Report and Recommendation of the President to the Board of Directors

Project Number: 51308-001
October 2019

Proposed Loan and Technical Assistance Grant India: Chennai–Kanyakumari Industrial Corridor: Power Sector Investment Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 5 September 2019)

Currency unit	–	Indian rupee/s (₹)
₹1.00	=	$0.01307
$1.00	=	₹71.98850

ABBREVIATIONS

ADB	–	Asian Development Bank
CKIC	–	Chennai–Kanyakumari Industrial Corridor
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
FMAP	–	financial management action plan
FRP	–	financial restructuring plan
GCC	–	General Construction Circle
IEE	–	initial environmental examination
KfW	–	Kreditanstalt für Wiederaufbau
PAM	–	project administration manual
TA	–	technical assistance
TANGEDCO	–	Tamil Nadu Generation and Distribution Corporation Limited
TANTRANSCO	–	Tamil Nadu Transmission Corporation Limited
TNEB	–	Tamil Nadu Electricity Board
TNERC	–	Tamil Nadu Electricity Regulatory Commission
UDAY	–	Ujwal DISCOM Assurance Yojana

WEIGHTS AND MEASURES

km	–	kilometer
kV	–	kilovolt
MVA	–	megavolt ampere
MW	–	megawatt
TWh	–	terawatt-hour

NOTES

(i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2019 ends on 31 March 2019.

(ii) In this report, "$" refers to United States dollars.

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PROJECT AT A GLANCE

1. Basic Data — **Project Number:** 51308-001

Project Name	Chennai-Kanyakumari Industrial Corridor: Power Sector Investment Project
Country	India
Borrower	Government of India
Country Economic Indicators	https://www.adb.org/Documents/LinkedDocs/?id=51308-001-CEI
Portfolio at a Glance	https://www.adb.org/Documents/LinkedDocs/?id=51308-001-PortAtaGlance
Department/Division	SARD/SAEN
Executing Agency	Tamil Nadu Transmission Corporation Limited (TANTRANSCO)

2. Sector

	Subsector(s)	ADB Financing ($ million)
✓ **Energy**	Electricity transmission and distribution	451.00
	Total	**451.00**

3. Operational Priorities

- ✓ Accelerating progress in gender equality
- ✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability
- ✓ Strengthening governance and institutional capacity

Climate Change Information

Climate Change impact on the Project	Medium
ADB Financing	
Adaptation ($ million)	24.50
Mitigation ($ million)	131.90

Sustainable Development Goals

SDG 9.1
SDG 13.a

Gender Equity and Mainstreaming

Some gender elements (SGE) ✓

Poverty Targeting

General Intervention on Poverty ✓

4. Risk Categorization: Complex

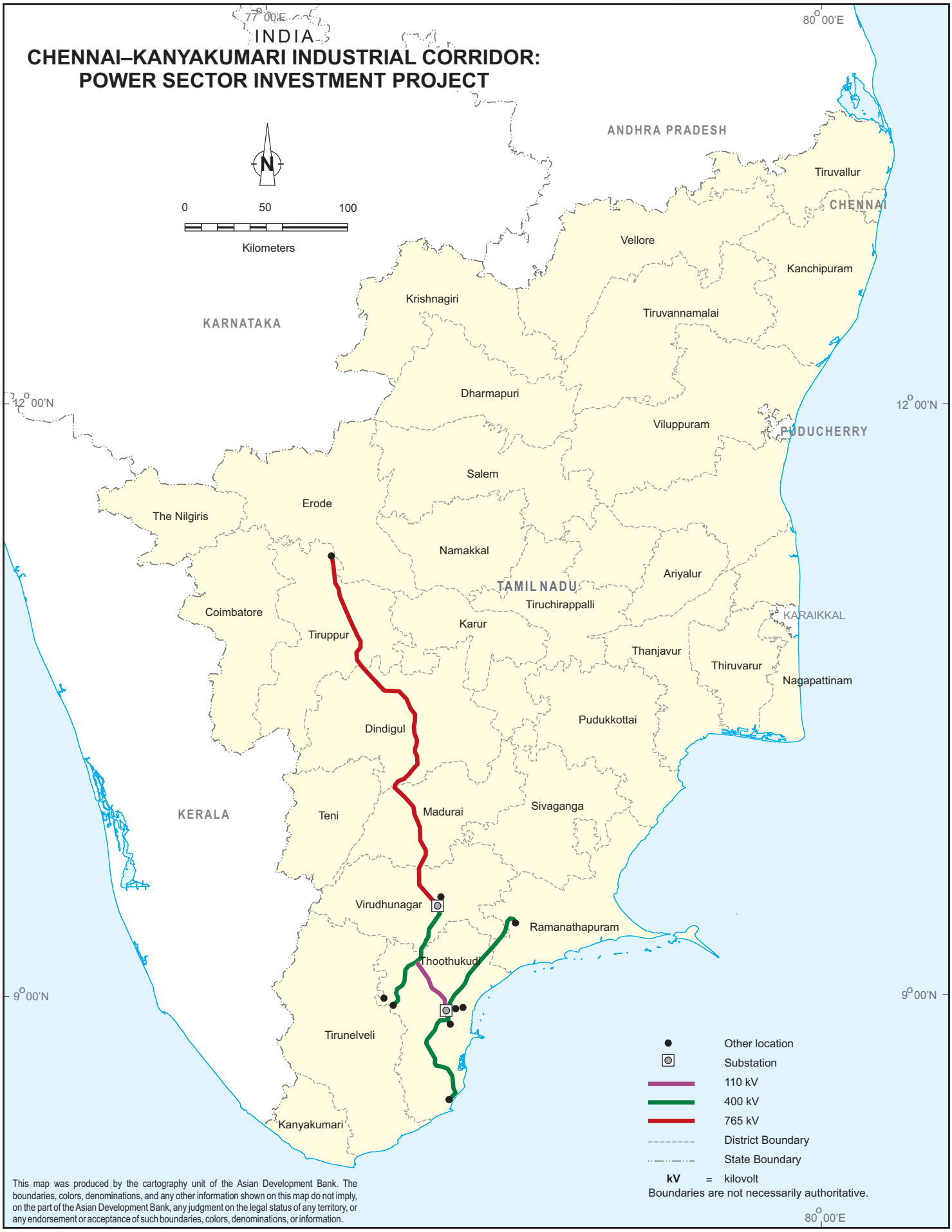
5. Safeguard Categorization **Environment:** B **Involuntary Resettlement:** B **Indigenous Peoples:** C

6. Financing

Modality and Sources	Amount ($ million)
ADB	**451.00**
Sovereign Project (Regular Loan): Ordinary capital resources	451.00
Cofinancing	**0.00**
None	0.00
Counterpart	**202.50**
Government	202.50
Total	**653.50**

Note: An attached technical assistance will be financed on a grant basis by the Technical Assistance Special Fund (TASF-OTHERS) in the amount of $650,000.

Currency of ADB Financing: US Dollar



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I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to India for the Chennai–Kanyakumari Industrial Corridor: Power Sector Investment Project. The report also describes proposed technical assistance (TA) for Institutional Capacity Building of Tamil Nadu Transmission Corporation Limited (TANTRANSCO), and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the TA.

2. The proposed project will strengthen power transmission connectivity between the southern part of the Chennai–Kanyakumari Industrial Corridor (CKIC) and the northern part of the CKIC by augmenting the 765 kilovolt (kV) and 400 kV networks. This will allow more power including renewable energy to be evacuated from new generation facilities in the south CKIC to the energy hungry north CKIC. The project will also enhance the institutional capacity of TANTRANSCO by (i) supporting the implementation of a financial restructuring plan (FRP) to restore the financial sustainability of TANTRANSCO; (ii) facilitating the introduction of gender sensitive workplace practices; and (iii) building TANTRANSCO's capacity to monitor the environmental and social impacts of power transmission projects.

II. THE PROJECT

A. Rationale

3. **Government development policies.** In 2018, Tamil Nadu had the second largest economy among Indian states with a gross domestic product of $250 billion. Industry accounts for a relatively high share of the state economy of 34%, compared with 26% for the national economy. Services account for 53% of the state economy, dominated by information technology; exports of services from the state totaled $15 billion in 2018. The agriculture sector accounted for 13% of the state economy. State gross domestic product growth averaged 7% annually over 2014–2018.[1]

4. The Government of Tamil Nadu has identified availability of quality infrastructure including a reliable power supply, as a key prerequisite for further economic development of the state. The state government is also committed to developing industrial corridors to link industrial and commercial hubs such as Chennai and Coimbatore with less developed rural areas to promote balanced development and poverty alleviation in rural areas. In this context, the Asian Development Bank (ADB) has been assisting the state government in developing the CKIC as a key component of the state's economic development strategy. The CKIC covers 23 of the state's 32 districts and 70% of the state population.[2]

5. The Government of Tamil Nadu is prioritizing the Chennai–Tiruchirappalli area in the northern part of CKIC for development of the manufacturing industry, while targeting the Madurai–Thoothukudi area in the southern part of the CKIC for development of renewable energy-based power generation because of the availability of wind and solar resources. Although Tamil Nadu has a relatively low incidence of poverty compared with the rest of the country, scarce water resources and arid conditions contribute to relatively high incidences of poverty in the southernmost districts

[1] PRS Legislative Research. *Tamil Nadu Budget Analysis 2019–2020.* (accessed 19 February 2019).
[2] ADB. 2019. *Chennai–Kanyakumari Industrial Corridor Comprehensive Development Plan Main Report.* Manila.

of the CKIC.[3] Development of renewable energy in the relatively poor southern districts will contribute to poverty alleviation, economic development, and employment creation.

6. **State government energy sector strategy.** Tamil Nadu, which accounts for nearly 9% of total electricity sales in India, is the third largest electricity consuming state in the country. As of March 2019, Tamil Nadu had installed generation capacity of 30,024 megawatts (MW), including 8,367 MW of wind power capacity and 2,444 MW of solar power capacity. Tamil Nadu has the highest installed renewable energy capacity among Indian states—renewable energy contributed to 23% of the state's total generation requirement as of March 2019.[4]

7. Tamil Nadu has achieved 100% household electrification. Per-capita electricity consumption in the state was about 1,372 kilowatts (kW) in fiscal year (FY) 2019, higher than India's national average of 1,075 kW, mainly driven by high electricity usage by industries. It is expected that industry and commercial enterprises will account for most of the future growth in electricity demand. Because of its success in developing its rich renewable energy resources. Tamil Nadu has become an energy-surplus state. The state government is keen to position Tamil Nadu as an exporter of electricity through the interstate transmission network to meet other states' demand for power.

8. It is expected that peak demand for electricity in Tamil Nadu will reach 25,000 MW by 2025, from 15,487 MW as of March 2019. The state government's Vision Tamil Nadu document envisages generation capacity reaching 50,000 MW by 2025, up from 30,024 MW as of March 2019.[5] This will involve adding 10,000 MW of wind and solar power capacity during 2019–2025. It is expected that Tamil Nadu will make a significant contribution to helping India achieve the national target of adding 175,000 MW of renewable energy capacity by 2022 under India's commitment to the United Nations Framework for Climate Change. The state government has identified strengthening the power transmission grid with adequate redundancy (spare capacity) as being vital to integrating large-scale renewable capacity with the power grid.

9. The state government unbundled the Tamil Nadu Electricity Board (TNEB)[6] in 2010 to form two separate state-owned companies: (i) Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO), responsible for generation and distribution; and (ii) TANTRANSCO, responsible for transmission. The main objective of the unbundling was to enhance the commercial orientation of power utilities and improve their corporate governance. As the sole transmission licensee of the state, TANTRANSCO owns and operates the transmission network at voltages in the range of 110 kV–765 kV.

10. The state government established the Tamil Nadu Electricity Regulatory Commission (TNERC) in 1999 to facilitate tariff-setting on sound economic principles. However, the state government has continued to set the tariffs for several consumer segments (farmers and poor households) below cost-recovery levels on socioeconomic grounds, contributing the difference to

[3] The percentage of people living below the poverty line in India is 21.9% (2012), while for Tamil Nadu the figure is 11.9% (2012). However, in terms of highest poverty incidence, the southern district of Ramanthanpuram is ranked 9th (with rural poverty incidence of 17.8% in 2012) out of 32 districts in Tamil Nadu. (Government of Tamil Nadu, State Planning Commission. 2017. *Tamil Nadu Human Development Report*. Tamil Nadu.)

[4] Government of Tamil Nadu, Energy Department. Policy Note 2018-19.

[5] Government of Tamil Nadu. 2014. *Vision Tamil Nadu: Strategic Plan for Infrastructure Development in Tamil Nadu*. Chennai.

[6] TNEB remains as the holding company of TANGEDCO and TANTRANSCO.

TANGEDCO as a revenue subsidy. However, these revenue subsidies have not been sufficient to meet the gap between the approved tariff for subsidized consumers and the cost of supply.

11. The state government absorbed TANGEDCO's liabilities of ₹230 billion ($3.5 billion) in 2017 as part of the Ujwal DISCOM Assurance Yojana (UDAY) scheme promoted by the central government.[7] TANGEDCO has committed to improving its commercial and financial performance in return for debt relief provided by the state government, and has committed to eliminating the gap between cost of supply and aggregate revenues realized (including for approved revenue subsidies). However, progress to date has not been satisfactory mainly because of delays in filing for annual tariff revisions by TANGEDCO. The state government has assured that submissions would be made for tariff revisions to TNERC on annual basis starting FY2021.

12. **Transmission constraints to be addressed.** The districts in the southern CKIC are expected to contribute 9,000 MW of added generation capacity during FY2019–2025. This includes 6,000 MW of renewable energy capacity, of which 2,060 MW are under construction as of March 2019. The existing transmission network capacity is inadequate to reliably evacuate power from these new renewable-energy-based plants in the southern CKIC.

13. As the demand for electricity and supply of renewable energy increase, the frequency and duration of curtailment of renewable-energy-based plants are likely to increase in the absence of a strengthened transmission network. This may deter further development of renewable energy in the region. This may also result in suboptimal operation of the power system (i.e., continuing to operate more expensive thermal power plants while curtailing the use of cheaper renewable energy sources). Therefore, in the absence of a strengthened transmission network, the economic cost of supplying electricity would increase, and greenhouse gas emissions would rise.

14. The project will establish an extra-high-voltage (765 kV) transmission link between Virudhunagar and Coimbatore to transfer the expected added generation capacity of 9,000 MW by 2025 in the southern CKIC to Coimbatore, which is a major industrial center. The project also includes the construction of a 400 kV/230 kV pooling substation at Ottapidaram and associated 400 kV transmission lines to pool power generated at renewable and thermal power plants in Thoothukudi District in the southern CKIC and transmit that power to the 765 kV/400 kV Virudhunagar substation. TANTRANSCO considered several alternative network configurations to meet the expected demand for transmission capacity and verified through engineering studies that the proposed solution is the optimum design configuration.

15. **Restoring the financial sustainability of Tamil Nadu Transmission Corporation Limited.** The project also seeks to restore the financial viability of TANTRANSCO by addressing legacy issues emanating from the allocation of liabilities and accumulated losses of the TNEB to its successor entities (TANTRANSCO and TANGEDCO) during the unbundling process. TANTRANSCO has been allocated a disproportionate share of liabilities of TNEB that were accrued for financing cash-flow deficits and recurrent losses before 2010.

16. These loans have no corresponding transmission assets, hence, TNERC has not allowed TANTRANSCO to recover debt service cost of these loans through transmission tariffs. TANTRANSCO has been compelled to borrow from commercial sources to bridge the resultant cash-flow deficit. Consequently, TANTRANSCO has fallen into a debt trap whereby it is compelled

[7] Ujwal DISCOM Assurance Yojana is the financial turnaround and revival package for electricity distribution companies (DISCOMs) initiated by the Government of India to find a permanent solution to improving the weak financial status of DISCOMs.

to keep borrowing more money to service its debt yet lacks additional revenue sources to recoup its debt-service obligations.

17. Another issue is that TANTRANSCO has not been able to contribute 30% of its capital expenditures as equity (30% is the expected equity contribution in transmission tariff methodology adopted by TNERC). Therefore, the depreciation provision allowed in transmission tariff by TNERC is not adequate to meet the debt service payments. As of 31 March 2019, the total unsustainable liabilities (to external creditors) that TANTRANSCO cannot service through transmission tariffs was estimated to be ₹57.3 billion ($806 million).

18. During project preparation, ADB assisted the government of Tamil Nadu in preparing a financial restructuring plan (FRP) to address this long-standing issue and restore the financial viability of TANTRANSCO. The project administration manual (PAM) describes the FRP and the draft loan agreement reflects key aspects of FRP as covenants.[8]

19. The FRP consists of the following key features: (i) an equity injection from the government of Tamil Nadu over 3 years starting from FY2021 to settle the unsustainable liabilities owed to external creditors; (ii) adjusting intercompany liabilities owed to TANGEDCO; (iii) extending the repayment period of TANTRANSCO's remaining loans to 12 years; (iv) rationalizing TANTRANSCO's future annual capital expenditures to ensure 30% of capital expenditure is financed with equity and internal cash generation; and (v) filing petitions for annual transmission tariff revisions with the TNERC.

20. Implementation of the FRP will enable TANTRANSCO to reach financial viability by 2024. In addition to supporting the FRP, the financial management action plan (FMAP) described in the PAM recommends several measures to improve corporate governance. The attached technical assistance (TA) will support these measures.[9] Implementation of the FRP and the FMAP will ensure that TANTRANSCO will become financially viable and will be able to finance its capital expenditures beyond 2024 using commercial sources and internal cash generation, without requiring government equity support.

21. **Alignment with Strategy 2030.** The project is closely aligned with the operational priorities of ADB's Strategy 2030 to (i) tackle climate change and promote renewable energy by improving transmission connectivity from the renewable-resource-rich southwest region of Tamil Nadu to load centers in Chennai and Coimbatore; (ii) strengthen governance and institutional capacity through implementation of the FRP and the FMAP; and (iii) promote gender-sensitive workplace practices and enhanced career opportunities for female staff.[10]

22. **ADB value addition.** Because of legacy issues related to the establishment of TANGEDCO and TANTRANSCO, both companies are saddled with unsustainable levels of debt. The government of Tamil Nadu has shown a keen interest to collaborate with ADB to resolve this issue. ADB has engaged in high-level policy dialogue with the Government of Tamil Nadu to restore the financial viability of TANTRANSCO in a fiscally sustainable manner. ADB assisted the Government of Tamil Nadu to develop a comprehensive FRP, to be implemented with ADB support under this project.

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[8] Project Administration Manual (accessible from the list of linked documents in Appendix 2).
[9] Attached Technical Assistance Report (accessible from the list of linked documents in Appendix 2).
[10] ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific.* Manila.

23. TANTRANSCO, the executing agency, has yet to gain experience in commissioning and operating 765 kV transmission assets, although it is one of the few state utilities in India authorized to invest in this type of asset. ADB has financed 765 kV transmission lines and substations implemented by the Power Grid Corporation of India.[11] The project incorporates ADB's experience and lessons learned through those projects with respect to technical design, contract management, and safeguard issues including accurately aligning transmission line routes at the outset to minimize safeguard-related issues during project implementation. ADB will use satellite technology to ensure the accuracy of the transmission line alignment and minimize environmental and social impacts.

B. Impact and Outcome

24. The project is aligned with the following impact: industrial development and renewable energy utilization in Tamil Nadu enhanced (footnote 5). The project will have the following outcome: power supply in the CKIC increased in a financially sustainable manner.

C. Outputs

25. **Output 1: Transmission link from southern Chennai–Kanyakumari Industrial Corridor to load centers in northern Chennai–Kanyakumari Industrial Corridor established.** This output will establish a 765 kV substation in Virudhunagar and 765 kV power transmission link between the power generation hub in the Madurai–Thoothukudi area (southern part of the CKIC) and load centers in the northern parts of the CKIC.

26. **Output 2: Pooling substation established in Thoothukudi District.** This output will establish a 400 kV pooling substation and associated transmission lines to receive electricity generated from power plants in the Thoothukudi district.

27. **Output 3: Financial and institutional capacity of Tamil Nadu Transmission Corporation Limited improved.** This output will (i) assist TANTRANSCO in implementing the FRP to restore its financial sustainability; (ii) support the implementation of the financial management action plan (FMAP) to improve the financial management capacity and corporate governance of TANTRANSCO; (iii) facilitate the introduction of gender-sensitive workplace practices within TANTRANSCO; and (iv) enhance the capacity of TANTRANSCO to monitor the environmental and social impacts of transmission projects. The attached TA (footnote 9) will support these activities.

D. Summary Cost Estimates and Financing Plan

28. The project is estimated to cost $653.5 million (Table 1). Detailed cost estimates by expenditure category and by financier are included in the PAM (footnote 8).

[11] ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to India for the National Grid Improvement Project*. Manila; and ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to India for the Green Energy Corridor and Grid Strengthening Project*. Manila.

Table 1: Summary Cost Estimates
($ million)

Item		Amount[a]
A.	**Base Cost[b]**	
	1. Transmission link from southern CKIC to northern CKIC	438.3
	2. Pooling substation in Thutthukudi District	120.2
	Subtotal (A)	**558.5**
B.	**Contingencies[c]**	**60.3**
C.	**Financing Charges During Implementation[d]**	**34.7**
	Total (A+B+C)	**653.5**

CKIC = Chennai–Kanyakumari Industrial Corridor

[a] Includes taxes and duties of $68.8 million to be financed by ADB. Such amount does not represent an excessive share of the project cost. The environment management cost of $2.69 million is to be incurred by the contractors. Excludes output 3 which will be funded by the Technical Assistance Special Fund of the Asian Development Bank (ADB) under the attached technical assistance.

[b] In January 2019 prices.

[c] Includes physical and price contingencies, and a provision for exchange rate fluctuations.

[d] Includes interest and commitment charges. Interest during construction for the ordinary capital resources loan has been computed at the 5-year United States dollar fixed swap rate plus an effective contractual spread of 0.5%. Commitment charges are 0.15% per year to be charged on the undisbursed loan amount.

Sources: Tamil Nadu Transmission Corporation Limited and Asian Development Bank estimates.

29. The government has requested a regular loan of $451 million from ADB's ordinary capital resources to help finance the project. The loan will have a 20-year term, including a grace period of 5 years; an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; a commitment charge of 0.15% per year; and such other terms and conditions set forth in the draft loan and project agreements. Based on the customized amortization schedule of semiannual repayment, the average maturity is 13 years, and there is no maturity premium payable to ADB.[12] The government will provide the proceeds of the ADB loan on a back-to-back basis to TANTRANSCO.

30. The summary financing plan is in Table 2. ADB will finance eligible expenditures in relation to supply and installation of substations and transmission lines on a turnkey basis, including goods and services tax. The counterpart funds to be provided by the government of Tamil Nadu through TANTRANSCO will be utilized for payment of compensation for right-of-way for transmission lines, land acquisition for substations, financial charges during implementation, project management expenses, and price and physical contingencies. The attached TA grant funded by the Technical Assistance Special Fund (TASF-other sources), administered by ADB, will finance the capacity building of TANTRANSCO (output 3).

[12] The customized amortization schedule is based on government's choice of repayment option.

Table 2: Summary Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank ordinary capital resources loan	451.0	69.0
Tamil Nadu Transmission Corporation Limited and Government of Tamil Nadu	202.5	31.0
Total	**653.5**	**100.0**

Sources: Tamil Nadu Transmission Corporation Limited and Asian Development Bank estimates.

31. Climate mitigation is estimated to cost $131.9 million and climate adaptation is estimated to cost $24.5 million. ADB will finance 100% of mitigation costs and 100% of adaptation costs.[13] The climate mitigation finance was estimated based on the share of renewable energy transmitted by the project financed transmission assets. The climate adaptation cost is estimated based on the incremental cost of transmission lines to withstand higher wind speeds (wind zone 4).

E. Implementation Arrangements

32. The government of Tamil Nadu will execute the project, acting through TANTRANSCO, the state-owned transmission utility. As the executing agency and implementing agency, TANTRANSCO will have overall responsibility for executing the investment project and for its day-to-day implementation. The Government of India will channel the ADB loan proceeds to the government of Tamil Nadu, which will then on-lend those funds to TANTRANSCO. The government of Tamil Nadu is also expected to make counterpart funds available to TANTRANSCO as equity investments to augment TANTRANSCO's capital base. The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 8).

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	November 2019–December 2024		
Estimated completion date	31 December 2024		
Estimated loan closing date	30 June 2025		
Management			
(i) Oversight body	Department of Energy, Government of Tamil Nadu; and Board of Directors, TANTRANSCO		
(ii) Executing agency	TANTRANSCO		
(iii) Implementing agency	TANTRANSCO		
(iv) Implementation unit	TANTRANSCO's Head Office in Chennai is responsible for Contract Management. There are 5–6 dedicated staff headed by Chief Engineer for Transmission assigned for this purpose. The General Construction Circle (Madurai) is responsible for on-site supervision of project implementation and there are 5 staff under the supervision of Superintendent Engineer (Madurai) for this purpose.		
Procurement	Open competitive bidding	7 contracts	$451 million
Retroactive financing and/or advance contracting	ADB has approved advance contracting. Retroactive financing is permissible up to 20% of the loan amount for expenditures incurred prior to loan effectiveness, but not earlier than 12 months before the signing of the loan agreement.		

[13] Climate Change Assessment (accessible from the list of linked documents in Appendix 2).

Aspects	Arrangements
Disbursement	The loan proceeds will be disbursed following ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.

ADB = Asian Development Bank, TANTRANSCO = Tamil Nadu Transmission Corporation Limited.
Source: Asian Development Bank estimates.

III. ATTACHED TECHNICAL ASSISTANCE

33. The proposed transaction TA will finance output 3 of the project. At the government's request, TANTRANSCO will be the executing agency and implementing agency for the TA. The TA will be implemented over 24 months from 1 December 2019 to 30 November 2021 (footnote 9).

34. The TA will (i) support implementation of the FRP and the FMAP by providing financial analysis expertise to TANTRANSCO, and supporting the preparation of a gap analysis of existing accounting practices and the requirements for adoption of Indian Accounting Standards; (ii) support TANTRANSCO to undertake a needs assessment to identify interventions to make TANTRANSCO a more gender-sensitive workplace, and support implementation and monitoring of some of these measures; and (iii) enhance the capacity of TANTRANSCO to monitor the safeguard aspects of transmission investment projects, including investments under the project.

35. The TA is estimated to cost $700,000, of which $650,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-other sources). TANTRANSCO will provide counterpart support in the form of counterpart staff, office space and other in-kind contributions.

IV. DUE DILIGENCE

A. Technical

36. ADB staff undertook due diligence of the project to establish the need for proposed transmission network strengthening in the context of expected additions of new generation capacity in the southern CKIC and the anticipated demand increase in the northern CKIC. TANTRANSCO Planning Department undertook power system studies to assess different network configurations and identify the least-cost option of providing transmission connectivity between the southern and northern CKIC. The Central Electricity Authority of India has reviewed and approved the technical substation designs, including the addition of shunt reactors to maintain voltages at desired levels during low-load periods.

B. Economic and Financial

37. The transmission pricing regime (the aggregate revenue requirement approach) in India and in Tamil Nadu is based on the cost-plus principle which means that tariffs are based on all eligible costs of the transmission utility plus a reasonable return on portion of equity financing of capital investments. As TNERC has approved the project as an eligible capital investment project, its financial internal rate of return (FIRR) is guaranteed under the prevailing regulatory regime. The FIRR does not depend on utilization levels (i.e. actual power flow of transmission assets funded under the project or an approved capital cost increase by the regulator). On this basis, the estimated FIRR of the project is 3.3%, compared with the project's weighted average cost of capital of 2.98%. ADB staff performed an analysis to assess the sensitivity of the FIRR to adverse changes in key variables, including (i) capital cost increase not allowed by the regulator; (ii) increase in operation and maintenance costs; and (iii) delay in project completion. The results of

the sensitivity analysis confirmed that the project's financial viability is robust under likely adverse scenarios.[14]

38. ADB staff conducted the economic analysis of the project in accordance with ADB guidelines. The analysis evaluated the costs and benefits in FY2019 constant prices for a period of 29 years starting from FY2019 until FY2047. The economic internal rate of return (EIRR) was calculated by comparing the with-project and without-project scenarios. The project is economically viable with an EIRR of 13.47%, and the project's expected net present value is $2.38 billion at an economic discount rate of 9% per year. The sensitivity of the EIRR was assessed with respect to the scenarios considered for the FIRR, plus a reduction in renewable and thermal generation capacity. The results of the sensitivity analysis are described in the economic analysis and confirmed that the project's economic viability is robust under likely adverse scenarios.[15]

C. Governance

39. The financial management risk is *substantial* mainly because of corporate governance issues with respect to the project executing agency (TANTRANSCO). These relate to (i) concerns about its financial viability (paras. 15–17); (ii) the absence of independent directors; and (iii) the absence of an internal auditor. The FRP to be implemented by the end of FY2024 will restore the financial viability of TANTRANSCO. The government and TANTRANSCO have agreed to appoint an internal auditor by the end of FY2020 to improve corporate governance.

40. TANTRANSCO operates under a robust legislative framework and is subject to annual audits by the comptroller and auditor general of Tamil Nadu. Its operations and tariffs are regulated by TNERC, and it has experience with the disbursement and procurement processes and procedures of international development agencies such as the Japan International Cooperation Agency and German development cooperation through KfW. However, ADB assessed the overall pre-mitigation financial management risk of TANTRANSCO as *substantial* because of low levels of computerization and automation in accounting and financial reporting, substantial unreconciled interunit and intercompany balances, the lack of a completed fixed assets registry, and a weak internal audit system.

41. ADB and TANTRANSCO have agreed upon a time bound FMAP, as described in the PAM and the financial management assessment.[16] The FMAP will mitigate the financial management risk. ADB has prepared a separate project financial management manual to improve the financial management of proceeds of ADB loan funds.

42. TANTRANSCO has well developed procurement systems which comply with its own procurement policy as well as the *Tamil Nadu Transparency in Tenders Act, 1998*, the *Tamil Nadu Transparency in Tenders Rules, 2000*, and the Government of India's *General Financial Rules, 2005*. It has experienced professionals in its Transmission (Electrical) and Transmission (Civil) Departments who have extensive experience in delivering projects of similar size and complexity using Open Competitive Bidding (OCB). The existing procurement processes are governed by regulations that require robust documentation which are archived and easily accessed and has the capability to provide data to support contract negotiations, dispute resolutions, and required

[14] The results of the sensitivity analysis are in the Financial Analysis (accessible from the list of linked documents in Appendix 2).
[15] Economic Analysis (accessible from the list of linked documents in Appendix 2).
[16] Financial Management Assessment (accessible from the list of linked documents in Appendix 2).

audits. The existing procurement processes and systems in place are considered adequate to satisfy any Asian Development Bank (ADB) requirements with only minor adjustments. The procurement activities under the project have been substantially completed and the overall procurement risk is assessed to be “moderate’.

43. ADB’s Anticorruption Policy (1998, as amended from time to time) was explained to and discussed with the government and TANTRANSCO. ADB undertook integrity due diligence and there were no adverse findings. The specific policy requirements and supplementary measures are described in the PAM. TANTRANSCO will consult ADB’s *Standard Bidding Document for the Procurement of Plant—Design, Supply, and Installation* to ensure value-for-money in procurement.

D. Poverty, Social, and Gender

44. The project will contribute to the overall economic development of the state by ensuring a more reliable, more competitive power supply for industry and services. This will in turn spur inclusive economic growth by generating employment and improving livelihoods. The project will promote renewable energy development in an underdeveloped region of the state.

45. **Gender.** The project is classified as having some gender elements. It presents limited opportunities for gender mainstreaming because of the nature of the project. However, gender-focused discussions undertaken at TANTRANSCO indicate that scope exists to introduce gender-friendly working conditions and practices at the utility, particularly in its field offices. These may include but not be limited to workplace facilities that respond to gender-based needs, including separate and convenient lavatories, resting rooms, and recreation and medical facilities for women.

E. Safeguards

46. In compliance with ADB’s Safeguard Policy Statement (2009), the project’s safeguard categories are as follows.[17]

47. **Environment (category B).** The project is categorized as environmental category B as the project will not pass through any environmentally or ecologically sensitive area. Following ADB’s Safeguard Policy Statement, TANTRANSCO has prepared an initial environmental examination (IEE), including an environmental management plan to minimize adverse impacts during project construction and operation. The technical design ensures that the electromagnetic fields are within safe limits at the ground level. There are no associated facilities as per the definition of associated facilities in ADB’s Safeguard Policy Statement. Induced impacts because of power generation capacity additions in the project impact areas are described in the IEE. TANTRANSCO has undertaken meaningful consultations with communities in the project impact areas. The IEE has been disclosed on ADB’s website. Although TANTRANSCO has the institutional capacity and experience to manage environmental risks through its General Construction Circle (GCC) Madurai, ADB will provide additional capacity building support through the attached TA. If unanticipated environmental and resettlement impacts occur during implementation, TANTRANSCO will prepare a corrective action plan or update the IEE and/or environment management plan to address and mitigate the issues. The GCC will supervise, monitor, audit, and report to ADB through semiannual environmental monitoring reports.

[17] ADB. 2009. *Safeguard Policy Statement.* Manila.

48. **Involuntary resettlement (category B).** TANTRANSCO has carefully designed the substations and transmission line alignments to avoid all structures and minimize land acquisition and involuntary resettlement. The substations will be built on land owned by TANTRANSCO and will not involve land acquisition. The 522 kilometres of project transmission lines will have mostly temporary impacts but will also have permanent impacts on trees and tower footprints. No households will be physically displaced or lose 10% or more of their productive (income-generating) assets. TANTRANSCO has prepared a resettlement plan in compliance with Indian regulations and ADB's Safeguard Policy Statement (2009) and disclosed on ADB's website. Mitigation measures and budgetary provisions are in place to provide compensation at replacement cost, commensurate to the impacts, and to restore livelihoods. TANTRANSCO will monitor implementation of the resettlement plan and submit semiannual monitoring reports to ADB.

49. **Indigenous peoples (category C).** The project area is not inhabited by indigenous populations therefore, the project will not impact indigenous peoples.

F. Summary of Risk Assessment and Risk Management Plan

50. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[18]

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigation Measures
Unexpected fiscal constraints and changes in the government of Tamil Nadu's fiscal priorities could delay the approval and implementation of the FRP.	Approval of the FRP and implementation of its key actions are covenanted in the loan agreement. ADB will closely follow up the timely approval of the FRP and implementation of the FRP actions mentioned in the PAM. In addition, the attached TA will provide support in implementing the FRP through consultancy inputs to undertake a financial analysis to confirm the amount of unsustainable liabilities to be settled and identify the intercompany account balances to be reconciled.
Potential delays in commissioning power generation plants may result in underutilization of transmission assets built under the project.	The government of Tamil Nadu will closely monitor the construction of TANGEDCO power plants. The central government has mandated the opening of letters of credit for power purchase by distribution companies such as TANGEDCO from 1 August 2019 to ensure timely payment to generators.
Extreme climate events such as storms and cyclones damage project assets during the construction and operational phases.	Adverse climate events such as storms, cyclones, and floods have been occurring with increasing frequency in southern India. The design standards of transmission towers have been strengthened to withstand higher wind speeds (wind zone 4). Tower foundations and substations have been designed to withstand floods.
Community resistance to granting right-of-way for transmission lines continues despite active consultation and adequate compensation.	TANTRANSCO will consult with affected parties and pay adequate compensation, including compensation for restrictions on land usage under transmission line corridors.
Weak financial management capacity of TANTRANSCO.	The attached TA will assist TANTRANSCO, as the executing agency, in (i) adopting Indian Accounting Standards; (ii) adopting a computerized accounting system; (iii) reconciling inter-unit and intercompany account balances; (iv) updating the fixed-asset register; and (v) strengthening the internal audit function.

[18] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

ADB = Asian Development Bank, FRP = financial restructuring plan, PAM = project administration manual, TA = technical assistance, TANGEDCO = Tamil Nadu Generation and Distribution Company Limited, TANTRANSCO = Tamil Nadu Transmission Corporation Limited.
Source: Asian Development Bank.

V. ASSURANCES

51. The Government of India, the government of Tamil Nadu, and TANTRANSCO have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

52. The government and TANTRANSCO have agreed with ADB on certain covenants for the project, which are set forth in the draft loan agreement and project agreement.

VI. RECOMMENDATION

53. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of $451,000,000 to India for the Chennai–Kanyakumari Industrial Corridor: Power Sector Investment Project, from ADB's ordinary capital resources, in regular terms, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 20 years including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao
President

7 October 2019

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with
Industrial development and renewable energy utilization in Tamil Nadu enhanced (Vision Tamil Nadu: Strategic Plan for Infrastructure Development in Tamil Nadu)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Power supply in the CKIC increased in a financially sustainable manner	By 2025: a. Generation capacity evacuated from southern CKIC increased to 9,000 MW[b] (2018 baseline: 3,000 MW) b. Electricity supply to districts comprising CKIC increased to 110 TWh (2018 baseline: 70 TWh) c. Financial ratios of TANTRANSCO improved: (i) Debt service coverage ratio increased to 1.5 (2018 baseline: 0.4) (ii) Current ratio increased to 1.0 (2018 baseline: 0.3) d. Major audit questions from external auditor eliminated (2018 baseline: 12 major qualifications of annual accounts of TANTRANSCO)	a. Tamil Nadu load dispatch center reports and Tamil Nadu Electricity Regulatory Commission b. TANGEDCO electricity sales data c–d. Audited financial statements of TANTRANSCO	Potential delays in commissioning power generation plants may result in underutilization of transmission assets built under the project
Outputs 1. Transmission link from southern CKIC to load centers in northern CKIC established 2. Pooling substation established in Thoothukudi District	By 2024: 1a. One 765 kV, 3,000 MVA substation installed at Virudhunagar (2018 baseline: 0 MVA) 1b. 242 km of 765 kV and 77 km of 400 kV and double circuit power transmission lines constructed and commissioned (2018 baseline: 0 km) By 2023: 2a. 400 kV, 1,100 MVA pooling substation in Ottapidaram constructed and commissioned (2018 baseline: 0 MVA)	1a–b, 2a–b. Project progress reports submitted by TANTRANSCO and ADB review missions	Community resistance to granting right-of-way for transmission lines continues despite active consultation and adequate compensation.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	2b. 139 km of 400 kV, 64 km of 230 kV and110 kV transmission lines constructed and commissioned (2018 baseline: 0 km)		
3. Financial and institutional capacity of TANTRANSCO improved	By 2020: 3a. Key actions of FRP implemented: (i) Intercompany account balance reconciliation prepared. (2018 baseline: NA) (ii) Unsustainable level of debt of TANTRANSCO determined and debt rescheduling plan prepared (2018 baseline: None) 3b. Key actions of FMAP implemented to facilitate adoption of Indian Accounting Standards: (i) Up-to-date fixed asset registry established (2018 baseline: NA) (ii) Gap analysis for adoption of Indian Accounting Standards prepared and recommendations implemented (2018 baseline: NA) By 2021: 3c. Gender-sensitive workplace measures agreed with TANTRANSCO and implemented (2018 baseline: NA) 3d. At least 20% of TANTRANSCO staff reported improved knowledge on monitoring environmental and social impacts of electricity transmission. (2018 baseline: 0)	3a. FRP implementation monitoring report to be prepared by TA consultants 3b. FMAP implementation monitoring report to be prepared by TA consultants 3c. TA monitoring report 3d. Pre- and post-training assessment	Unexpected fiscal constraints and changes in the Government of Tamil Nadu's fiscal priorities could delay the approval and implementation of the FRP.

Key Activities with Milestones
1. Transmission link from southern CKIC to load centers in northern CKIC established (Q3 2018–Q4 2024) 1.1 Prepare and issue bid documents for Virudhunagar substation (Q3 2018–Q1 2019) 1.2 Issue bid documents for transmission lines connected to Virudhunagar substation (Q4 2018–Q1 2019) 1.3 Award contract for Virudhunagar substation (Q2 2019–Q4 2019) 1.4 Award contracts for transmission lines connected to Virudhunagar substation (Q2 2019–Q4 2019) 1.5 Construct and commission Virudhunagar substation (Q1 2020–Q4 2023) 1.6 Construct and commission transmission lines connected to Virudhunagar substation (Q1 2020–Q4 2024)
2. Pooling substation established in Thoothukudi District (Q3 2018–Q4 2023) 2.1 Prepare and issue bid documents for Ottapidaram substation and transmission lines (Q3 2018–Q1 2019) 2.2 Award contract for Ottapidaram substation and transmission lines (Q2 2019–Q4 2019) 2.3 Construct and commission Ottapidaram substation (Q1 2020–Q4 2023). 2.4 Construct and commission transmission lines connected to Ottapidaram substation (Q1 2020–Q4 2023)
3. Financial and institutional capacity of TANTRANSCO improved (Q12020–Q1 2024) 3.1 Implement time-bound financial restructuring plan (Q2 2020–Q1 2024) 3.2 Implement FMAP (Q1 2020–Q1 2024) 3.3 Conduct gender needs assessment (Q1 2020–Q2 2020) 3.4 Implement key recommendations of gender needs assessment (Q3 2020–Q4 2021)
Input
ADB ordinary capital resources loan: $451.0 million ADB technical assistance: $0.65 million TANTRANSCO and Government of Tamil Nadu: $202.5 million
Assumptions for Partner Financing
Not applicable

ADB = Asian Development Bank, CKIC = Chennai–Kanyakumari Industrial Corridor, FMAP = financial management action plan, FRP = financial restructuring plan, km = kilometer, kV = kilovolt, MVA = megavolt ampere, MW = megawatt, NA = not applicable, Q = quarter, RFI = results framework indicator, TANGEDCO = Tamil Nadu Generation and Distribution Corporation, TANTRANSCO = Tamil Nadu Transmission Corporation Limited, TWh = terawatt-hour.

[a] Government of Tamil Nadu. 2014. *Vision Tamil Nadu: Strategic Plan for Infrastructure Development in Tamil Nadu.* Chennai.

[b] Districts of Virudhnagar, Madurai, Dindigal, Thenny, Thoothukudi, and Tirunalveli.

Contribution to the ADB Results Framework: To be determined

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=51308-001-3

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Energy
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Financial Analysis
8. Economic Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Risk Assessment and Risk Management Plan
12. Attached Technical Assistance Report
13. Climate Change Assessment
14. Initial Environmental Examination
15. Resettlement Plan

Supplementary Documents

16. Financial Management Assessment
17. Entity Financial Analysis Report
18. Project Procurement Risk Assessment
19. Detailed Sector Assessment: Energy (Power)
20. Climate Risk and Vulnerability Assessment
21. Gender Analysis