



**ASIAN INFRASTRUCTURE
INVESTMENT BANK**

PD000315-IND
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**Project Document
of the Asian Infrastructure Investment Bank
Sovereign-backed Financing
Republic of India
Assam Electricity Distribution System Enhancement and Loss Reduction Project**

Currency Equivalents

(As at October 31, 2021)

Currency Unit – Indian Rupee (INR)

INR1.00 = USD0.013

USD1.00 = INR74.9

Borrower's Fiscal year

April 1 – March 31

Abbreviations

ADB	Asian Development Bank
AERC	Assam Electricity Regulatory Commission
AIIB	Asian Infrastructure Investment Bank
APDCL	Assam Power Distribution Company Limited
ARR	Aggregate Revenue Requirement
AT&C	Aggregate Technical and Commercial losses
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EOCC	Economic Opportunity Cost of Capital
ES	Environmental and Social
ESMP	Environmental and Social Management Plan
ESMPF	Environmental and Social Management Planning Framework
ESP	Environmental and Social Policy
ESS	Environmental and Social Standards
FIRR	Financial Internal Rate of Return
FM	Financial Management
GDP	Gross Domestic Product
GoA	Government of Assam
Gol	Government of India
GRM	Grievance Redress Mechanism
HVDS	High Voltage Distribution System
IFR	Interim Financial Report
IOCT	International Open Competitive Tendering
KV	Kilo-Volts
MDB	Multilateral Development Bank
NCT	National Competitive Tendering
O&M	Operation & Maintenance
PDS	Project Delivery Strategy
PIU	Project Implementation Unit
PMC	Project Management Consultancy
PPM	Project-affected Peoples Mechanism
RPF	Resettlement Planning Framework
ToR	Terms of Reference
TPDF	Tribal People Development Framework
WTP	willingness to pay

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1. Summary Sheet

Republic of India

Assam Electricity Distribution System Enhancement and Loss Reduction Project

Project No.	000315
Borrower	Republic of India
Project Implementation Entity	Assam Power Distribution Company Limited
Sector/ Subsector	Energy / Electricity Transmission and Distribution
Project Objective	To improve the reliability, capacity and security of power distribution system in Assam
Project Description	The project aims to augment Assam's electricity distribution system, comprising networks at 33Kilo-Volts (KV) level and below, by a) constructing new 33/11KV substations at important load centers, b) laying of new 33KV and 11KV overhead distribution lines, c) installation of new High Voltage Distribution System (HVDS) at select locations to improve reliability and to reduce the distribution losses, and d) introducing smart meters at consumer end.
Implementation Period	Start Date: February 1, 2022 End Date: December 31, 2027
Expected Loan Closing Date	April 2028
Cost and Financing Plan	Project Cost: USD 482 million <u>Financing Plan</u> Government of Assam: USD 96 million AIIB Loan: USD 386 million
Size and Terms of AIIB Loan	USD 386 million, at the Bank's standard interest rate for sovereign-backed loans (terms to be determined at negotiations)
Cofinancing (Size and Terms)	None
Environmental and Social Category	B
Risk (Low/Medium/High)	Medium
Conditions for Effectiveness	Receipt of legal opinion on the Loan Agreement and the Project Agreement.
Key Covenants	The borrower shall ensure that the implementation of all project activities complies with AIIB's Environmental and Social Policy and Standards, Policy on Prohibited Practices, and Procurement Policy and its associated Interim Operational Directives on Procurement Instructions for Recipients

	<p>The Project Implementing Entity to:</p> <ul style="list-style-type: none"> - Submit quarterly project progress reports to AIIB within 45 days from the end of reporting period - Submit semi-annual Environmental and Social management progress reports to AIIB within 45 days from the end of reporting period - Submit quarterly Interim Financial Report (unaudited) within 45 days from the end of reporting period - Submit audited annual project financial statements and audited annual entity financial statements to AIIB within nine months and twelve months, respectively, from the end of each fiscal year
Retroactive Financing (Loan % and dates)	Up to 20 percent of the loan amount for the eligible expenditures incurred and paid for not earlier than 12 months before the signing date of the loan agreement.
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that AIIB is in compliance with the policies applicable to the Project.
Project Approval (Board/President)	Board of Directors

President	Jin Liqun
Vice President	Urjit Patel
Director General	Rajat Misra
Project Team Leader	Hari Bhaskar, Principal Investment Operations Specialist
Team Members	<p>Abhishake Vijay, Economist Consultant Aditi Khosla, Counsel Dasarathi Mandayam, Technical Specialist Consultant Georgi Dzhartov, Social Development Specialist Mengmeng He, Finance Associate Jurminla Jurminla, Senior Procurement Specialist Pedro Farraz, Environment Specialist Yogesh Malla, Financial Management Specialist</p>

2. Project Description

A. Project Overview

1. **Project Objective.** The objective of the project is to improve the reliability, capacity and security of power distribution system in Assam.

2. **Project Description.** Building on the 24x7 Power for All program¹, the Assam Power Distribution Company Limited (APDCL) has been undertaking several projects to expand and upgrade its distribution grid including adoption of fully automated management systems. These initiatives have resulted in a rapid expansion of electricity consumers in Assam from 4.2 million in March 2018 to around 6.4 million in March 2021 leading to congestion of the already congested electricity network and increase in transmission and distribution losses. The project aims to decongest the electricity distribution network and to reduce the distribution losses by undertaking several new initiatives including construction of new 33/11KV substations with the associated 33KV and 11KV distribution lines, construction of HVDS and installation of smart meters. These interventions will help in Assam's efforts to enhance the quality and reliability of the power supply while bringing it closer to its goal of ensuring long-term sustainability of power supply. While the new substations will reduce network congestion, reduce technical losses and improve the reliability of power supply, the HVDS and smart meters will result in the reduction of technical and commercial losses. A similar project, financed by AIIB, is also being carried out by the transmission utility to decongest the transmission network. Together, these projects will help improve the reliability, capacity and security of the power supply system in Assam, and improve the energy efficiency by reducing the losses.

3. **Expected Results.** The project is expected to result in improvement of the distribution network by reducing distribution losses, voltage fluctuations and power failure rates. The Results Monitoring Framework is presented in Annex 1. The key results will be measured and monitored using the following key indicators :

- (i) Primary energy consumption saved (measured in Giga Watt hours or GWh);
- (ii) Greenhouse gas emissions reduction (tons of CO₂ equivalent per year);
- (iii) Reduction in distribution losses (%); and
- (iv) Additional capacity added to the distribution system (measured in Mega Volt-Ampere or MVA).

4. **Intermediate Indicators.** A set of intermediate indicators (outputs) have been designed, and their progress will be measured to ensure that the project is on track to meet the above results indicators. The planned intermediate indicators are:

- (i) Number of 33/11KV substations constructed;
- (ii) 33KV distribution lines constructed in Kilometers;

¹ 24x7 Power for all is a Government of India initiative, in partnership with states, to ensure round the clock electricity supply to the consumers,

- (iii) 11KV distribution lines constructed in Kilometers; and
- (iv) Number of smart meters installed at consumer end.

5. **Expected Beneficiaries.** The direct beneficiaries of the project are the existing and new energy consumers, both commercial (33KV and 11KV consumers) and residential (low voltage consumers), through increased availability of reliable power supply. The project is expected to benefit around 1 million people with 48% of them being women. A large part of the proposed investments is targeted towards improving power supply to rural areas thus providing opportunities to increase the household income and standards of living in some of the poorer communities in Assam.

B. Rationale

6. **Strategic fit for AIIB.** The project is well aligned with AIIB's Energy Sector Strategy: Sustainable Energy for Asia that focuses, among other things, on i) promoting energy access and security; ii) improving the reliability of electricity supply; and iii) loss reduction and utility-driven energy efficiency programs. Energy efficiency improvements that are expected to reduce the greenhouse gas emissions and the use of smart meters resonate with the 'Green Infrastructure' and 'Technology-enabled Infrastructure' themes of the Corporate Strategy, respectively.

7. **Value addition by AIIB.** The value additions resulting from AIIB's involvement in the project are:

- (i) Ensuring implementation of international Environmental and Social (ES) management practices in dealing with the environmental and social impacts. Implementation of these practices and interaction with AIIB's ES specialists helps build the ES management capacity of the Project Implementing Entity. For example, considering the diversity of Assam, AIIB's involvement ensures that special emphasis is placed on the impact of the project on bio-diversity and the indigenous people, and the corresponding mitigation measures required while preparing the ES documents;
- (ii) Enhancing the quality of the project preparation and implementation by following international good practices, and ensuring cost effectiveness and sustainability of investments (especially by including climate resilience aspects in the project design); and
- (iii) Ensuring financial viability of the project. Projects in the electricity distribution sector do not attract private sector investments and so, public financing is vital to get such projects off the ground.

8. **Value addition to AIIB.** The Government of India (GoI) has ambitious plans a) to provide reliable and affordable power for all its citizens, and b) to roll out similar programs across the country to reduce the distribution losses and to improve the performance of the electricity distribution companies. This is expected to result in many such distribution system strengthening projects across India. AIIB's engagement in this stand-alone project will help to replicate a similar approach when such opportunities arise in future and to further develop our understanding of the power sector in India. Further, such distribution modernization programs are being planned in

other member countries in South Asia region and our participation in this project will enable us to learn key lessons that can be replicated in such future programs.

9. **Lessons learned from previous projects.** Key lessons learned from similar projects prepared and implemented by us and other development partners are

- (i) the need to engage professional external support for the Project Implementing Entity, in the form of Project Management Consultants (PMC), from early stages of the project to assist in day-to-day project management to adhere to the timelines, costs and reporting requirements. Engagement of such a PMC firm early on helps with professional support to the Project Implementing Entity in day-to-day management of the project and in identifying delays and issues, if any, in advance thereby providing sufficient time to the stakeholders to resolve the issues.
- (ii) the ability to monitor the project's implementation seamlessly from remote as these projects are normally spread over a vast geographical area. The prevailing travel restrictions on account of the pandemic have reduced the opportunities for on site implementation monitoring and so, such a web based monitoring system will help in keeping track of the project's progress from remote.
- (iii) to ensure regular flow of funds from the Government of Assam (GoA) to APDCL to sustain the pace of implementation of the project.

10. APDCL has already appointed a PMC for this project. The PMC will develop a web-based project monitoring system that will help in monitoring the implementation progress from the headquarters of both APDCL and AIIB. To facilitate regular flow of funds from GoA to APDCL, suitable covenants will be included in the legal agreements.

C. Components

11. The project will have the following components:

- (i) Component 1: Construction of approximately 196 nos. of 33/11KV substations with the associated 33KV and 11KV distribution lines;
- (ii) Component 2: Construction of HVDS at around 2,000 locations to replace the existing low voltage network;
- (iii) Component 3: Installation of approximately 185,000 smart meters for domestic consumers; and
- (iv) Component 4: Technical assistance including a) engaging Project Management Consultants to support project implementation, and b) implementing measures such as trainings, workshops and procurement of new testing tools to improve the capacity of APDCL.

D. Cost and Financing Plan

12. The total project cost is approximately USD 482 million with a request from Gol to AIIB for a financial assistance of USD 386 million (80% of the project cost). The indicative cost and financing plan are as shown in Table 1:

Table 1: Indicative Cost and Financing (USD millions)

Item	Cost	Financing			
		AIIB		Govt. of Assam	
		Amount	Share	Amount	Share
<u>Component 1</u> Construction of 33/11KV substations and the associated 33KV and 11KV distribution lines	329	263	80%	66	20%
<u>Component 2</u> Construction of HVDS	105	84	80%	21	20%
<u>Component 3</u> Installation of smart meters	44	35	80%	9	20%
<u>Component 4</u> Technical Assistance including hiring of Project Management Consultants and other capacity building measures	4	4	100%	-	-
Total	482	386	80%	96	20%

E. Implementation Arrangements

13. **Implementation period.** The project is expected to be implemented from February 1, 2022 to December 31, 2027.

14. **Implementation Management.** APDCL is responsible for construction, operation and maintenance of the electricity distribution network in Assam and is responsible for the implementation of the project. APDCL currently operates and maintains around 427 nos. 33KV/11KV substations, around 350,000 circuit-kilometer of distribution lines from 33KV to low voltage, and about 90,000 distribution transformers. APDCL is led by its Managing Director and has experience working with Multilateral Development Banks (MDB) such as the Asian Development Bank (ADB). APDCL has recently completed two projects financed by ADB.

15. **Project Implementation Unit:** APDCL has established a Project Implementation Unit (PIU) at its headquarters to carry out the day to day activities related to the preparation and implementation of the project. This PIU is headed by a project director, and is responsible for all the aspects of project preparation and implementation including procurement, financial

management (FM), ES safeguards compliance and liaison with AIIB. The PIU consists of staff members from various units, including technical, procurement, ES and FM. APDCL had operated similar PIUs in the past for ADB financed projects and is, therefore, familiar with such a set up. The district offices of APDCL around Assam will support the PIU in day to day implementation support on the ground. In addition, APDCL has appointed a PMC for professional assistance in project implementation.

16. **Procurement.** Procurement activities for the project will be conducted in accordance with the provision of AIIB's Procurement Policy, January 2016, and Section II of Interim Operational Directives: Procurement Instructions for Recipients (PIR), June 2016. The procurement of works, and goods will follow International Open Competitive Tender (IOCT) and National Competitive Tender (NCT) processes as set out in paragraphs 10.1 and 10.4 of the Bank's PIR, respectively, using an electronic procurement platform acceptable to AIIB. The contracts will be Design, Supply and Installation (DSI) contracts in which the contractor will be fully responsible for delivering the scope of works on a turn-key basis. IOCT is the default procurement method for any contracts estimated to cost USD 40 million and above for civil works and USD 3 million and above for goods. The procurement and contracting strategies along with the detailed procurement arrangements are agreed in the Project Delivery Strategy (PDS).

17. **Financial Management.** APDCL will be responsible for the overall project financial management. The PIU shall be staffed with qualified finance/accounts personnel, responsible for maintaining acceptable levels of project financial management and shall prepare the annual project budget based on procurement plan and activity schedule.

18. The internal control process and procedures of APDCL shall be applied for the project. The internal audit unit of APDCL shall conduct internal audit of the project on semi-annual basis and share the report with AIIB. The PIU will maintain a separate project account along with all supporting documents. The financial progress of the project will be reported on a quarterly basis through Interim Financial Reports (IFRs) within 45 days from the end of each fiscal quarter. The project financial statements shall be audited by an independent chartered accountant firm appointed by the Comptroller and Auditor General based on ToR as agreed with AIIB. The external audit reports including the management letter for each year of project implementation will be submitted as follows: (i) the project audit report within 9 months from the fiscal year-end, and (ii) APDCL entity audit report within 1 month from the date of audit report but no later than 1 year from end of the fiscal year.

19. The Government of Assam will pre-finance the project expenditures and release funds periodically to APDCL. Based on the statement of expenditures, AIIB will make reimbursements to the Government of Assam's treasury for eligible expenditures under its financing. A Disbursement and Financial Information Letter will detail out the authorized signatories, process of submitting claims and other terms and conditions of disbursements related to the project.

20. **Monitoring and Evaluation.** The PIU established in APDCL is responsible for monitoring the implementation of the project to ensure that the project is implemented within the agreed scope, cost and time schedule while adhering to the agreed procurement, ES and FM parameters.

The PIU, with support from its district offices and PMC, will prepare various monitoring and evaluation reports, including a) quarterly progress reports that will cover all essential aspects of project implementation, including contract awards, disbursements, physical progress as per defined key performance indicators, key implementation issues and solutions and updated implementation and procurement plans for the next 12 months, b) semiannual ES reports, c) FM reports including quarterly interim financial reports, internal and external audit reports at specified intervals. The PMC will help APDCL conduct supplementary sub project ES assessment for AIIB's review before construction starts. The PMC will also develop or provide a web-based program to monitor project implementation. This web-based program is expected to be useful for monitoring project's implementation progress from remote locations.

21. **AIIB's Implementation Support:** AIIB will conduct implementation support missions (in-person or virtual, depending on the travel restrictions) 2-3 times a year to strengthen the implementation and monitoring process. Where available, the bank plans to use Ultra High Resolution Satellite Imagery, an example of which is shown in Figure 1, to monitor the construction progress. AIIB will also rely on a) the web-based monitoring system² to be developed by the PMC to monitor implementation in real-time, and b) various progress reports from APDCL and PMC to monitor the progress. These measures are expected to help the bank identify implementation issues, if any, in advance so that the corrective actions can be initiated at early stages.

Figure 1



Existing substations 220KV Jakhlabandha and 220KV Shankardevnagar, 30 cm resolution, Image Copyright 2021 DigitalGlobe Inc

² PMC will develop a web-based monitoring system that can be accessed by APDCL's staff at the work site, APDCL headquarters, PMC staff, and AIIB. APDCL's field engineers will update the implementation progress in this system at regular intervals which can then be viewed and reviewed by authorized users from remote locations.

3. Project Assessment

A. Technical

22. **Project Design.** With the Government of India's push to ensure electricity access to all its citizens, Assam's consumer base went up from 4.2 million in 2018 to around 6.4 million in March 2021. This added to the existing congestion in the electricity distribution network in Assam while also leading to an increase in the distribution losses. The technical design of the project has been carried out with an objective to reduce the network congestion and to reduce the distribution losses through various interventions. The design is also based on load forecast done by APDCL to cater to the projected growth in demand. Interventions such as a) constructing new substations close to the load centers and HVDS to reduce the technical losses, and b) installation of smart meters to reduce the commercial losses are considered appropriate. The technology used in the project is quite standard and has been used across India by various distribution companies.

23. **APDCL's Implementation Capacity.** APDCL has designed and implemented similar projects in the past, including those financed by development partners, and has adequate capacity to implement the project. APDCL is incorporating the following additional measures to strengthen its implementation capacity:

- (i) **Appointing a PMC.** The PMC's scope of work includes activities such as project supervision, implementation of the environmental and social management planning framework (ESMPF) and plans, design and engineering services, coordination with contractor(s) and other government agencies and assistance in procurement activities. Having a PMC on board will facilitate early identification and resolution of issues, if any, without much impact on the project's timeline and cost.
- (ii) **Web-based monitoring system.** As the project covers a wide geographic area throughout the state of Assam, the PMC will develop a simple web-based project monitoring system to help track the project's progress during implementation and specially to support the flow of information from a large number of remote locations to APDCL's headquarters. The web-based monitoring system will monitor, among other parameters, the physical, procurement and financial progress of the project. APDCL's staff in its field offices will work together with the PMC to update the physical progress of the project in the web-based monitoring system at regular intervals. AIIB will be closely involved in the development phase of the web-based monitoring system by way of providing relevant technical and process related inputs, and participate in the trial run before the system is operationalized.

24. **Operational Sustainability.** APDCL operates and maintains more than 420 substations (capacity of more than 4,300 MVA) and about 360,000 km of 33KV, 11KV and low voltage distribution lines, and serves about 6.4 million consumers. APDCL has sufficient experience, resources and systems to operate and maintain the assets created under this project. Additional

capacity building measures to improve APDCL’s capacity to construct, operate and maintain its assets in a sustainable manner will be designed and implemented, as required.

25. **Climate-Resilient Design.** The climate related risks are the same as the ones assessed for the transmission sector project in Assam that was prepared by the bank earlier. An assessment on climate related risks has been conducted and the results and recommendations have been incorporated into the project design. According to the ‘Acclimatise Aware’ project-specific climate risk screening, the project is exposed to high overall climate-related risk, with high exposure to risks induced by the increase in precipitation, floods, snow loading, landslides and wind speed increase. Adaptation measures such as designing the distribution towers for maximum wind speed and suitably elevating the foundations of the structures beyond the highest flood level are incorporated into the project design. These adaptation measures will reduce the project’s vulnerability to climate change.

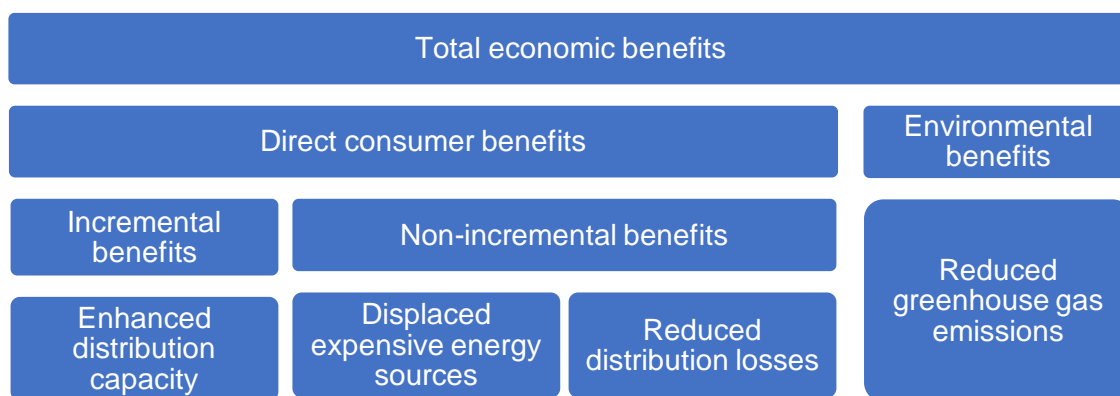
B. Economic and Financial Analysis

26. **Economic Analysis.** An economic cost–benefit analysis was carried out to assess the economic viability of the project on a with- and without-project basis over a project lifetime of 30 years, inclusive of a five-year construction period. Economic costs and benefits were measured in constant September 2021 prices, excluding transfer payments, financing charges and adjustments for market distortions. An economic opportunity cost of capital (EOCC) of nine percent was applied .

27. Without the project, the distribution system will be constrained with higher system losses, resulting in increased cost of supply with pricier substitutes, leaving some existing demand unserved and suppressing future growth. Operation and maintenance (O&M) expenses are expected to increase as the system will require greater repairs and maintenance on account of higher loading.

28. **Economic Benefits.** The economic benefits derived with the project are summarized in Figure 2

Figure 2: Project Economic Benefits



29. The economic benefits shown in Figure 2 above are valued as follows:

- (i) **Increased system capacity (incremental).** Valued at INR 6.59/kWh, i.e., weighted average willingness to pay of residential, industrial and commercial consumers.
- (ii) **Displaced demand (non-incremental).** Valued at INR 6.85/kWh, i.e., the average of unit price of diesel generation of INR 14/kWh and power procured from bilateral traders and power exchange by APDCL for its consumers of INR 3.33/kWh.³
- (iii) **Reduced system loss (resource cost savings).** Valued at the average variable cost of INR 2.25/kWh for Assam Power Generation Company Ltd. power plants, including a margin of INR 0.75/kWh to cover short-term fluctuations on account of tariff under-recovery.⁴
- (iv) **Environmental benefits.** Estimated using the Indian grid emission factor of 820-ton equivalent of CO₂ per gigawatt hour⁵ and priced at USD 40.08/ton of CO₂ equivalent.⁶

30. **Economic Costs.** The project's economic costs include capital investments in land and the distribution system to be supported by the project, including consulting services and physical contingencies but excluding any price contingencies, debt service charges and any other financial charges. Recurrent costs include O&M costs of the distribution system (two percent of total investments) and the cost of power supply (INR 4.06/kWh).

31. **Economic Internal Rate of Return (EIRR).** Based on available data and adopted assumptions, the EIRR for the project in the base case scenario is 19.90 percent, and its net present value at an economic opportunity cost of capital of nine percent is USD336 million. EIRR exceeds the hurdle rate, and the project is considered economically viable.

32. **Sensitivity Analysis.** A sensitivity study was carried out to assess the economic viability of the project investment. It is highly robust and can withstand large variations in five scenarios: (a) 20 percent construction cost overruns; (b) 20 percent increase in O&M costs; (c) 20 percent less incremental benefits; (d) 20 percent less non-incremental benefits; (e) 20 percent less environmental benefits; (f) one year delay in project commissioning; and (g) a worst-case scenario that combines all the above. The detailed results are in Annex 3.

33. **Financial Analysis.** The financial analysis was carried out from the perspective of APDCL. Project costs included investment and O&M costs of the distribution system only, which include taxes, duties and physical contingencies but excluded price contingencies and financing costs. All investment costs were expressed in September 2021 constant prices. Financial benefits included incremental revenue against the capital costs of assets commissioned, additional sales to consumers, and cost savings on account of reduced distribution loss. The analysis assumes that

³ Tariff order for APDCL for FY2022.

⁴ Tariff order for APGCL for FY2022.

⁵ CO₂ Baseline Database for the Indian Power Sector, User guide. December 2019. cea.nic.in

⁶ Social cost of carbon- [Greenhouse Gas Emissions Accounting for ADB Energy Project Economic Analysis: Guidance Note](#)

when the project investments are commissioned and commence operations, the electricity tariff will be: (i) adjusted to a level in line with tariff regulations of the Assam Electricity Regulatory Commission (AERC); and (ii) adjusted on a regular basis following the same guideline. Nominal revenues were deflated to constant price values using expected domestic inflation. Conservative estimates for financial benefits were considered to accommodate any regulatory disallowances and pass-on of benefits to electricity consumers by the regulatory commission.

34. **Financial Internal Rate of Return (FIRR).** Based on the above assumptions, the weighted average cost of capital (WACC) is computed at 2.31 percent, the project investment yields a financial net present value of USD150 million, and the FIRR works out to 5.23 percent (both expressed in post-tax real terms) exceeding the WACC.

35. **Sensitivity Analysis.** The project investment is robust enough to withstand variations in key market and project-specific parameters in these scenarios: (a) 20 percent construction cost overrun, (b) one-year delay in commencement of operations, (c) 20 percent increase in O&M costs and (d) 15 percent decrease in additional sales and tariff revenue. However, the project yielded a negative financial net present value when a combined case with all the above-mentioned adverse events was constructed. The detailed results are in Annex 3.

36. **Financial Assessment of APDCL.** APDCL's tariffs are regulated by AERC. Every year, AERC determines the total revenue to be recovered by APDCL in the subsequent financial year by issuing a tariff order. During this exercise, AERC also trues up the previous years' revenues and costs, compensating APDCL for any under-recovery and adjusting any over-recovery in future tariffs. The aggregate revenue requirement (ARR) is the sum of all costs allowed to determine the tariff for any year. Based on ARR and average cost of supply (ACoS), existing tariffs are revised to match average billing rate with ACoS.

37. **Revenue.** APDCL's Revenue has increased substantially during last five years. Total operating revenue which consists of revenue from tariffs, non-tariff revenue and other income has grown substantially from INR 41 billion in FY2016 to INR 66.2 billion in FY2020 at a compounded annual growth rate of 13 percent. The average billing rate of APDCL has improved overall during this period.

38. **Net Profit.** After reporting marginal losses in FY2016 and FY 2017, APDCL has been posting marginal profits over the last three years. Profit during FY2020 was INR 2 billion which is about three percent of its total revenue.

39. **Cash Balances.** The average year-end closing cash balance (since FY2016) has been INR 24 billion, with INR 30 billion equivalent in cash at the end of FY2020, indicating adequate liquidity.

40. **Long-Term Borrowings.** APDCL has borrowings of INR 6.28 billion from Power Finance Corporation Limited (an Indian financial institution under the ownership of the Ministry of Power, Government of India) and around INR 6 billion from GoA. However, loans from the Power Finance

Corporation for the R-APDRP⁷ scheme, are subject to conversion into grant once APDCL achieves the targets set under the scheme.⁸ During FY2020, outstanding debt liability of INR 11.33 billion towards the state government was converted into grant and equity under central government's UDAY⁹ scheme.

C. Fiduciary and Governance

41. **Procurement.** APDCL has already implemented two projects financed by ADB and therefore, are familiar with the procurement arrangements of MDBs. In line with its project organization for the ADB financed projects, APDCL has already set up a PIU at its headquarters with specialists for various functions including procurement. The PIU will be supported by the district offices at the field level to manage the day to day project operations. In addition, the PMC is on board to support PIU in implementation of this project.

42. The PIU has prepared a PDS detailing procurement arrangements and contracting strategy. The PDS has been prepared considering the PIU's procurement capacity, market conditions, procurement related risks and proposed mitigation measures. As per the PDS, APDCL has proposed turn-key approach of procurement and contracting strategy where a single contractor is made responsible for design, supply, installation and commissioning of the contract package which is different from their conventional practice of sourcing materials and labour contractors separately. This approach provides many advantages over conventional approach as single contractor is responsible for delivering the entire contract package on turn-key basis. In addition, this approach also reduces the administrative burden on APDCL as there are lesser contracts to be managed as compared to the conventional approach. The lessons learnt from implementing the previous projects financed by ADB have been incorporated while sizing the contract packages. The project sites are spread across entire state of Assam and therefore, various factors such as geographical conditions, administrative set-up, volume of works under each administrative set-up, availability of field-level staff, market conditions etc. have been carefully considered while sizing the contract packages which is expected to promote competition.

43. The project will use ADB's design, supply & installation, single stage two-envelope Standard Procurement Document modified to suit AIIB's procurement policy requirements. As per the latest draft project procurement plan, the majority of packages are estimated to cost less than USD 40 million and therefore, tenders will be conducted following NCT using the GoI's e-procurement portal (www.assamtenders.gov.in) with the first NCT package being prior reviewed by the Bank. Where there is a tender package to be included in the project procurement plan with a value in excess of USD 40 million for works or USD 3 million for goods the tender will be conducted in accordance IOCT and all packages will be subject to prior review by the Bank. This

⁷ R-APDRP stands for 'Restructured Accelerated Power Development and Reforms Program'. This program was launched in 2008 with the main focus being reduction of aggregate technical and commercial losses in the power sector in urban areas.

⁸ Loan towards Part-A projects of R-APDRP scheme are subject to conversion into grant on establishment of the required system after verification. 90% of loan towards Part-B projects of R-APDRP scheme are subject to conversion into grant equally over 5 years on achievement of target losses in the project area.

As on March 31, 2020, 22% of R-APDRP pertains to Part-A projects and rest pertains to Part-B APDRP projects.

⁹ Ujwal Discom Assurance Yojana ([UDAY](http://www.ujwal.gov.in)), launched by the Government of India, is a financial turnaround and revival package for the electricity distribution companies.

e-procurement portal is widely used by the government agencies as well as by the projects funded by MDBs, and is expected to enhance transparency in tendering process. Tenders for 15 packages of civil works (constituting about 35% of the project cost) are concluded and are ready for contract award. The contract for PMC has been awarded and the PMC is already on board. Considering the procurement arrangements as defined in the PDS, the overall procurement risk is rated as medium. AIIB has reviewed the draft PDS along with the procurement plan and agrees with APDCL's procurement risk rating and mitigation measures.

44. **Financial Management.** The FM capacity of APDCL was assessed focusing on institutional capacity, staffing, planning/budgeting, funds flow, accounting, internal controls, reporting and audit arrangements. APDCL has prior experience in implementing projects funded by MDBs and is familiar with MDBs' financial management requirements. Based on the assessment, FM capacity is considered adequate and FM risk as High.

45. **Staffing.** APDCL has finance staff experienced in implementing projects funded by MDBs. APDCL provides staff to PIU with required skills to carry out the project financial management. Once assigned for the project, staff transfer is minimal. Additional FM support shall be provided through PMC support to PIU. The staff deputed to this project will be provided specific training, if required, related to AIIB FM, reporting and disbursements.

46. **Planning and Budgeting.** The project follows APDCL's planning and budgeting procedures. PIU will prepare an annual budget, based on the procurement plan and activity schedule, which will be reviewed and approved by APDCL. The project budget will then be submitted to the Government of Assam (GoA) for inclusion in the annual State budget, under a separate budget line.

47. **Funds Flow.** The project follows the GoA's treasury system for funds flow from the GoA to APDCL. As per existing practice, the State Finance Department releases both central share & state share on yearly basis (in March) after submission of the utilization certificate. The funds released shall be deposited in the separate account maintained for the project. The releases are in the nature of Grant-in-Aid and accounted as Capital Reserve. APDCL makes payments for eligible expenditures incurred electronically to the bank accounts of the payees as per payment system being followed by APDCL. The unused fund of the project at the end of the fiscal year is carried over to the next fiscal year. This practice of year end fund release may result in-year liquidity issue for APDCL. Hence, it is recommended to release funds on quarterly basis to APDCL as per forecast. Subsequently, APDCL shall release funds to PIU on quarterly basis.

48. **Accounting, Financial Reporting and Internal Controls.** APDCL follows accrual basis of accounting and has its own chart of accounts for accounting classification. The chart of accounts can be modified to accommodate project requirements. It uses SAP accounting software for the entity level accounting and reporting. It has been using Tally Accounting software for externally aided projects. The project financial statements shall be prepared on accrual basis. PIU will maintain a separate project account including loan register and use SAP Accounting software. PIU will prepare IFRs on a quarterly basis for submission to AIIB within 45 days from the end of

each fiscal quarter. The format and the content of IFRs will be agreed by the start of the project implementation.

49. The auditors have reported internal control weaknesses for the last two fiscal years. The key internal control weaknesses identified by the auditors are: non-reconciliation of physical and accounting records of fixed asset and inventory; no adjustment of differences in fixed assets and inventory identified by third party based on physical verification; no control measures to safeguard assets from loss, damage or misappropriation, non-reconciliations of significant accounts; no adequate preventive or detective controls over recording of transactions; and unreconciled General Ledger balances. Considering the material weaknesses in the internal controls, the auditors have issued adverse opinion on the internal control framework in FY2019-20.

50. APDCL has an internal audit unit headed by their Chief General Manager (Finance and Accounting). The unit has two chartered accountants and dedicated team of staff with 10 to 20 years of experience. Internal audit is carried out at the entity level, and head office including field offices are covered within one to three years' timeframe. The internal audit report is submitted to APDCL's Managing Director and if required, to its Audit Committee. Considering the internal control weaknesses as identified by the auditors and the risk involved, the internal audit shall be carried out by APDCL's internal audit unit for this project on periodic basis (semi-annual). The project internal audit report shall be shared with AIIB within the agreed timeframe. A Terms of Reference (ToR) shall be prepared by APDCL with concurrence of AIIB detailing nature of engagement, reporting structure and timeline.

51. APDCL is being audited by independent Chartered Accountant firms appointed by the Comptroller and Auditor General of India in accordance with the standards on auditing issued by the Auditing and Assurance Standards Board under the Council of Institute of Chartered Accountants of India. For the last two fiscal years, the external auditors have issued disclaimer of audit opinions. The main reasons for disclaimer of audit opinions related to material non-reconciliation in fixed assets, inventories, cash/bank, liabilities, provisions etc., wrong accounting of grant, income and expenses, non-adjustment of identified items, and not accounting of expenses.

52. In FY2020-21, APDCL has initiated some corrective actions to improve overall fiduciary environment such as maintenance of books of accounts in SAP Accounting software, physical verification of fixed assets conducted by Ernst & Young and submission of draft report to APDCL, physical verification of inventories, reconciliation of unreconciled cash/bank balances in inter unit accounts, identification and conversion of capital work in progress to respective asset class etc. These corrective measures are likely to help in reducing internal control weaknesses and enhance credibility, reliability & transparency of the financial statements.

53. APDCL shall appoint the existing external auditor to conduct audit of the project financial statements including Statement of Expenditures in accordance with the standards on auditing issued by the Institute of Chartered Accountants of India. APDCL will prepare ToR to comply with the AIIB's audit requirements and seek concurrence of AIIB before appointment of the auditor. The external auditor will review the internal control system of the project; report on weaknesses,

non-compliance of the financial procedures and financing agreement, accounting issues, ineligible expenses and implementation status of prior year audit recommendations; and suggest rectifications and improvement. The project audited financial statements including management letter will be submitted to AIIB within nine months of the end of each fiscal year. APDCL will submit the entity audited financial statements including management letter to AIIB within one month from the date of audit report but no later than one year from end of the fiscal year.

54. **Governance and Anti-corruption.** AIIB's Policy on Prohibited Practices (2016) will apply to the project. AIIB will regularly monitor implementation. AIIB reserves the right to investigate—directly or indirectly through its agents—any alleged corrupt, fraudulent, collusive or coercive practices relating to the project and to take necessary measures to prevent and redress any issues in a timely manner, as appropriate.

D. Environmental and Social

55. **Environmental and Social Policy and Categorization.** The Environmental and Social Categorization of the project is B, due to the moderate nature and scale of project activities. This categorization is based on the following considerations: (i) environmental and social impacts are localized, expected to be temporary and reversible in nature; (ii) environmental, social, and health and safety risks can be managed through good international practice; and (iii) APDCL has demonstrated experience working on similar projects, including those funded by other Multilateral Development Banks. AIIB's Environmental and Social Policy (ESP 2019), including the Environment and Social Standards (ESSs) and the Environmental and Social Exclusion List will apply to this project. Although social impacts are anticipated to be minimal or unlikely, all sub-projects will be screened for social impacts including those related to land acquisition, involuntary resettlement and on Indigenous Peoples. If any impacts are identified, appropriate mitigation measures will be prepared in accordance with the provisions of ESS 2 (Involuntary Resettlement) and ESS 3 (Indigenous Peoples).

56. The project is using a framework approach through the preparation of an Environmental and Social Management Planning Framework (ESMPF), because the site-specific characteristics of the activities to be financed under the project are not fully known and/or will be implemented in a phased approach. The ESMPF has been prepared with detailed criteria and guidance for the development of site-specific Environmental and Social Impact Assessments (ESIAs) / Environmental and Social Management Plans (ESMPs) for project activities. Though economic or physical displacement of people or impacts to Scheduled Tribes¹⁰ are not anticipated, a Resettlement Planning Framework (RPF) and a Tribal People Development Framework (TPDF) have been developed in the event that ESIA screening of sub-projects indicates any impacts on these populations. Both these instruments contain guidelines and procedures for the preparation of site-specific Resettlement Plans (RPs) and Tribal Development Plans (TDPs) if needed. The

¹⁰ Scheduled Tribes are one of the officially designated groups of historically disadvantaged Indigenous Peoples. The term Scheduled Tribe is recognized in the Constitution of India

ESMPF, RPF and TPDF are disclosed on the websites of AIIB¹¹ and APDCL¹², along with the corresponding summary in Assamese.

57. The management, mitigation, and monitoring measures to address site-specific risks and impacts will be detailed in the ESMPs, in accordance with the criteria and the procedures detailed in the ESMPF. The ESMPs will include provisions related to occupational health and safety, plans for biodiversity protection, air and water pollution control, construction waste management, noise control, labor influx, mitigation of Gender-based violence risks, sexual exploitation and harassment (GBV/SEAH) and the management of workers' accommodation and construction sites. Archaeological chance finds procedures will also be applicable to all construction activities. The ESMPs will set out the institutional arrangements, timelines, and corresponding budgets for these activities, including capacity building. The implementing agency will be required to ensure that the ESMPs and the Code of Conduct for workers are incorporated into the construction contracts and subcontracts.

58. **Environmental Aspects.** New 33/11kV substations, related lines and facilities will be sited to avoid any environmentally sensitive and protected areas. The proposed civil works and construction activities are expected to generate some adverse impacts related to dust and noise, construction waste, health and labor safety issues, and disruption to local traffic as well as to local businesses and residents. These are expected to be of limited duration, influence and localized, during the construction phase. These environmental impacts will be mitigated by the ESMPs for sub-projects which will be prepared in accordance with the criteria detailed in the ESMPF and through appropriate implementation management during construction.

59. **Environmental and Social Capacity and Resources.** APDCL has an established collaboration with ADB on environmental and social capacity building. As a result, it benefits from funding to strengthen its capacity and enhance its corporate resources on environmental and social aspects.

60. **Climate Change Risks and Opportunities.** The project will take into consideration the climate change effects of an anticipated continuous increase in heavy precipitation events as described in para 25. Adaptation measures incorporated into the design include (a) use of special foundation designs for towers located close to rivers or with landslide risks, (b) drainage system strengthening at substations, (c) landfilling of greenfield land used for new substation construction and (d) earthquake-resistant designs. The climate change mitigatory measures incorporated in the project include construction of HVDS that is expected to result in reduction of technical losses, and introduction of smart meters that is expected to result in increased billing and revenue collection efficiency (and reduced revenue collection losses, as a result). Thus, in addition to meeting electricity supply capacity requirements and improving the reliability in the system, the investments will also help avoid greenhouse gas emissions by 344 kilo tons of CO₂. Based on the joint MDB methodologies for climate finance tracking, USD 8.2 million (2.2 percent) of AIIB's

¹¹ <https://www.aiib.org/en/projects/details/2019/proposed/India-Assam-Distribution-System-Enhancement.html>

¹² <https://www.apdcl.org/website/Aiib>

financing will be considered as climate adaptation finance and USD 149 million (38.6 percent) will be considered as climate mitigation finance.

61. **Social Aspects.** The design of substations and distribution lines aims to minimize adverse social impacts, such as permanent/temporary land acquisition, adverse impacts on agriculture and/or livelihoods, and other social impacts associated construction activities. Given that most of the proposed substations, distribution lines and HVDSs have already been identified and will be sited on Government or APDCL's own land, the acquisition of land is expected to be minimal. However, as part of the ESIA/ESMP preparation, all activities will be screened for impacts related to land acquisition and involuntary resettlement. In the event a site-specific ESIA/ESMP determines that permanent or temporary land acquisition, restriction of access, or economic displacement of people are found to be unavoidable, these will be minimized, and mitigation measures prepared in accordance with the provisions of the RPF.

62. **Community and Occupational Health and Safety, Labor and Employment Conditions.** The ESMPF has identified likely social impacts and risks associated with community and occupational health and safety, GBV/SEAH, COVID-19 transmission, and labor issues. These will be mitigated and managed in accordance with the provisions of the ESMPs, including the workers' Code of conduct and associated measures that will be included in the relevant procurement documents. The contractors shall prepare a COVID-19 response and management plan in line with World Health Organization and Government of India guidelines, taking into consideration COVID-19 health and safety requirements at the time of mobilization.

63. **Stakeholder Engagement, Consultation and Information Disclosure.** Consultations on the draft ESMPF were concluded in January 2020 as per AIIB's requirements. Stakeholder engagement, consultation and information disclosure will continue during project implementation, for the site-specific ESMPs, taking into account national restrictions related to COVID-19. The English versions of the ESMPF and Assamese executive summary have been disclosed online, with hard copies made available in the project area.

64. **Project-level Grievance Redress Mechanism.** A multi-tier Grievance Redress Mechanism (GRM) will be developed in accordance with the requirements of AIIB's ESP. Locally appropriate public consultation and disclosure process will be used to disseminate information about the GRM. Communities and individuals who believe that they are adversely affected by the project will be able to submit complaints to the project-level GRM for their resolution. In addition to the above GRM for addressing complaints from the local community, commensurate mechanism will be made available at the contractor level for worker related grievances.

65. **Project-affected People's Mechanism.** AIIB's Policy on the Project-affected Peoples Mechanism (PPM) applies to this Project. The PPM has been established by AIIB to provide an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by AIIB's failure to implement the ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of AIIB's Management. Information on AIIB's PPM is available at:

<https://www.aiib.org/en/policies-strategies/operational-policies/policyon-the-project-affected-mechanism.html> .

E. Risks and Mitigation Measures

66. Based on a preliminary assessment, AIIB has assigned an overall 'Medium' risk rating to the project. The possible risks and the mitigation measures are listed in Table 2.

Table 2 Summary of Risks and Mitigating Measures

Risk Description	Assessment Ratings (High, Medium, Low)	Mitigation Measures
Implementation Delays. Delays in project implementation due to delays in acquiring land for the substations	Low	i) Most of the substations are expected to be constructed in the land owned by the government departments that have a set process of transferring land ownership to APDCL.
Implementation delays. Delays due to institutional capacity of APDCL	Medium	i) A separate PIU has been created in APDCL to focus exclusively on implementation of this project. This PIU will be supported by the district offices for on field monitoring and implementation. ii) An experienced PMC firm has been hired to supplement APDCL's capacity in monitoring and implementation. iii) APDCL has experience implementing similar projects financed by ADB.
Procurement. Transparency in procurement process	Low	The tendering is done using the e-procurement platform that has been assessed as satisfactory by the MDBs.
Procurement. Increase in costs of equipment (switchgear, cables etc) due to increase in commodity prices	Medium	i) Tenders for almost 35% of the project cost have been received, evaluated and the contracts are ready to be awarded. These tender packages are within the estimated cost. ii) Contingencies have been provided for in the project cost.
ES implementation. Knowledge and capacity of APDCL staff to	Medium	i) PMC has ES specialists to monitor the implementation of ES plans. APDCL's ES staff will build their capacity by working with the PMC. ii) AIIB will periodically monitor the implementation of ES plans.

implement the ES plans.		
FM Delay in release of funds by the Government of Assam to APDCL for the project implementation.	Medium	<ul style="list-style-type: none"> i) Though the Government of Assam has assured timely release of funds, AIIB will monitor the annual budget provisions and release of funds. ii) Suitable covenants will be introduced in the legal agreements. iii) PMC will help APDCL monitor utilization of funds and work with APDCL to ensure timely coordination & follow-up with the finance department of the Government of Assam.
FM Internal control weaknesses flagged by the auditors during the previous years' audits	High	<ul style="list-style-type: none"> i) APDCL has taken quite a few measures as described in the FM assessment section to mitigate the impact of this risk. ii) As required by AIIB, APDCL will conduct a) semi-annual internal audit of project activities, and b) annual audit, by external auditors, of the project accounts. The TORs for these audits will be mutually agreed between AIIB and APDCL. iii) The requirement of such audits will be added as covenants to the legal agreements between the bank, borrower and the implementing agency. iv) The FM specialist in PMC will help monitor the audit requirements. AIIB too will monitor the implementation of these requirements periodically.

Annex 1: Results Framework and Monitoring

Project Objective	To improve the reliability, capacity and security of power distribution system in Assam									
Indicator Name	Unit	Baseline 2020-21	Cumulative Target Values					End Target	Frequency	Responsibility
			2022	2023	2024	2025	2026			
Project Objective Indicators										
Additional capacity added to the distribution system	MVA	-	-	-	450	1,020	1,765	1,765	Annual	APDCL
Primary energy consumption saved	GWh	-	-	-	105	240	441	441	Annual	APDCL
Reduction in distribution losses in the Network	%	20.13	20.13	20.13	19.03	17.05	15.35	15.35	Annual	APDCL
Greenhouse gas emissions reduction	KtCO ₂	-	-	-	85	210	344	344	Annual	APDCL
Improvement in LT: HT Ratio of the distribution network	Ratio	2.94: 1	2.94:1	2.94:1	2.88: 1	2.83: 1	2.78: 1	2.78: 1	Annual	APDCL
Intermediate Results Indicators										
New 33/11 KV Sub-stations constructed	No.	-	-	-	48	110	196	196	Annual	APDCL
New 33 KV lines constructed	Km	-	-	-	250	1,200	2,500	2,500	Annual	APDCL
New 11 KV lines constructed	Km	-	-	-	520	2,100	5,500	5,500	Annual	APDCL
Smart meters installed at consumer end	No.	-	-	15,000	80,000	170,000	185,000	185,000	Annual	APDCL
Smart meters installed at distribution transformers	No.	-	-	4,000	18,000	38,000	40,000	40,000	Annual	APDCL

Annex 2: Detailed Project Description

1. The growth in electricity demand in India is expected to keep pace with its economic growth. The Indian economy is expected to recover strongly from the current pandemic growing by over 8.5 percent in FY2021 and averaging 7.5 percent over the next few years (according to the data from the World Economic Outlook Database of the International Monetary Fund) which is expected to result in increasing electricity demand too.

2. The push by Gol in the last decade, through its 24x7 Power for all program, to ensure supply of round the clock electricity to the consumers has resulted in addition of millions of consumers across the states. Assam's consumer base increased from 4.2 million in March 2018 to 6.4 million in March 2021, a fifty percent increase. An unintended effect of this increase in consumer base is the congestion of the already congested electricity grid network with a potential to affect the quality of the power supply. Also, the distribution losses that were in a downward trajectory from 2012 to 2018 started rising again due to many factors with the increase in number of low voltage consumers being one of them. With electricity access targets largely achieved, the focus now is to improve the quality and reliability of power supply, and to bring in efficiency gains by reducing technical and commercial losses.

3. In order to strengthen the distribution network and to address various improvements such as a) de-congestion of the electricity network, b) reduction of the losses through introducing pre-paid smart meters, increasing the high voltage : low voltage lines ratio and other measures, and c) increasing the transformation capacity to cater to the growth in electricity demand, APDCL conceived the 'Assam Electricity Distribution System Enhancement and Loss Reduction Project' and proposed the project for AIIB's financing. The project will focus on the improvement actions stated above by

- a. Constructing new 33/11KV substations and the associated 33KV and 11KV lines to reduce network congestion;
- b. Constructing new HVDS to increase the high voltage to low voltage lines ratio – to decrease the technical losses; and
- c. Install pre-paid smart meters that is expected to improve the billing and collection efficiency of APDCL thereby reducing the commercial losses.

4. Assam Electricity Grid Corporation Limited, the transmission utility, has recently embarked on a similar project to strengthen (and de-congest) its transmission network and to reduce the losses with financial support from AIIB (approved by AIIB's board in January 2021). Both the transmission and the distribution system improvement projects are expected to strengthen the respective networks, reduce technical and commercial losses, increase the networks' transformation capacity and prepare the utilities to face the projected growth in demand. The focus of Gol to improve the quality and reliability of power supply, and to reduce the technical and commercial losses is expected to result in many such transmission and distribution network

improvement projects across the country. Successful implementation of this project can potentially open the doors for similar future opportunities in India.

5. The project will have the following components:

- a. Component 1: Construction of approximately 196 nos. of 33/11KV substations with the associated 33KV and 11KV distribution lines.
 - i. Under this component, 33/11KV substations (mostly outdoor substations) will be constructed in many areas across lower, central and upper Assam regions. The locations of these substations are chosen in such a way that they are closer to the load centers. This component will also involve stringing the 33KV and 11KV overhead lines to and from the substations.
- b. Component 2: Construction of HVDS at around 2,000 locations to replace the existing low voltage network.
 - i. The HVDS network will be installed in about 2,000 locations across all the distribution circles (nineteen, in total) in Assam. Installation of these HVDS networks is expected to significantly improve the voltage profile and to reduce the technical losses as many low voltage lines will be replaced with higher voltage lines.
- c. Component 3: Installation of approximately 185,000 smart meters for domestic consumers and around 40,000 smart meters at the distribution transformers end.
 - i. Insufficient billing of the electricity charges to the consumers and the inability to recover all the due payments from the consumers, leading to reduced billing and collection efficiency, respectively, are major contributors to the commercial losses in the electricity distribution sub-sector. The hilly and remote terrains in Assam render manual billing more difficult than in plain terrains. Installation of pre-paid smart meters (to replace conventional meters) at the consumer end will help APDCL ensure that the consumers pay for the electricity used by them and will eliminate manual intervention in billing and collection of payments from the consumers. In addition, these smart meters also will help APDCL to study the consumption pattern and to implement optimal load management.
 - ii. Under other projects, APDCL has already started installation of about 350,000 smart meters at consumer end. Also, installation of about 620,000 smart meters is planned by APDCL in another project in the pipeline. With the installation of about 185,000 smart meters under this project, APDCL plans to ensure that consumers in eight sub-divisions (out of the 158 sub-divisions) are completely covered with smart meters.

iii. After completing the installation of all the smart meters listed in subparagraph ii above, APDCL would have covered about 15% of its consumer base in Assam with smart meters. More projects will be launched to cover the remaining consumers under the proposed Revamped Distribution Sector Scheme announced by Gol's Ministry of Power.

d. Component 4: Technical assistance including a) engaging Project Management Consultants to support project implementation, and b) implementing measures such as trainings, workshops and procurement of new testing tools to improve the capacity of APDCL.

6. APDCL will be responsible for the implementation of this project. APDCL has experience working with MDBs such as ADB. APDCL has recently completed two projects financed by ADB. APDCL is responsible for construction, operation and maintenance of the electricity distribution network in Assam and is responsible for the implementation of the project. APDCL currently operates and maintains around 427 nos. 33KV/11KV substations, around 350,000 circuit-kilometer of distribution lines from 33KV to low voltage, and about 90,000 distribution transformers.

7. To facilitate implementation of the project, APDCL has established a PIU at its headquarters. This PIU is headed by a project director, and is responsible for all the aspects of project preparation and implementation including procurement, FM, ES safeguards compliance and liaison with AIIB. The PIU consists of staff members from various units, including technical, procurement, ES and FM. The district offices of APDCL around Assam will support the PIU in day to day implementation support on the ground. In addition, APDCL has appointed a PMC for professional assistance in project implementation.

Annex 3: Economic and Financial Analysis

1. This annex comprises (i) the economic analysis of the project investments, (ii) the financial analysis of the project investments, and (iii) the financial assessment of APDCL.

A. Economic Analysis

2. **Assumptions.** The analysis was conducted using a "with-project" and "without-project" framework to compare the project's EIRR against an assumed EOCC (the hurdle rate) of nine percent. The program will be executed by APDCL over 2022-2026/27. Economic cost-benefit analysis was carried out using the following assumptions:

- (a) All costs and revenues are expressed in September-2021 constant prices.
- (b) The capital expenditure consists of all incremental expenditures related to the project, including consulting services and physical contingencies but excluding any price contingencies, debt service charges and any other financial charges.
- (c) The operating expenses include all incremental annual expenditures incurred by APDCL related to the project and were considered as two percent of total investments, in line with standard international practices and similar investment projects in Assam. The assumed O&M expenses included any annual software support or license renewal fees.
- (d) The 25-year benefit period is 2027-2051.
- (e) Marginal benefits and O&M expenses are considered during the implementation period for each phase, bearing in mind the project's modular nature.
- (f) No taxes and depreciation are considered for the economic analysis.
- (g) The residual value of the project-financed assets was considered as 10 percent of the capital investment expenditure after 25 years of operations.

3. **Methodology.** To evaluate the project's economic viability, two mutually exclusive and alternative scenarios were hypothesized: without and with the project. To assess the incremental benefits arising from the construction of the proposed project, a plausible alternative "without-project" scenario was hypothesized, where the proposed investments were assumed not to be undertaken. In the "without-project" scenario, O&M expenses were expected to increase as the system would require greater repairs and maintenance because of higher loading of the power systems. However, this incremental cost was excluded from the present analysis for simplicity and conservatism. If these costs were included, the project's economic viability would have been enhanced further.

4. The "with-project" scenario considered all investments to be carried out as planned and that the benefits in the evaluation period materialized as envisaged during project planning. The additional benefits under the with-project scenario compared with the without-project scenario were classified into direct consumer benefits and environmental benefits. Direct consumer benefits were further categorized into incremental and non-incremental benefits.

5. Economic benefits and costs were expressed in constant prices and net economic cashflows were computed. An EIRR of the cashflows was calculated. EIRR was compared with assumed EOCC to assess the project's economic viability. To assess robustness of economic viability, the economic net present value (ENPV) was computed at EOCC and a sensitivity analysis was carried out, where key variables were changed (unfavorably) by reasonable increments. EIRR and ENPV were tabulated for each independent change and also for a combined case (worst-case scenario).

6. **Economic Benefits.** The program's economic benefits were assessed for the forecast period-starting from 2027. Because the project is modular, marginal benefits were considered from the third year onward during implementation. To maintain consistency, proportionate O&M expenses were considered during implementation. Direct consumer benefits included additional electricity demand met from the grid as a direct consequence of the project and resource cost savings on power procurement cost on account of system loss reduction. Direct consumer benefits were categorized as follow:

- (a) **Non-incremental benefits.** The project is expected to meet some of the demand currently being met by alternatives to grid electricity. The benefits were valued at weighted average cost of alternative power sources like diesel generators and open access contracts at INR 6.85/kWh, adjusted for APDCL's procurement rates.
- (b) **Incremental benefits.** The benefits are a result of increased distribution system capacity and improved system reliability, resulting in fewer outages. The additional demand served through the project because of incremental benefits was valued at consumers' willingness to pay (WTP):
 - (1) WTP for domestic consumers of INR5.02/kWh was calculated as the average of domestic tariff (up to 5 kW) of INR5.98/kWh and average WTP computed for lifeline consumers of INR4.05/kWh (at current prices).¹
 - (2) WTP of INR9.76/kWh for industrial consumers was computed as the average rate of power procured from captive plants or independent power producers of INR12/kWh and high-tension industrial electricity tariff of INR7.52/kWh.
 - (3) WTP of INR7.39/kWh for commercial and other consumers was assumed to be the average of the WTP for industrial and residential consumers.

¹ Based on B. Gill, S. Saluja, and D. Palit. 2017. Electricity Pricing and the Willingness to Pay for Electricity in India: Current Understanding and the Way Forward. The Energy and Resources Institute, New Delhi. WTP for Uttar Pradesh. Per capita income is higher for Assam, and hence WTP of domestic consumers in Assam is expected to be higher than the WTP of domestic consumers in Uttar Pradesh. Therefore, these WTP estimates are conservative in nature. The WTP was escalated by yearly inflation to arrive at the 2021 value of INR4.05/kWh.

Average variable cost of Assam Power Generation Company Limited (APGCL) for FY 2022 with a premium of INR 0.75/kWh was considered as cost of additional power procurement for period up to 2026. This premium is the compensation/adjustment for a recent dip in variable tariff of APGCL stations and other market factors. After 2026, average power procurement price (including fixed charges) of INR 4.06/kWh for FY2022 was considered as unit cost of power procurement to serve the additional demand, as APDCL is expected to contract additional power capacity to meet its future demand.

- (c) **Resource cost savings.** Other benefits included resource cost savings from reduced distribution losses. The benefits considered avoided power purchase costs to maintain the same level of electricity sales and were valued at average variable cost of INR 1.50/kWh of thermal power plants of APGCL for FY2022 of (Tariff order for FY2022) plus a premium of INR0.75/kWh.

7. **Environmental Benefits.** The reduced power purchase due to reduced system losses was considered to reduce greenhouse gas emissions. The emissions were valued using an Indian grid emission factor of 820-ton equivalent of CO₂ per gigawatt hour.² They were priced at a conservative rate of \$40.08/tonne of CO₂ equivalent.³

8. **Economic Costs.** The financial costs, including physical contingencies but excluding price contingencies and financial charges during implementation, were converted to economic costs using India's domestic price numeraire. Tradable inputs (goods and services) were adjusted by the shadow exchange rate factor of 1.04,⁴ while unskilled labor was adjusted by a shadow wage rate factor of 0.89 for India.^{5,6} The total financial investment costs were assumed to include 20 percent labor costs (70:30 skilled to unskilled) and traded goods and services would form 70 percent of total goods and services. The cost of land was also considered.

9. The additional cost of generation was factored by considering an average power purchase cost of the state distribution company, APDCL. This cost of INR4.06/kWh included fixed charges and variable costs.⁷ The existing generation or generation planned and under execution is assumed to be sufficient to realize the project benefits, and no additional project-specific generation investments will be required.

² CO2 Baseline Database for the Indian Power Sector, User guide. December 2019. cea.nic.in

³ Social cost of carbon- [Greenhouse Gas Emissions Accounting for ADB Energy Project Economic Analysis: Guidance Note](#)

⁴ Rajasthan Secondary Towns Development Sector Project-economic analysis, Asian Development Bank, September 2020. <https://www.adb.org/sites/default/files/linked-documents/42267-031-ea.pdf>

⁵ Shadow exchange rate factor was estimated based on trade statistics from FY2012–FY2013 to FY2016–FY2017.

Shadow wage rate factor = INR224/day (minimum wage in 2019 for unskilled laborers) / INR252/day (practiced labor wage rate paid by contractors to unskilled laborers). Paycheck.in. Minimum Wage—Tripura. <https://paycheck.in/salary/minimumwages/tripura>

⁶ Rajasthan Secondary Towns Development Sector Project-Economic Analysis, Asian Development Bank, September 2020. <https://www.adb.org/sites/default/files/linked-documents/42267-031-ea.pdf>

⁷ Tariff order for APDCL for FY2022.

10. Annual O&M costs were assumed to be two percent of total investment costs, considering the nature of the project assets and in line with international standards.⁸

11. **Economic Internal Rate of Return.** The economic analysis confirms that the proposed project is economically viable, with an overall EIRR of 19.9 percent against an EOCC or hurdle rate of 9 percent. The ENPV at the EOCC or hurdle rate of 9 percent is estimated at USD336 million, confirming the project's robust economic viability.

Table 3. Economic Internal Rate of Return (USD million)

Year	Economic benefits			Economic costs		Net economic cash flow
	Incremental	Non-incremental	Environmental	Investments	Operating	
2022	-	-	-	24.7	-	(24.7)
2023	-	-	-	87.9	-	(87.9)
2024	11.8	3.2	4.3	88.8	0.4	(69.9)
2025	30.0	10.7	10.6	102.7	1.2	(52.7)
2026	50.9	18.2	14.6	123.2	2.5	(42.1)
2027	34.2	18.0	14.6	-	8.2	58.7
2028	38.8	18.8	14.6	-	8.2	64.0
2029	43.4	19.6	14.6	-	8.2	69.4
2030	50.2	20.8	14.6	-	8.2	77.4
2031	54.8	21.6	14.6	-	8.2	82.8
2032	61.6	22.8	14.6	-	8.2	90.8
2033	68.4	24.0	14.6	-	8.2	98.8
..
2050	75.3	25.2	14.6	-	8.2	106.9
2051	75.3	25.2	14.6	(38.9)	8.2	147.9
					EIRR (real):	19.90%
					ENPV:	336

Source: Asian Infrastructure Investment Bank estimates.

12. The sensitivity analysis (Table 4) demonstrates that the project's expected economic performance is robust.

Table 4. Sensitivity Analysis

S. No.	Sensitivity Parameter	Variation	EIRR	ENPV (USD million)	Switching value
	Base case		19.90%	336	
	Changes				
1	Project capital costs	20%	16.70%	278	120%
2	Operation and maintenance costs	20%	19.60%	326	670%
3	Incremental benefits	-20%	17.40%	252	-82%
4	Non-incremental benefits	-20%	19.00%	305	-

⁸ Assam Power Sector Investment Program-economic analysis for project 2.

5	Environmental benefits	-20%	18.60%	287	-
6	Delay in commissioning	+ 1 Year	16.9%	273	
	All combined (1-6)		11.20%	82	

B. Financial Analysis

13. **Methodology and Key Assumptions.** The analysis evaluated the project's financial viability based on the incremental costs and revenues. An after-tax discounted cash flow analysis was conducted in real terms to determine WACC, FIRR and the financial net present value. A sensitivity analysis assessed the impact of adverse movements in the underlying assumptions on the FIRR.

14. Project costs include only investment and O&M costs of the distribution system, including taxes, duties and physical contingencies but excluding price contingencies and financing costs. All investment costs are expressed in constant prices. A 25-year benefit period (2027-2051) was adopted for analysis. Realization of a terminal value of 10 percent of total investment was assumed at the end of the benefit period.

15. Project benefit is measured in terms of incremental revenue allowed in tariffs towards capital cost of assets commissioned under this investment. The ARR which forms the basis of tariffs, includes recovery of the full cost of loan capital by way of accelerated rates of depreciation and interest; return on equity of 16.0% (post-tax); operation and maintenance expenses⁹ based on a mix of historical and normative principles.; interest on working capital; and corporate tax.

16. The analysis assumes that when the project is operational, the electricity tariff will be: (i) adjusted to a level in line with tariff regulations of AERC; and (ii) adjusted on a regular basis following the same guideline. Nominal revenues were deflated to constant price values using expected domestic inflation. However, considering general trend of delays in capitalization of assets in its books of account by APDCL, only partial capitalization (50% in 2027 and 75% in 2028) was considered. Additionally, a disallowance factor of 15% was assumed to acknowledge any disallowance of cost inefficiencies by AERC in tariffs.

17. Additional cashflow on account of higher sales due to this project, was valued at 50% of the economic benefits to compensate for lower or delayed tariffs and inadequate revenue realization on part of APDCL.

18. Savings on account of lower distribution losses is generally shared with the consumers in the short-term, and ultimately passed on fully to the consumers through a lower trajectory of target distribution losses by state regulatory commissions. Suitable assumptions were therefore considered while modelling cashflows against these power purchase cost savings.

⁹ For simplification, O&M expense at a fixed rate of 2% of approved capital expenditure, escalated in nominal terms at 4.0% per annum were considered. They are in line with investment analysis for similar projects in Assam.

19. **Weighted Average Cost of Capital.** To calculate the WACC, financing sources were assumed to consist of an AIIB loan constituting 80 percent of the total capital requirement and equity contributions from the state government for the balance of 20 percent. The regulatory return on equity allowance of 16.0 percent was adopted as a proxy for the state government's required return on equity. Corporate tax rate of 34.94 percent was considered and included any applicable cess and surcharge. The overall real, post-tax WACC for the investment is 2.31 percent.

20. **Financial Internal Rate of Return.** APDCL is expected to commission some assets during the implementation period and, therefore, earn tariff revenue on the investments in the commissioned assets. Conservatively, no commissioning of assets (partial or otherwise) resulting in an increase in tariff was considered in the financial analysis during the implementation period. Realized FIRR will be higher if APDCL commissions some of the assets from this investment during project implementation.

21. The project's FIRR works out to 5.23 percent, which is higher than the WACC of 2.31 percent. The project's financial net present value is estimated at USD150 million.¹⁰ Therefore, the project is considered financially viable.

22. **Sensitivity Analysis.** Sensitivity analyses of the FIRR for key variables indicates that the project, is financially viable and offers acceptable returns under a range of possible scenarios. Adverse scenarios with a 20% increase in capital costs, 20% increase in operation and maintenance costs (with the increase assumed to be not allowed in the ARR), 15% reduction in additional sales (and tariff revenues), one year delay in commencement of operations, and a combined downside scenario were also considered.

23. The project FIRR is found to be most sensitive to change in additional sales and tariff revenues. A 21% decrease in additional sales and tariff revenue will cause the project to turn financially non-viable. However, justifiable increase in costs and reasonable tariffs will be allowed by AERC and therefore these risks are already partially mitigated by virtue of cost-recovery principles of AERC.

Table 5. Sensitivity Analysis

S. No.	Sensitivity Parameter	Variation	FIRR (%)	FNPV (USD million)	FIRR SV (%)
	Base case		5.23%	149.8	
1	Capital cost increase	20%	3.38%	62.8	35.00%
2	O&M cost increase	20%	4.84%	127.3	135%
3	Tariff revenue	-15%	3.12%	39.5	-21%
4	Delays in commissioning	+ 1 Year	4.69%	126.4	
5	Combined (1-4)		0.78%	(85.1)	

¹⁰ FNPV was computed at the project post-tax and real WACC of 2.31 percent.

C. Financial Assessment of Assam Power Distribution Company Limited

Table 6. Assam Power Distribution Company Ltd.: Summarized Financial Performance
(INR million)

Item	2016	2017	2018	2019	2020
Revenue from electricity sales	39,991	45,646	56,974	61,163	64,208
Other income	1,113	1,350	2,018	2,557	2,050
EBITDA	(818)	1,393	4,728	3,633	(744)
Interest expenses	2,455	2,555	2,674	2,907	1,836
Exceptional items	(2,588)	(1,230)	(49)	(230)	(5,403)
Net income	(1,039)	(340)	1,644	210	2,027
Cash & equivalents at end of the year	15,145	23,574	28,223	25,232	29,763
Long term borrowings	10,482	11,212	12,815	12,310	12,313
Total Equity	15,365	24,114	37,729	55,214	85,626

Source: Audited financial statements of Assam Power Distribution Company Ltd.

24. **Revenue.** Revenue of APDCL has increased substantially during this period. Total operating revenue which consists of revenue from tariffs, non-tariff revenue and other income has grown substantially from INR 41 billion in FY2016 to INR 66.2 billion in FY2020- compounded annual growth rate of 13%. Though, there has been regular but marginal tariff reduction over last 4 years, however average billing rate of APDCL has overall improved on account of higher sales, reduced technical and commercial losses, and tariff rationalization.

25. As on date, all approved historical revenue gaps/surplus, except for revenue gap of INR 4.37 billion, pertaining to FY2021 (including under-recovery for FY2019), were allowed in tariffs. This amount is deferred merely on account of procedures and tariff determination framework and will be allowed during tariff determination of FY2023.

26. **Net Profit.** After reporting marginal losses in FY2016 and FY 2017, APDCL has been posting marginal profits over the last three years. Profit during FY2020 was INR 2 billion which is about three percent of its total revenue.

27. AERC allows a return on equity of 16% to APDCL in addition to the other prudent costs. Ideally, APDCL is expected to book reasonable profits-about 16% of its equity. However, in practice, APDCL is reporting marginal losses or minimal book profits. Primary reasons for less-than-expected financial performance are disallowance of various costs in its ARR considering the capital structure of APDCL and other operational inefficiencies. Major disallowances include:

- a. AERC doesn't allow power purchase expenses on account of actual distribution losses being higher than the norms set by AERC. Two-thirds of the disallowed power purchase expenses are therefore borne by APDCL.
- b. Depreciation on assets funded through consumer contributions and grants are not allowed by AERC.
- c. Return on equity of 16% is allowed only on a certain portion of equity as majority of assets are funded through government grants (and some consumer contributions).

- d. Unpaid (but accounted for) interests are not allowed in tariffs by AERC.
- e. No capital costs are allowed to APDCL unless the scheme has been capitalized in its book of accounts. As on March 31, 2020 capital-works-in-progress of APDCL was 1.32 times its net fixed assets of INR 43.9 billion.
- f. Past regulatory gap of INR 4.37 billion has not yet been allowed in tariffs on account of general procedures of truing-up (expected to be completed in 2023).

2. **Cash Balances.** The average year-end closing cash balance (since FY2016) was INR 24 billion equivalent, with INR 30 billion equivalent in cash at the end of FY2020, indicating adequate liquidity.

28. **Long-term borrowings.** APDCL has borrowings of INR 6.28 billion from Power Finance Corporation Limited (an Indian financial institution under the ownership of the Ministry of Power, Government of India) and around INR 6 billion from GoA. However, loans from the Power Finance Corporation for the R-APDRP scheme, are subject to conversion into grant once APDCL achieves the targets set under the scheme, as explained in paragraph 39 under the section titled 'Economic and financial Analysis' in this document. During FY2020, outstanding debt liability of INR 11.33 billion towards the state government was converted into grant and equity under central government's UDAY scheme after which the outstanding debt repayment liability of APDCL reduced substantially to INR 2.2 billion at the end of FY2020.¹¹

29. A summary of borrowings and outstanding debt-related liabilities of APDCL is presented in Table 7. The restructuring under the UDAY scheme has been summarized in Table 8.

Table 7: Borrowings and outstanding debt-related liabilities of APDCL
(INR million)

Particulars	2016	2017	2018	2019	2020
Long term borrowings					
Loans from PFC (secured)	3,258	4,104	5,838	5,838	6,288
Loans from GoA (unsecured)	7,224	7,108	6,978	6,472	6,025
<i>Total long-term borrowings</i>	<i>10,482</i>	<i>11,212</i>	<i>12,815</i>	<i>12,310</i>	<i>12,313</i>
Short term borrowings	646	1,306	1,592	1,298	1,266
Other liabilities-long term borrowings					
Past period GoA loan repayment due	7,465	8,452	9,500	10,650	2,205
GoA Loan repayment due within a year	987	911	1,044	1,134	914
<i>Total repayment due on GoA loans</i>	<i>8,452</i>	<i>9,363</i>	<i>10,545</i>	<i>11,784</i>	<i>3,119</i>
Interest payments carried forward					
Interest accrued and due on loan from GoA	6,451	8,275	10,230	12,480	7,591
Interest accrued but not due on GoA Loan	0	0	0	0	1
Interest accrued but not due on R-APDRP loan	1,373	1,788	2,388	3,751	3,060

¹¹ Cut-off for UDAY scheme was the outstanding debt liability to state government on September 30, 2015.

Table 8: Conversion of state-debt into grant/equity under UDAY scheme
(INR million)

Particulars	Amount
Outstanding loan amount at the end of FY2015	15,100
Loan waived off (in %)	75%
Loan waived off	11,325
Converted into grant	8,494
Converted into equity	2,831
Related interest expenses waived-off	5,540

30. **Equity and reserves.** As of March 31, 2020, the company had share capital of INR 1.6 billion, which was unchanged during the entire 5-year period. However, as on March 31, 2020, equity amount of INR 3.7 billion was accounted as 'share application pending allotment' which will be converted subsequently into share capital. This amount included loan converted into equity under UDAY restructuring scheme of INR 2.8 billion and legacy amount of INR 887 million-transferred from erstwhile Assam State Electricity Board.

31. Assam enjoys a status of 'Special Category'¹² state and receives substantial grant from GoI and GoA to fund its capital schemes. Hence, GoI and GoA grants form a major portion of its reserves. At the end of FY2020, GoI grants (or related funds) stood at INR 66.9 billion-about the size of 1-year of total revenue of APDCL. GoA grants, which are booked under capital reserves, stood at INR 33.6 billion at the end of FY2020. This amount included grant of INR 5.8 billion received against projects financed through sovereign loans extended by ADB.

¹² Special category status is a classification given by the Government of India (to certain states) to assist development of states that face geographical and socio-economic disadvantages.

Annex 4: Member and Sector Context

A. Country context

1. The Indian economy grew at a healthy rate of 7.4 percent per annum on average between FY2014 and FY2018, but growth has been steadily slowing down in recent years. Disruptions due to the demonetization initiative in November 2016 and teething implementation issues related to the rollout of goods and services tax in July 2017, resulted in growth dropping to 7.0 percent in FY2017 and 6.1 percent in FY2018. Weak economic growth in the rural sector, sluggish external demand, and stresses in corporate and financial sector balance sheet further dented growth to 4.2 percent in FY2019. COVID-19 pandemic and the associated social distancing measures have significantly impacted growth in FY2020. India's Gross Domestic Product (GDP) contracted by -24.4 percent in Q1:FY2020, but steadily recovered in the subsequent quarters. GDP is estimated to have contracted by 7.3% in FY2020.

2. While the economy was expected to recover strongly in FY2021 the second wave in April and May 2021 has impeded the strong recovery. To contain the spread of the virus, localized restrictions were imposed, compared to a nationwide lockdown during the first wave. GDP grew by 20.1 percent in Q1:FY2021 mainly due to a favorable base effect.

3. The contraction in the economy is expected to impact significantly some of the most vulnerable sections of the economy and reverse many of the impressive socioeconomic gains made by India over the last two decades. Between 2004-05 and 2011-12 poverty rates fell from 39.9 percent of population to 22.5 percent. Poverty rates are estimated to have further fallen to values ranging between 8.1 to 11.3 percent between 2012 and 2017.¹³ However, recent household data by the Centre for Monitoring Indian Economy indicate that the job losses due to COVID-19 pandemic is likely to have pushed up poverty rates to levels last seen in 2016, implying around 4 years of setback in its poverty reduction effort. The World Bank estimates that the Covid-19 pandemic has resulted in an increase in the overall poverty rate by around 2.5 percentage points in FY2020.

4. According to the Periodic Labour Force Survey 2017-18, 77.1 percent of employment in India is non-regular—either self-employed or casual workers with another 13.7 percent in regular jobs that are lacking in social protection. Thus between 364 and 473 million workers face the risk of being adversely affected by the disruptions caused by the pandemic. High frequency employment survey indicates a sharp increase in unemployment rate (UR) from 7.9 percent during January to March 2020 i.e., the quarter preceding the lockdown, to 18.5 percent during April to June 2020 when the lockdown policy measures were most stringent. With the easing of the restrictions, the UR improved and averaged 7.2 percent between July-2020 and March-2021. The localized restrictions on account of the second wave again pushed up the UR to 11.9 percent in May-2021. While it has declined from these levels, the UR remains above the pre-pandemic levels.

¹³ South Asia Economic Focus, Fall 2020: Beaten or Broken? Informality and COVID-19, World Bank

5. The Indian economy is expected to recover strongly from the current pandemic growing by over 8.5 percent in FY2021 and averaging 7.5 percent over the next few years.¹⁴ The growth is expected to be assisted by improvement in business climate, rapid urbanization, unified tax regime and favorable demographics. At the same time, achieving high rate of growth will be contingent on addressing key bottlenecks and emerging challenges including creating job opportunities by raising the competitiveness, resolving infrastructural bottlenecks, bridging the skill deficit, improving institutional capacities, and addressing environmental degradation.

6. Bridging the infrastructure gap is vital for India to achieve rapid and inclusive growth in a sustainable manner. According to Global Infrastructure Outlook, India needs USD 4.5 trillion investment in infrastructure between 2015 and 2040 with the electricity sector accounting for more than half of the investment requirement.¹⁵ The *Strategy for New India @75* by NITI Aayog, outlines government's objective to (a) make available 24x7 power to all by 2019, (b) achieve 175 GW of renewable energy generation capacity by 2022, (c) reduce imports of oil and gas by 10 per cent by 2022-23 and (d) continue to reduce emission intensity of GDP to help India achieve the NDC target of 2030.¹⁶ Similarly, the Report of the Task Force on National Infrastructure Pipeline has projected total infrastructure investment of about USD 1.4 trillion over the period 2020 to 2025 for India to become a USD 5 trillion economy. Nearly a quarter of this investment is required in the energy sector.¹⁷

7. Although, Assam is the largest economy in the northeast region, its per capita income is below the national level and it ranks 28th amongst all other states. Between FY2015 and FY2018, Assam grew at annual average rate of 8.8 percent. The services sector contributes a major portion to Assam's Net State Value Added (~41 percent), followed by agriculture and mining (~31 percent) and the industry (~28 percent). Within agriculture, Assam is known for its tea and its production contributes to more than 50 percent of India's tea production.

8. As per CMIE data, Assam's estimated unemployment rate was 4.7 percent in FY2019 which is lower than the national average (7.6 percent). The impact of the Covid-19 lockdown restrictions, both during the first and the second waves, had a relatively lesser impact on Assam's employment conditions than the rest of India.

9. The Government of Assam (GoA) has outlined an ambitious plan to bridge the infrastructure deficit by 2030. It intends to more than double the length of surface roads both in relation to area as well as population. It aims to provide electricity to every household, significantly increase the share of renewables in energy generation, and reduce AT&C losses. It also seeks to achieve universal telephone connection and five to 10-fold increase in the seats available for vocational education.¹⁸ An ADB study has pointed out that bridging the infrastructure deficit is critical for the state to augment manufacturing of selected sectors like electrical equipment and

¹⁴ World Economic Outlook Database, October 2020, International Monetary Fund

¹⁵ Global Infrastructure Outlook, Oxford Economics and Global Infrastructure Hub, 2017

¹⁶ Strategy for New India @75, NITI Aayog, 2018

¹⁷ Economic Survey 2019-2020, Ministry of Finance, Government of India

¹⁸ Assam Agenda 2030: Strategies and Actions for Achieving Sustainable Development Goals, Transformation and Development Department, Government of Assam, October 2018.

accessories, plastic and plastic products; electronics system design and manufacturing and pharmaceuticals.¹⁹ Similarly, Assam's ability to emerge as an attractive destination for high value services like Information Technology and IT-enabled services and aircraft maintenance, repair and overhaul services, availability of robust infrastructure including good quality of power supply is important.

B. Sector and Institutional Context

10. The 24x7 Power for All Program was a joint initiative of the Government of India, 29 State Governments and 7 Union Territories with the objective to make power available for 24 hour per day to all households, industry, commercial businesses, public needs, agriculture and any other electricity consuming entities for all by 2019. The program covered several areas such as power generation, transmission, distribution, financial support, renewable energy and energy efficiency. Specifically on electricity distribution, the program aimed to provide access to all households along with creation of new distribution network or strengthening of existing infrastructure.

11. The Government of India achieved full electrification of all households in March 2019.²⁰ According to the International Energy Agency's definition, the electricity access rate in India has moved from 43% in 2000, 68% in 2010 to 99.6% in 2019. The focus of the government is now to ensure a secure and reliable supply of electricity by strengthening distribution networks and implementing distributed renewable generation systems in rural areas.²¹

12. The India Power Market is mostly unbundled, with separate entities responsible for generation, transmission and distribution, in accordance with the 2003 Electricity Act. Retail activities such as electricity sales and electricity distribution to consumers is done by distribution companies (Discoms).

13. The financial situation of Discoms across India is generally poor and has been further exacerbated by the COVID-19 pandemic. By September 2021, Discom debt was approximately 12 billion USD. Majority of the 67 Discoms, which are typically owned by the state governments, face high levels of debt related to high technical and commercial losses, power theft, lack of metering and poor cost recovery. In November 2015, the Government of India, in agreement with states, introduced the Ujwal DISCOM Assurance Yojana (UDAY) scheme to convert 75% of Discom's debt into state governments bonds.²² In return the Discoms would have to reduce the cost of power generation, support the development of renewable energy, invest in energy efficiency measures and improve their operational and financial performance. The State of Assam signed up for UDAY.²³

14. The Government of Assam's Power Sector Master Plan (2014) sets three main targets for the electricity sector: i) achieve universal access to electricity by 2022; ii) improve the quality and reliability of electricity supply; and iii) address electricity sector constraints to support economic

¹⁹ Assam as India's Gateway to ASEAN, Asian Development Bank, March 2021.

²⁰ The Government of India states that a village is electrified when 10% of households and all public buildings are connected to the grid.

²¹ International Energy Agency, India 2020 – Energy Policy Review, January 2020.

²² <https://www.uday.gov.in/>

²³ <https://praapti.in/>

development. In the electricity distribution sector, the Government of Assam plans to improve efficiency and operation of distribution assets to deliver quality electricity supply to consumers including enhance financial sustainability, build staff capacity and improve resource planning. Overall, the Master Plan identified a total of US\$3.5 billion of investments in the electricity sector during FY2012-2022 covering generation, transmission and distribution. The investment requirements in the electricity distribution alone are US\$1.1 billion.

15. Prior to 2004, the Assam State Electricity Board (ASEB) was the sole agency responsible for the generation, transmission and distribution of electricity in the State of Assam. ASEB was unbundled in 2004 leading to the creation of the Assam Power Generation Company Ltd, Assam Electricity Grid Corporation Ltd and Assam Power Distribution Company Ltd which are responsible for power generation, transmission and distribution, respectively. The Assam Electricity Regulatory Commission sets the electricity tariffs and regulates the sale, distribution and supply of electricity in the State of Assam.

16. APDCL is the sole electricity distribution company in the State of Assam. It is responsible for operation, maintenance and development of the electricity distribution grid, which comprises of distribution lines of 33 kilovolts (kV) and below. APDCL has approximately 6.4 million clients covering residential, agriculture, commercial, public and industrial sectors. Building on the 24x7 Power for All program, the APDCL has been undertaking several projects to expand and upgrade its distribution grid including adoption of fully automated management systems. For example, electricity access increased by about 50% in the last three years in the State of Assam, representing an increase of 2.1 million new consumers.

17. Despite significant progress, the electricity distribution grid in the State of Assam remains very congested due to fast growth in electricity demand and increasing number of consumers. In FY2012, the distribution losses stood at about 26% and have fallen only to about 20% in FY2020. APDCL is focusing on improving reliability, capacity and security of the distribution system and reducing losses to 15% by FY2026.

Annex 5: Sovereign Credit Fact Sheet

A. Recent Economic Development

1. India is a lower-middle-income country, with a GDP per capita at USD 1900.7 and a population of 1.38 billion in 2020.²⁴ It is the world's third largest economy by purchasing power parity. India's economy grew at an average annual rate of 7.4 percent between FY2014 and FY2018 but has slowed down in recent years following disruptions due to the demonetization initiative in November 2016 and the teething issues associated with the rollout of goods and services tax in July 2017.^{25,26} Growth slowed down to 4.0 percent in FY2019 due to weakness in private consumption, investment and exports, owing to rural distress, stress in the financial sector, and sluggish global demand. The Indian economy contracted by 7.3 percent in FY2020 as a result of the COVID-19 pandemic and resulting lockdown.²⁷ The economy showed signs of revival in the last two quarters of FY2020 as the lockdown measures were gradually eased. Growth in first quarter of FY2021 surged to over 20.0 percent, mainly due to base effects.

2. Inflation averaged 6.2 percent in the FY2020, above the target band of 2-6 percent, primarily driven by food inflation due to supply side disruptions. The central bank reduced the repo and reverse repo rates by 115 and 155 basis points to 4.0 and 3.35 percent respectively, to stimulate aggregate demand, which had declined due to the lockdown. The central bank introduced several measures to reduce the borrowing cost, bolster liquidity, and improve credit flow to the productive sectors. Inflation moderated slightly to average 5.5 percent in the first half of FY2021 due to decline in food inflation even as core inflation remained sticky. Key policy rates were left unchanged in with the central bank maintaining an accommodative stance.

3. General government fiscal deficit is estimated to have risen to 12.8 percent of GDP in FY2020. A downturn in revenue due to economic slowdown and higher spending on the stimulus package resulted in the fiscal deficit widening significantly. Buoyant revenue collection by the central government have constrained the fiscal deficit during April to August to 31.1 percent of the budgeted deficit, well below the pre-pandemic average during FY2016 to FY2019. Capital expenditure has grown by 27.8 percent during this period in line with budget estimates. The sharp increase in fiscal deficit and a contraction in GDP in FY2020 resulted in the public debt rising to close to 90 percent of GDP in FY2020.

4. The current account posted a surplus in FY2020, for the first time since 2002, due to a greater decline in imports as compared to exports. The current account remained in surplus in the first quarter of FY2021 on account of contraction in the trade deficit and an increase in net services receipts. Remittances experienced a strong increase as economic prospects improved globally. The trend of robust FDI inflows continued with net FDI inflow of USD 11.9 billion.

²⁴ The income group classification for fiscal year 2019 is based on World Bank criteria.

²⁵ Data are based on fiscal years. Fiscal year 2020 (FY2020) begins on 1 April 2020 and ends on 31 March 2021.

²⁶ On Nov. 8, 2016, India's government announced withdrawal of the legal tender of INR500 and INR1,000 notes, which accounted for 86 percent of the value of currency in circulation, and introduction of new INR500 and INR2,000 notes.

²⁷ On March 24, the government announced a nationwide lockdown till April 14, subsequently extended to May 30. Lockdown was eased beginning June 1.

5. In June 2020, Moody's downgraded India's rating to Baa3 with a negative outlook, but revised the outlook to stable in its October 2021 update while retaining the Baa3 rating. In April 2021, Fitch revised India's outlook to negative, due to slow reform momentum and challenging economic environment, limited fiscal space and stress in the financial sector.

B. Economic Indicators

Selected Macroeconomic indicators (2018-2022)

Economic Indicators	FY2018	FY2019	FY2020	FY2021*	FY2022*
Real GDP growth	6.5	4.0	-7.3	9.5	8.5
CPI Inflation (average, % change)	3.4	4.8	6.2	4.9	4.1
Current account balance (% of GDP)	-2.1	-0.9	1.0	-1.2	-1.6
General government overall balance (% of GDP)	-6.3	-7.4	-12.8	-11.3	-9.1
General government gross debt (% of GDP)	70.2	73.9	89.4	90.1	86.3
Public gross financing needs (% of GDP)	10.5	11.4	16.7	14.2	13.2
External debt (% of GDP)	20.1	19.8	20.6		
Gross external financing need (% of GDP) 1/	10.4	10	8.9	11.0	11.2
Gross international reserves (USD billions) 2/	415.8	481.3	581.1	637.4	
Exchange rate (INR/USD, EOP) 2/	69.6	71.4	73.0	74.3	

Note: FY 2020 ran from April 1, 2020 to March 31, 2021

* denotes projected figures

1/Data for 2021-22 are AIIB Staff Projections based on IMF

2/Reserves and exchange rate for FY2021 are sourced from RBI and pertain to October 2021.

Source: IMF World Economic Outlook July 2021, April 2021, Reserve Bank of India, and IMF Country Report 19/385.

C. Economic Outlook and Risks

6. India is expected to grow at 9.5 percent in FY2021 aided by low base and the effects of the fiscal stimulus kicking in. Growth projections for FY2021 were revised downwards by the IMF from April due to the severe second COVID wave from April to May and associated localized lockdown impacting economic activity. High frequency indicators like purchasing managers index, electronic waybills and freight traffic indicate a dissipating impact from the second wave and a return to normal economic activity. Going forward, government expenditure is expected to be a major pillar for recovery. The National Monetization Plan for brownfield assets is expected to free resources worth USD 81 billion over the next three years to finance infrastructure. Private consumption is expected to inch up although it may be constrained by rising household debt levels in the pandemic. Similarly, private investment is expected to pick up amidst improving business sentiment and credit conditions. Exports are likely to bolster growth as global demand picks up.

7. Overall inflation is expected to decrease to 4.9 percent in FY2021, as supply chains recover and agriculture output increases. However, an increase in oil prices could lead to

resurgence of inflationary pressures. The central bank is likely to continue its accommodative stance till the end of 2021 and support the economy through liquidity pressures.

8. Fiscal deficit in FY2021 is expected to moderate to a bit 11.3 percent of GDP as tax revenue increases on the back of improved economic activity. However, the pace of fiscal consolidation will be slower than originally outlined in the Fiscal Responsibility and Budget Management Review Committee. The federal government proposes to invest heavily in infrastructure in FY2021 with capital expenditure scheduled to increase by more than 26.0 percent focusing on housing, roads, railways and telecom.

9. Public debt, which was estimated to rise sharply to 89.4 percent of GDP in FY2020, levels last witnessed in early 2000s, is expected to inch up to 90.1 percent in FY2021. Despite being high, India's public debt remains sustainable given favorable debt dynamics and the projected increasing economic growth trend in the medium term. Furthermore, with public debt having a long and medium maturity, being denominated in domestic currency, and primarily held by residents, the debt profile is favorable. India's external debt is expected to remain stable.

10. The current account balance is projected return to deficit as import growth is expected to outpace export growth. Increase in oil prices is expected to exacerbate the trade deficit. Remittances are also expected to pick up as Middle East economies recover and spread of the COVID-19 pandemic in advanced economies is contained.