.

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

Source: Study team analysis.

---

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 papable. 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.


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.


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. 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

Step 1: Build competitiveness
- Sustainable resource management and robust supply chain
- Bamboo development network
- Regulatory and institutional reforms

Step 2: (Short to medium term)
- Target low hanging market segments:
  - Substitution of imports worth $6 billion of hardwood and wood products annually with bamboo wood from the state
  - Replace 25% of annual imports of round stick incense
  - Upgrade handicraft capabilities
  - Branding
  - Consumer oriented designs

Step 3: (Medium to long term)
- Target high quality western markets by segment
  - Hardwood
  - Furniture

Source: Study team analysis.

---

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

**Figure 4.5: Building Competitiveness in Bamboo**

1. Develop a sustainable resource management mechanism in the form of Bamboo Producer Groups (BPGs)

   Sustainable bamboo resource management and integrated supply chain will lead to lower cost and higher value add

   - Set up BPGs led by women
   - Each BPG could have its own nursery to sell seedlings to its members
   - Access to finance could be facilitated through microcredit (JLG/SHG/BPG)
   - Common infrastructure for pre-processing finance via existing schemes of the government
   - Skills training
   - Promotion of Agro-forestry
   - Joint forest management for commercial plantation of bamboo
   - Dedicated internet access via VSAT or other protocols

   An integrated supply chain for bamboo production and processing that exploits all dimensions of the raw material in an environment-friendly manner

2. Bamboo development network for building competitiveness

   - A dedicated network that will serve the needs of the value chain stakeholders from producers to consumers
   - This network is envisaged outside the state system, initially supported by contribution from the state and subscription from enterprises

   - Develop a holistic product mix to achieve cost competitiveness with the PRC and Viet Nam
   - Build quality standards among producers for marketable products
   - Undertake sector promotion activities
   - Undertake brand building
   - Undertake enterprise development—Startups, innovations, etc.
   - Develop sectoral skills
   - Enable access to finance for MSMEs (role of NEDFI)
   - Engage with policy stakeholders
   - Undertake economic assessment of Bamboo Ecosystem Services
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.\(^9\)

---

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).

---


11 Study team industry research including discussions with industry experts.
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
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.

---

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibrugarh</td>
<td>122,965</td>
<td>122,845</td>
<td>122,623</td>
<td>121,390</td>
<td>121,390</td>
<td>115,534</td>
<td>115,534</td>
</tr>
<tr>
<td>Sivasagar</td>
<td>94,934</td>
<td>95,056</td>
<td>94,921</td>
<td>93,630</td>
<td>93,630</td>
<td>88,454</td>
<td>88,454</td>
</tr>
<tr>
<td>Darrang</td>
<td>41,923</td>
<td>42,139</td>
<td>41,805</td>
<td>41,506</td>
<td>41,506</td>
<td>39,211</td>
<td>39,211</td>
</tr>
<tr>
<td>Cachar</td>
<td>32,745</td>
<td>32,413</td>
<td>34,380</td>
<td>35,834</td>
<td>35,834</td>
<td>33,853</td>
<td>33,852</td>
</tr>
<tr>
<td>Nagaon</td>
<td>8,014</td>
<td>8,209</td>
<td>8,024</td>
<td>8,086</td>
<td>8,086</td>
<td>7,639</td>
<td>7,639</td>
</tr>
<tr>
<td>Assam</td>
<td>321,687</td>
<td>322,222</td>
<td>322,210</td>
<td>322,210</td>
<td>322,210</td>
<td>304,400</td>
<td>304,400</td>
</tr>
</tbody>
</table>


---

3. **Brand building around STGs.** Recapturing the substantial tea heritage of Assam through brand building for STGs would be needed.

4. **Export strategy for STGs.** A dedicated export marketing agency for STGs should be set up, beyond the existing Tea Board.

5. **Product differentiation and positioning.** Single Estate or Single Origin Tea could be promoted.

6. **Marketing.** Marketing campaigns could especially target global tea buyers.

7. **Organic farming.** Incentivizing STGs to move toward organic cultivation could make the Single Estate or Single Origin Tea even more exclusive and high value.

8. **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/](http://greentea-homestay.com/).

<table>
<thead>
<tr>
<th>District</th>
<th>No. of Small Tea Growers</th>
<th>Registered Area in Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibrugarh</td>
<td>208</td>
<td>19,160</td>
</tr>
<tr>
<td>Tinsukia</td>
<td>265</td>
<td>18,595</td>
</tr>
<tr>
<td>Sivasagar</td>
<td>290</td>
<td>9,590</td>
</tr>
<tr>
<td>Golaghat</td>
<td>1,387</td>
<td>11,286</td>
</tr>
<tr>
<td>Sonitpur</td>
<td>1,073</td>
<td>4,651</td>
</tr>
<tr>
<td>Jorhat</td>
<td>194</td>
<td>5,879</td>
</tr>
<tr>
<td>Udalguri</td>
<td>0</td>
<td>3,583</td>
</tr>
<tr>
<td>Lakhimpur</td>
<td>266</td>
<td>1,489</td>
</tr>
<tr>
<td>Karbi Anglong</td>
<td>489</td>
<td>489</td>
</tr>
<tr>
<td>Nagaon</td>
<td>145</td>
<td>643</td>
</tr>
<tr>
<td>Assam</td>
<td>4,955</td>
<td>77,229</td>
</tr>
</tbody>
</table>

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. 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).

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.
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).

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.
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

---

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**

[Map of international road corridors across Assam]

**Source:** Study team analysis.

BCIM Corridor = Bangladesh, China, India, and Myanmar Corridor.
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.
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 a 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.
**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).

Table 5.1: Projects Identified on the Guwahati–Chattogram Routes

<table>
<thead>
<tr>
<th>State</th>
<th>Project Name</th>
<th>Project Cost (₹ million)</th>
<th>Length (km)</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>Silchar–Badarpur</td>
<td>770</td>
<td>5</td>
<td>Feasibility Stage</td>
</tr>
<tr>
<td>Assam</td>
<td>Sutarkandi–Karimganj</td>
<td>2,030</td>
<td>14</td>
<td>Feasibility Stage</td>
</tr>
<tr>
<td>Assam</td>
<td>Panchgram–Silchar</td>
<td>3,340</td>
<td>23</td>
<td>Feasibility Stage</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>Dawki–Shillong</td>
<td>13,780</td>
<td>95</td>
<td>DPR stage</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>Mawlyngkhung–Mawryngkneng (Shillong bypass)</td>
<td>7,110</td>
<td>49</td>
<td>Feasibility Stage</td>
</tr>
</tbody>
</table>

DPR = Detailed Project Report.
Source: National Highways and Infrastructure Development Corporation.

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**

Source: Study team analysis.
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—from 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**

![Route 2 Diagram](image-url)

- Highways in neighboring countries
- Spine
- National Highway in India
- Route

**Route length in kilometers (1,077 km)**

- Guwahati to Mandalay: 295, 309, 473

<table>
<thead>
<tr>
<th>Route length within Assam</th>
<th>Route length within rest of India</th>
<th>Route length within Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

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–Kalem–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**

Source: Study team analysis.
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

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

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. 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

---

Figure 5.11: Prioritization Matrix of Road Projects in Assam

<table>
<thead>
<tr>
<th>Conceptualization</th>
<th>DPR under progress</th>
<th>DPR complete</th>
<th>Project under procurement</th>
<th>Project under construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Medium term</td>
<td>Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crucial</td>
<td>Three projects ₹12.18 billion</td>
<td>Two projects ₹29 billion</td>
<td>One project ₹0.77 billion</td>
<td></td>
</tr>
<tr>
<td>Need to have</td>
<td>Three projects ₹23.70 billion</td>
<td>One project ₹13.78 billion</td>
<td>Three projects ₹46.37 billion</td>
<td>Seven projects ₹29.37 billion</td>
</tr>
<tr>
<td>Good to have</td>
<td>Long term</td>
<td>Medium term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DPR = Detailed Project Report.
Source: Study team analysis.
(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.

**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.

Access to Chattogram port is crucial for industrial development in the region.
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 and Myanmar would facilitate increased trade between India and its neighbors.
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 Lakhipur 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 Kushiyara 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:


**Figure 5.13: Inland Waterways in Assam**

Source: Study team analysis.
• Routes 5 and 6. Rajshahi–Godagari–Dhulian

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 Lakhipur 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 Lakhipur (50 km) along with development of a new terminal at Lakhipur 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.

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”.

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

**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 a 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.
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

---

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

<table>
<thead>
<tr>
<th>Entity</th>
<th>Key Role / Function</th>
</tr>
</thead>
</table>
| Guwahati Metropolitan Development Authority | – 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 | – 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%).  

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/vidoc2030.pdf.

5 Footnote 2.
the other cities, critical infrastructure, including water supply, waste management, public transportation, etc., is inadequate, technologically out dated, 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).

---

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

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structural Challenges</strong></td>
<td></td>
</tr>
<tr>
<td>Single core of urbanization</td>
<td>Balanced regional development</td>
</tr>
<tr>
<td></td>
<td>Cluster manufacturing approach based on a network of economic centers, manufacturing centers, and border centers may be considered.</td>
</tr>
<tr>
<td></td>
<td>• Public transport solutions</td>
</tr>
<tr>
<td></td>
<td>• Energy and resource conservation through the three “Rs”—reduce, reuse, and recycle</td>
</tr>
<tr>
<td></td>
<td>• Disaster preparedness</td>
</tr>
<tr>
<td>Predominantly brownfield urbanization</td>
<td>Land notification as a mode of industrial development</td>
</tr>
<tr>
<td></td>
<td>• Discussed above in the subsection entitled “Notification of Industrial Zones”</td>
</tr>
<tr>
<td>Pragmatic master planning and ensuring compliance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Except for Guwahati, master plans for all urban centers are dated and require urgent and realistic revision. Hence fresh comprehensive master plans that are responsive to the economic and development goals (including for greenfield sites) are required.</td>
</tr>
<tr>
<td></td>
<td>• Urban development patterns have been observed to deviate from prescribed pattern in master plans.</td>
</tr>
<tr>
<td></td>
<td>• Compliance with the pattern prescribed in respective master plans is strongly recommended.</td>
</tr>
<tr>
<td>Insufficient utilities</td>
<td>Smart infrastructure</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>
Various centers to serve as economic nodes as the scale of existing urban centers is inadequate to accommodate, sustain, and promote enhanced economic activity.

2. Pragmatic master planning and compliance with development norms for these greenfield industrial clusters will also have to be ensured.

3. Land pooling framework can be adopted for developing such greenfield nodes.

4. 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.

5. 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.
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.

²Hydrocarbon 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. 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.

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.

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.

---

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 19 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.


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%. 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. 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

---

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

---

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, Mangaldooi, 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, Kumchhai, 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.
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).

**Table 7.1: Oil Refineries in Assam**

<table>
<thead>
<tr>
<th>Refineries</th>
<th>Year</th>
<th>Company</th>
<th>Capacity (MMTPA)</th>
<th>Planned Expansion (MMTPA)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digboi</td>
<td>1901</td>
<td>IOCL</td>
<td>0.65</td>
<td>0</td>
<td>Digboi refinery is the oldest operating refinery in the world and produces premium wax and microcrystalline wax.</td>
</tr>
<tr>
<td>Guwahati</td>
<td>1962</td>
<td>IOCL</td>
<td>1.00</td>
<td>0.200</td>
<td>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.</td>
</tr>
<tr>
<td>Bongaigaon</td>
<td>1974</td>
<td>IOCL</td>
<td>2.35</td>
<td>0.350</td>
<td>Bongaigaon Refinery and Petrochemicals Ltd, which originally processed Assam crudes, is now capable of processing imported crudes.</td>
</tr>
<tr>
<td>Numaligarh</td>
<td>2000</td>
<td>NRL</td>
<td>3.00</td>
<td>6.000</td>
<td>Numaligarh Refinery is the largest refinery in NER equipped with modern units of hydrocracker and delayed coker for maximizing distillate yield.</td>
</tr>
</tbody>
</table>

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

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. 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.

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). 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

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Owner</th>
<th>Length (kilometers)</th>
<th>Capacity (MMT)</th>
<th>Percentage Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakwa–Moran (new)</td>
<td>ONGC</td>
<td>18</td>
<td>1.5</td>
<td>24.1</td>
</tr>
<tr>
<td>Lakwa–Moran (old)</td>
<td>ONGC</td>
<td>15</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Geleki–Jorhat</td>
<td>ONGC</td>
<td>49</td>
<td>1.5</td>
<td>22.2</td>
</tr>
<tr>
<td>Geleki–Jorhat (new)</td>
<td>ONGC</td>
<td>48</td>
<td>1.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Borholla–Jorhat</td>
<td>ONGC</td>
<td>43</td>
<td>0.6</td>
<td>24.2</td>
</tr>
<tr>
<td>Borholla–Jorhat new TPL</td>
<td>ONGC</td>
<td>43</td>
<td>0.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Duliajan–Digboi–Bongaigaon–Barauni pipeline</td>
<td>OIL</td>
<td>1193</td>
<td>8.4</td>
<td>77.7</td>
</tr>
</tbody>
</table>

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


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

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Owner</th>
<th>Length (kilometers)</th>
<th>Capacity (MMT)</th>
<th>Percentage Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guwahati–Siliguri</td>
<td>IOCL</td>
<td>435</td>
<td>1.4</td>
<td>129.9</td>
</tr>
<tr>
<td>Numaligarh–Siliguri</td>
<td>OIL</td>
<td>654</td>
<td>1.7</td>
<td>103.1</td>
</tr>
</tbody>
</table>

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


---

Footnote 7.

Footnote 7.

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.
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.
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.
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%. 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


---

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

| Inspection enablers | • 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 | • 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 | • 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 | • 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 | • 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.

Table 8.2: Interventions for Improving Ease of Doing Business Reforms

| Single window system | • 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.  
| • Digitize property tax payment records of last 5 years at local municipality or municipal corporation office and publish these records online in public domain.  
| Land administration and transfer of land and property | • 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 non-industrial 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.  
| • 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.  
| Construction permit | • 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 | • 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.  
| • 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.  
| Others | • 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.

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

---

3 Bilateral / Multilateral Agreements:
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. 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 Plans. 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. 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.

Prior trade related studies conducted by ADB and others:


Assessment of Cross-Border Trade Potential for Assam

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

Waterway Network and Coastal Shipping

About 891 km of NW-2 (Brahmaputra river) and 121 km of NW-16 (Barak river) flow through Assam. 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 Kushiyara River and Siraiganj–Daikhawa stretch of Jamuna River in the Indo-Bangladesh protocol route by jointly undertaking necessary dredging.

---

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

---


Figure 9.5: Framework for Assessing Cross-Border Trade Issues

Key Thrust Areas

1. Customs
   - Assess border formalities, access to ICT applications, and operational NSWs.

2. Nontariff Measures
   - Identify NTMs (SPS, TBT, etc.) imposed by neighboring countries on trade items.

3. Border Infrastructure
   - Assess adequacy of “at the border” and “behind the border” infrastructure facilities.

4. Transport Facilitation
   - Assess transit facilitation arrangements.

Adds to time and cost of cargo movement between northeast region of India and neighboring countries.

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. The key issues and constraints related to cross-

---

1 Bilateral and Multilateral Agreements:

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.’
Assessment of Cross-Border Trade Potential for Assam

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 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 neighbors are trying to reduce paperwork and facilitate smoother processes.

Table 9.1: Status of India, Bangladesh, and Bhutan with Respect to Adopting Trade Facilitation Enablers

<table>
<thead>
<tr>
<th>Country</th>
<th>Facilitating Advanced Filing of Bill of Entry</th>
<th>Risk Management System</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Advance filing of BOE has been implemented but take-off is slow on account of delays in receipt of original documents and COO and amendment to BOE which adds to cost and time.</td>
<td>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.</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Advance filing of BOE is not permitted.</td>
<td>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.</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Advance filing of BOE is not permitted.</td>
<td>There is a felt need for a robust online risk management system as also a system of self-assessment by importers.</td>
</tr>
</tbody>
</table>

Table 9.2: Status of Single Window Implementation

<table>
<thead>
<tr>
<th>Country</th>
<th>Single Window for Exports</th>
<th>Single Window for Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Implementation in progress</td>
<td>Implementation in progress</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>No single window</td>
<td>No single window</td>
</tr>
<tr>
<td>Bhutan</td>
<td>No single window</td>
<td>No single window</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Implementation in progress</td>
<td>Implementation in progress</td>
</tr>
</tbody>
</table>

Source: Study team analysis.

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

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. 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**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri and food processing</td>
<td>• Specific registration / permit requirements from government authorities</td>
</tr>
<tr>
<td>Cement</td>
<td>• Specific labeling, marking, and packaging requirements</td>
</tr>
<tr>
<td>Automobiles</td>
<td>• Adherence to varying technical specifications and quality requirements</td>
</tr>
<tr>
<td>Medicinal plants</td>
<td>• Mandatory conformity assessment (inspections at borders)</td>
</tr>
<tr>
<td>Paper and paper-based products</td>
<td>• Varying tolerance limits for residues / contaminants</td>
</tr>
<tr>
<td>Petrochemicals</td>
<td></td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td></td>
</tr>
<tr>
<td>Plastic and plastic-based products</td>
<td></td>
</tr>
<tr>
<td>Tea</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Land Port in Bangladesh (Corresponding LCS / ICP in India)</th>
<th>List of Commodities Permitted or Restricted</th>
<th>Impact on Industrial Segments Identified for Achieving Vision 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akhaura (Agartala)</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Restricted commodities. No other commodity can be exported from India.</td>
<td>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.</td>
</tr>
<tr>
<td>Ramgarh (Sabroom)</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Restricted commodities. No other commodity can be exported from India.</td>
<td>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.</td>
</tr>
<tr>
<td>Sheola (Sutarkandi)</td>
<td>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.</td>
<td>Select value chains across agriculture and food processing industry are restricted from exporting their products to Bangladesh through Dawki land port.</td>
</tr>
<tr>
<td></td>
<td>Restricted commodities. No other commodity can be exported from India.</td>
<td>Select value chains across agriculture and food processing industry are restricted from exporting their products to Bangladesh through Dawki land port.</td>
</tr>
<tr>
<td>Tamabil (Dawki)</td>
<td>Permitted commodities. All commodities other than those in the “restricted” list (below) may be exported from India.</td>
<td>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, wood, and glass are permitted to export their products to Bangladesh through Dawki land port.</td>
</tr>
<tr>
<td></td>
<td>Restricted commodities. Export of fish, thread, powder milk, sugar, and potato from India is not permitted.</td>
<td>Select value chains across agriculture and food processing industry are restricted from exporting their products to Bangladesh through Dawki land port.</td>
</tr>
</tbody>
</table>

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.
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.

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).

India may promote regional integration through CBEZs in cooperation with the neighboring countries.
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
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 (j) 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.


(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

<table>
<thead>
<tr>
<th>Trade Facilitation</th>
<th>Seamless Movement of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Longbang-Tra Linh: Residents living within 20 km of the border will be able to exchange commodities at the trade zone duty-free, if they spend less than CNY8,000 per day.</td>
<td>• A labor management center is proposed to be established to regulate the cross-border movement of workers.</td>
</tr>
<tr>
<td>Viet Nam has issued a decree facilitating the following:</td>
<td>• Vietnamese border residents can stay in the border areas of the PRC using a border pass. If they are not able to enter and leave the PRC within the same day, they can stay overnight by using a temporary residence permit issued by the District Public Security Bureau. If necessary, the bureau can permit them to stay for up to 6 months.</td>
</tr>
<tr>
<td>• Border residents (defined as Vietnamese citizens with permanent residence in border areas) are exempted from customs duties on goods valued at not more than VND2 million ($89) per person per day, on no more than 4 days a month.</td>
<td>• Chinese and Vietnamese people who possess a border pass do not need passports at Dongxing and Hekou borders.</td>
</tr>
<tr>
<td>• Goods traded and exchanged by border residents for direct consumption are not subjected to medical quarantine, such as for animals, plants, and aquatic products, unless the competent state body warns of an epidemic or contagious disease.</td>
<td>• Private and rented cars are allowed to cross between Dongxing and Mong Cai.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fiscal Incentive</th>
<th>Simplified Customs and Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The PRC provides loans with discounted interest for infrastructure construction in cross-border economic cooperation zones.</td>
<td>• The PRC and Viet Nam have decided to open joint border check points thus implementing “Two countries, one inspection” system. Neutral zones will be created in which Chinese and Vietnamese customs officials can work side-by-side without worrying about territorial issues.</td>
</tr>
<tr>
<td>• Before the end of 2020, 15% tax discount will be extended to enterprises in priority industries in west PRC.</td>
<td></td>
</tr>
</tbody>
</table>

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.\(^\text{13}\) 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.

---

Figure 9.12: Recommendations for Improving Cross-Border Trade in Assam

<table>
<thead>
<tr>
<th>Short Term</th>
<th>Medium Term</th>
<th>Long Term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customs</strong></td>
<td>- Increased transparency in trade portals of South and Southeast Asian countries</td>
<td>- Development of requisite infrastructure to extend EDI facilities to all non-EDI LCSs in the NER, which will also help in RMS-based inspections</td>
</tr>
<tr>
<td>- BPR to simplify customs procedures</td>
<td></td>
<td>- Development of integrated National Single Window systems across the region, connecting government agencies, traders, insurers, logistics service providers, and bankers</td>
</tr>
<tr>
<td><strong>Nontariff measures</strong></td>
<td>- Increased transparency on SPS / TBT norms adopted in South and Southeast Asian countries</td>
<td>- Bilateral discussions to explore scope for adoption of global standards on SPS/TBT norms for priority sectors identified for the NER</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Holding bilateral discussions to harmonize SPS/TBT-related standards or develop mutual recognition agreements for the priority sectors identified for the NER</td>
</tr>
<tr>
<td><strong>Border infrastructure</strong></td>
<td>- Fast-tracking of Phase I projects for the NER by Land Ports Authority of India</td>
<td>- Fast-tracking of Phase II projects for the NER by Land Ports Authority of India</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Completion of missing links in the NER under the Trans-Asian Highway and Railway routes</td>
</tr>
<tr>
<td></td>
<td>- Operationalization of non-functional LCSs in the NER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Upgrading of key LCSs to ICPs in the NER</td>
<td></td>
</tr>
<tr>
<td><strong>Transport facilitation</strong></td>
<td>- Establishment of key protocols (insurance, axle loads, fitness certificate, etc.) under cargo transit agreements like BBIN, PIWTT, etc.</td>
<td>- Development of mechanisms for off-border clearances, with underlying regulatory changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Introduction of electronic cargo tracking system in collaboration with neighboring countries, backed with infrastructure augmentation and regulatory changes</td>
</tr>
</tbody>
</table>


Source: Study team analysis.
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–Akaura–Chattogram, Guwahati–Agartala–Akaura–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; (ii) setting up of climate-controlled storage for horticultural and spice crops closer to farms or mandis; (iii) ensuring that storage includes grading, packing, and other processing facilities to minimize wastage; (iv) meeting national and global food safety standards; (iv) establishing market infrastructure to meet growing volume and demand; (v) creation of PPP-based cold chain; (vi) logistical connectivity to larger out-of-state markets; (vii) adherence to food safety and quality standards; and (viii) 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 (v) 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>
<thead>
<tr>
<th>Challenge</th>
<th>Solution Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single core of urbanization</td>
<td>Balanced regional development</td>
</tr>
<tr>
<td>Sustainability</td>
<td>• Public transport solutions</td>
</tr>
<tr>
<td></td>
<td>• Energy and resource conservation through the three “Rs”—reduce, reuse, and recycle</td>
</tr>
<tr>
<td></td>
<td>• Disaster preparedness</td>
</tr>
<tr>
<td>Predominantly brownfield urbanization</td>
<td>Land notification as a mode of industrial development</td>
</tr>
<tr>
<td></td>
<td>• To avoid losing out on economies of scale, promote concentrated clusters of industry in the vicinity of urban centers.</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure and support facilities’ development has to be integrated clearly into the land notification model.</td>
</tr>
<tr>
<td>Pragmatic master planning and ensuring compliance</td>
<td>• Compliance with the pattern prescribed in respective master plans is strongly recommended.</td>
</tr>
<tr>
<td>Insufficient utilities</td>
<td>Smart infrastructure</td>
</tr>
</tbody>
</table>
### Key Takeaways and Action Points

**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.

### 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.

---

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overlapping developmental roles</td>
<td>Strong institutional structure</td>
</tr>
<tr>
<td>Disjointed urban planning</td>
<td>District coordination</td>
</tr>
<tr>
<td>Limited devolution of functions to ULBs</td>
<td>Effective implementation of state government acts</td>
</tr>
<tr>
<td>Inadequate municipal finances</td>
<td>Exploiting alternate sources of revenues and project delivery</td>
</tr>
<tr>
<td>Inadequate availability of skilled human resources</td>
<td>Professionalization of municipal cadre</td>
</tr>
</tbody>
</table>

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

Develop mutual recognition agreements for priority sectors.
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.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.