ADB

Board of Directors

**SUMMARY PROCEDURE**

**FOR OFFICIAL USE ONLY**

R127-15
30 October 2015

# Proposed Loan
# Power Transmission Improvement Project (Myanmar)

1. The Report and Recommendation of the President (RRP: MYA 46390-002) on the proposed loan to Myanmar for the Power Transmission Improvement Project is circulated herewith.

2. This Report and Recommendation should be read with *Country Operations Business Plan: Myanmar, 2015–2017,* which was circulated to the Board on 13 February 2015 (DOC.IN.45-15).

3. In the absence of any request for discussion and in the absence of a sufficient number of abstentions or oppositions (which should be communicated to The Secretary by the close of business on 23 November 2015), the recommendation in paragraph 40 of the paper will be deemed to have been approved, to be so recorded in the minutes of a subsequent Board meeting. Any notified abstentions or oppositions will also be recorded in the minutes.

For Inquiries: D. Bui, Southeast Asia Department
(Ext. 5751)
P. Rhee, Office of the General Counsel
(Ext. 1509)

ADB

# Report and Recommendation of the President to the Board of Directors

Project Number: 46390-002
October 2015

# Proposed Loan
# Republic of the Union of Myanmar: Power Transmission Improvement Project



Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 2 October 2015)

| | | |
|---|---|---|
| Currency unit | = | kyat (MK) |
| MK1.00 | = | $0. 000775 |
| $1.00 | = | MK1,289.50 |

## ABBREVIATIONS

| | | |
|---|---|---|
| ACCC | – | aluminum compact core conductor |
| ADB | – | Asian Development Bank |
| DDR | – | due diligence report |
| EMP | – | environmental management plan |
| ESE | – | Electric Supply Enterprise |
| GDP | – | gross domestic product |
| IEE | – | initial environmental examination |
| JICA | – | Japan International Cooperation Agency |
| MEPE | – | Myanmar Electric Power Enterprise |
| MOEP | – | Ministry of Electric Power |
| PAM | – | project administration manual |
| PIC | – | project implementation consultant |
| PIU | – | project implementation unit |
| SDR | – | special drawing right |
| YESC | – | Yangon Electricity Supply Corporation |

## WEIGHTS AND MEASURES

| | | |
|---|---|---|
| GWh | – | gigawatt-hour |
| km | – | kilometer |
| kV | – | kilovolt |
| kWh | – | kilowatt-hour |
| $m^2$ | – | square meter |
| MVA | – | megavolt ampere |
| MW | – | megawatt |

## NOTE

(i) In this report, “$” refers to US dollars.

| | |
|---|---|
| **Vice-President** | S. Groff, Operations 2 |
| **Director General** | J. Nugent, Southeast Asia Department (SERD) |
| **Directors** | C.N. Chong, Energy Division, SERD<br>W. Wicklein, Myanmar Resident Mission, SERD |
| **Team leader** | D-T. Bui, Senior Energy Economist, SERD |
| **Team members** | O. Domagas, Senior Financial Control Specialist, Controller's Department<br>A. Fox, Principal Procurement Specialist, Operations Services and Financial Management Department<br>C. Jung, Energy Specialist, SERD<br>R. Kausar, Unit Head Project Administration Unit, SERD<br>H. Lee, Energy Economist, SERD<br>M. Paterno, Finance Specialist, SERD<br>G. Peralta, Senior Safeguards Specialist (Environment), SERD<br>P. Rhee, Counsel, Office of the General Counsel<br>A. Samoza, Project Officer, SERD<br>M. Suga, Social Sector Specialist, SERD |
| **Peer reviewer** | K. Enomoto, Energy Specialist, South Asia Department |

**CONTENTS**

# PROJECT AT A GLANCE

**1. Basic Data** — **Project Number:** 46390-002

| | | | |
|---|---|---|---|
| **Project Name** | Power Transmission Improvement Project | **Department /Division** | SERD/SEEN |
| **Country** | Republic of the Union of Myanmar | **Executing Agency** | Ministry of Electric Power |
| **Borrower** | Republic of the Union of Myanmar | | |

| **2. Sector** | **Subsector(s)** | **ADB Financing ($ million)** |
|---|---|---|
| ✓ **Energy** | Electricity transmission and distribution | 80.00 |
| | **Total** | **80.00** |

| **3. Strategic Agenda** | **Subcomponents** | **Climate Change Information** | |
|---|---|---|---|
| Inclusive economic growth (IEG) | Pillar 1: Economic opportunities, including jobs, created and expanded | Climate Change impact on the Project | Low |

| **4. Drivers of Change** | **Components** | **Gender Equity and Mainstreaming** | |
|---|---|---|---|
| Private sector development (PSD) | Public sector goods and services essential for private sector development | No gender elements (NGE) | ✓ |

| **5. Poverty Targeting** | | **Location Impact** | |
|---|---|---|---|
| Project directly targets poverty | No | Urban | High |

**6. Risk Categorization:** Complex

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

**8. Financing**

| **Modality and Sources** | **Amount ($ million)** |
|---|---|
| **ADB** | **80.00** |
| Sovereign Project loan: Asian Development Fund | 80.00 |
| **Cofinancing** | **0.00** |
| None | 0.00 |
| **Counterpart** | **3.30** |
| Government | 3.30 |
| **Total** | **83.30** |

**9. Effective Development Cooperation**

| | |
|---|---|
| Use of country procurement systems | Yes |
| Use of country public financial management systems | No |

Source: Asian Development Bank

# I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the Republic of the Union of Myanmar for the Power Transmission Improvement Project.[1]

2. The project will help to complete the critically important 230 kilovolt (kV) transmission ring line supplying electricity to the populous Yangon region and ensure a reliable supply of electricity for sustainable economic development.[2] The project is in line with the Asian Development Bank (ADB) interim country partnership strategy for Myanmar for 2012–2014, which has been extended to 2016. Energy is a core sector in this strategy, which makes electric power infrastructure a priority within the sector. The project is included in the country operations business plan for Myanmar for 2015–2017.[3]

# II. THE PROJECT

## A. Rationale

3. Improving electricity supply in Myanmar to make it reliable is critical to sustaining the country's economic growth and meeting the government's poverty reduction objectives. Myanmar embarked on wide-ranging economic reforms in 2011 that have resulted in a rapid expansion of its economy. Gross domestic product (GDP) grew at an annual average of 7.2% during 2011–2014 to $56.6 billion, and the government expects growth to average 7.1% a year during 2015–2030. Sustaining this high growth will be important to reducing poverty and improving living conditions, particularly given the low baseline per capita GDP of $1,113 in 2014. Per capita electricity consumption during the year was only 165 kilowatt-hours (kWh), and the electrification rate was a low 35%.

4. As the economy grows and poverty reduction accelerates, demand for electricity is expected to rise by 9.6% annually from 10,112 gigawatt-hours (GWh) in 2013 to 49,924 GWh in 2030. To meet this rising demand, the government plans to expand the power subsector's physical infrastructure by developing new generation sources, upgrading and expanding transmission and distribution networks. It also intends to strengthen the subsector's governance and performance.

5. **Priority areas for power subsector development.** With assistance from ADB and other development partners, the government has prepared long-term development plans for the energy sector.[4] The plans accord high priority in the power subsector to (i) rehabilitating existing power plants and constructing new ones to increase installed generation capacity to meet fast-growing demand; (ii) expanding and upgrading the transmission grid and substations to remove bottlenecks and ensure that they can transmit all the power generated at the power plants to the load demand centers; (iii) expanding transmission and distribution networks to connect more consumers to the electricity grid, particularly in rural areas; and (iv) strengthening the

---

[1] The design and monitoring framework is in Appendix 1.

[2] ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for Power Transmission and Distribution Improvement Project*. Manila (TA 8342-MYA).

[3] ADB. 2012. *Interim Country Partnership Strategy: Myanmar, 2012–2014*. Manila; ADB. 2015. *Country Operations Business Plan: Myanmar, 2015–2017*. Manila.

[4] The government prepared its national electricity master plan with assistance from the Japan International Cooperation Agency (JICA), the national electrification plan with World Bank support, and the Myanmar energy master plan under ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for Enhancing the Power Sector's Legal and Regulatory Framework*. Manila (TA 8469-MYA).

transmission and distribution networks, especially in the populous Yangon and Mandalay regions, which are the country's important commercial centers.

6. **Subsector governance and institutions.** The power subsector's legal and regulatory infrastructure has been strengthened, particularly through a new electricity law enacted in 2014. The law provides the framework for formulating electricity regulations, creating a regulatory authority, and improving effectiveness and performance in the subsector through greater private sector participation. The Ministry of Electric Power (MOEP) is in charge of all subsector activities, including developing, implementing, operating, and maintaining all the country's hydropower, coal-fired, and gas-fired power plants, as well as the power transmission and distribution networks. The MEPE, which is an operational department of the MOEP, is responsible for developing, operating, and maintaining the transmission networks.[5] The subsector has been undergoing a gradual restructuring to improve governance and competitiveness. In 2015, the Yangon Electricity Supply Board, which was previously also an operational department of MOEP, was made the Yangon Electricity Supply Corporation (YESC), a semiautonomous stated-owned enterprise.

7. **System generation and transmission planning.** The MOEP's generation and transmission expansion plans and the national electricity master plan provide a schedule for the construction of new generation and transmission projects across the power system between now and 2030. Current installed capacity totals 4,366 megawatts (MW) nationwide, consisting of 3,005 MW of generation capacity based on hydropower; 1,236 MW based on gas; a 120 MW coal-fired power plant; and 5 MW using renewable energy. To meet the growing power demand, the government aims to increase total generation capacity to 23,594 MW by 2030, including 8,896 MW based on hydropower. The transmission network will also need to be expanded significantly to accommodate the added power supply. The country's electricity master plan includes construction of a 500 kV backbone grid to transmit electricity generated in the North to load demand centers in the South, along with 230 kV grids that will branch out to provide electricity to support socioeconomic development, rural electrification, and poverty reduction.

8. **ADB assistance.** Since ADB reengaged in Myanmar in 2012, it has provided $4.7 million in technical assistance to help the country strengthen governance and performance in the energy sector and a $60 million Asian Development Fund loan to expand and upgrade electricity infrastructure.[6] ADB (i) helped to develop the 2014 electricity law[7] and prepare transmission and distribution grid codes and electric standards and specifications; (ii) provided institutional support to the MOEP; (iii) supported a financial management assessment of four state-owned enterprises under the MOEP; and (iv) assisted the MOEP in strengthening safeguard requirements and procedures.[8] In addition, ADB's Energy for All initiative provided assistance to promote the use of off-grid solar-based systems to improve access to electricity

[5] The MEPE is also in charge of operating and maintaining gas-fired power plants.

[6] ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of the Union of Myanmar for the Power Distribution Improvement Project*. Manila (Loan 3084-MYA [SF]).

[7] ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for Enhancing the Power Sector's Legal and Regulatory Framework*. Manila (TA 8469-MYA); ADB. 2014. *Technical Assistance to the Republic of the Union of Myanmar for Support for Public–Private Partnership Framework Development*. Manila (TA 8624-MYA).

[8] ADB. 2012. *Technical Assistance to the Republic of the Union of Myanmar for Capacity Building Support for Project Identification.* Manila (TA 8251-MYA); ADB. 2012. *Technical Assistance to the Republic of the Union of Myanmar for Capacity Development and Institutional Support*. Manila (TA 8244-MYA); ADB. 2012. *Technical Assistance to the Republic of the Union of Myanmar for Financial Management Assessment of Energy Sector.* Manila (TA 8216-MYA); and ADB. 2010. *Technical Assistance for Strengthening and Use of Country Safeguard Systems.* Manila (TA 7566-REG, subproject: Capacity Building for Implementing Environment and Social Safeguards in Myanmar).

for people in remote states and regions in Myanmar.[9] ADB is preparing a programmatic approach for long-term support in Myanmar's power subsector, and the proposed project is integral to this approach.

9. **Development coordination.** ADB, the Japan International Cooperation Agency (JICA), and the World Bank have worked closely to coordinate their assistance in the power subsector.[10] This assistance has included (i) loans and grants from ADB to rehabilitate distribution networks in the Magway, Mandalay, Sagaing, and Yangon regions; (ii) loans and grants from the World Bank to rehabilitate Thaton's gas-fired plant (108 MW); and (iii) loans and grants from JICA to rehabilitate gas-fired plants within Yangon region, and a hydropower plant and distribution networks in other townships in the Yangon region. In the near future, ADB plans to help strengthen the country's 230 kV transmission and distribution networks, JICA intends to support construction of the 500 kV national transmission backbone and rehabilitation of the Yangon distribution network, while the World Bank will support both on-grid and off-grid rural electrification.[11]

10. **Yangon region.** The Yangon region is the country's main commercial center, economic hub, the entry point for foreign direct investment, the key initial destination for foreign tourists, and the source of 24% of Myanmar's GDP. The region consumes about 50% of the country's electricity, of which commercial and industrial activities account for a 52% share that will continue to grow. All this makes a reliable supply of electricity crucial to the country's socioeconomic growth and the strengthening of Yangon's aging and overloaded transmission and distribution networks a government priority. Along with ADB's power distribution project approved in 2013 (footnote 6), this project will significantly improve the reliability of the electricity supply in Yangon, benefitting the region's residential, commercial, and industrial consumers and the country's overall development.

11. **Project focus.** Yangon's current transmission network consists mainly of 66 kV facilities set up as two inner rings. These 66 kV networks receive power via an incomplete outer 230 kV ring, which supplies electricity to the Ahlone and Thaketa substations. Meanwhile, the transmission sections between Ahlone, Thida, and Thaketa substations still operates at 66 kV. This situation requires the urgent upgrade of the transmission sections between Ahlone, Thida, and Thaketa substations from 66 kV to 230 kV. The MEPE is now upgrading the Ahlone–Thida section, and the project will upgrade the Thida–Thaketa–Kyaikasan transmission lines to 230 kV and construct two new substations at South Okkalapa and West University. This will complete the critical 230 kV ring for Yangon through substations at Ahlone, Thida, Thaketa, South Okkalapa, Hlawga, Myang Tagar, West University, Hlaing Thayar, and back to Ahlone. The MEPE will be responsible for connecting the new South Okkalapa and West University substations to be built under the project to the rest of the transmission network. Upon project completion, the fully equipped 230 kV transmission ring will boost supply capacity and reliability and reduce transmission losses. The MEPE plans to develop two larger additional 230 kV transmission rings in phases.

[9] ADB. 2014. *Technical Assistance for Off-Grid Renewable Energy Demonstration Project.* Manila (TA 8657-MYA).
[10] Development Coordination (accessible from the list of linked documents in Appendix 2).
[11] A development partner power subsector working group was established in May 2013. ADB and JICA co-lead the working group, which includes such other development partners as the Netherlands, Norway, the United Kingdom, and the World Bank.

## B. Impact and Outcome

12. The project's impact will be the economic and social benefits to residential, commercial, and industrial consumers in the Yangon region from reliable and adequate supply of electricity. The outcome will be improved reliability of the Yangon region's power transmission network.

## C. Outputs

13. The project outputs will be (i) a 230 kV power transmission ring, including 230 kV transmission line and substations, developed for the Yangon region; [12] and (ii) the capacity of MEPE staff to implement ADB-financed projects strengthened. Construction of the transmission lines and substations will be completed in March 2019. A fully staffed project implementation unit will be established within MEPE.

## D. Investment and Financing Plans

14. The project is estimated to cost $83.3 million (Table 1).

**Table 1: Project Investment Plan**
($ million)

| Item | | Amount[a] |
|---|---|---|
| **A.** | **Base cost**[b] | |
| | 1. Equipment, materials, and installation: | |
| | Thida–Thaketa transmission line | 5.0 |
| | Thaketa substation (extension) | 3.4 |
| | Thaketa–Kyaikasan transmission line | 4.2 |
| | Kyaikasan substation (upgrade) | 14.3 |
| | South Okkalapa substation (new) | 15.7 |
| | West University substation (new) | 14.1 |
| | Civil works | 2.2 |
| | 2. Project implementation consultants | 3.8 |
| | 3. Project administration cost | 0.8 |
| | 4. Environmental and social safeguard | 0.3 |
| | 5. Taxes and duties | 3.4 |
| | **Subtotal (A)** | **67.2** |
| **B.** | **Contingencies**[c] | |
| | 1. Physical | 7.2 |
| | 2. Price | 7.5 |
| | **Subtotal (B)** | **14.7** |
| **C.** | **Financing charges during implementation**[d] | 1.4 |
| | **Subtotal (C)** | **1.4** |
| | **Total (A+B+C)** | **83.3** |

[a] Includes $3.4 million taxes and duties to be financed from Asian Development Bank loan resources.
[b] In July 2015 prices.
[c] Physical contingencies computed at 10% for all expenditure items. Price contingencies computed using inflation rates of 0.3% for 2015, 1.5% for 2016, 1.4% for 2017, and 1.5% for 2018–2020 for foreign exchange costs; and using inflation rates of 6.3% for 2015, 6.6% for 2016, 6.3% for 2017, and 6.1% for 2018–2020 for local currency costs. This includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
[d] Includes interest and commitment charges. Interest during implementation calculated at 1%.
Source: Asian Development Bank estimates.

[12] Including (i) 8.2 kilometers (km) of 230 kV double-circuit transmission line between the Thida and Thaketa substations, and 8.6 km of 230 kV single-circuit transmission line between Thaketa and Kyaikasan substations; (ii) the extension of the switchyard at the existing 230 kV Thaketa substation to accommodate two new 230 kV transmission lines; (iii) an upgrade of the existing Kyaikasan substation from 66 kV to 230 kV; and (iv) construction of new 230 kV substations at South Okkalapa and West University.

15. The government has requested a loan in various currencies equivalent to SDR56,678,000 from ADB's Special Funds resources to help finance the project, including taxes and duties, and interest during implementation.[13] The government requested and ADB confirmed financing of $3.4 million for taxes and duties from the ADB loan.[14] The loan will have a 32-year term, including a grace period of 8 years, an interest rate of 1.0% per annum during the grace period and 1.5% per annum thereafter, and such other terms and conditions set forth in the draft loan agreement. The financing plan is in Table 2.

**Table 2: Financing Plan**

| **Source** | **Amount** ($ million) | **Share of Total** (%) |
|---|---|---|
| Asian Development Bank | | |
| Special Funds resources (loan) | 80.0 | 96 |
| Government | 3.3 | 4 |
| **Total** | **83.3** | **100** |

Source: Asian Development Bank estimates.

## E. Implementation Arrangements

16. The MOEP will be the executing agency, and the MEPE will be the implementing agency for the project. The MEPE will be responsible for overall project implementation. A project implementation unit (PIU) to be established in the MEPE will be in charge of day-to-day implementation activities. The implementation arrangements are summarized in Table 3 and further described in the project administration manual (PAM).[15]

**Table 3: Implementation Arrangements**

| **Aspects** | **Arrangements** | | |
|---|---|---|---|
| Implementation period | January 2016–December 2019 | | |
| Estimated completion date | 30 June 2019 | | |
| Estimated loan closing date | 31 December 2019 | | |
| Management | | | |
| (i) Executing agency | MOEP | | |
| (ii) Implementing agency | MEPE | | |
| (iii) PIU | To be established by the MEPE and responsible for day-to-day implementation of the project. The PIU staffing and their responsibilities are outlined in the PAM. The PIU will be supported by the PICs. | | |
| Procurement | International competitive bidding | 2 contract packages | $ 59.49 million[a] |
| | Local procurement procedures | 1 contract package | $ 2.20 million |
| Consulting services | QCBS 90:10 (firm) | 209 person-months | $ 4.35 million[a] |
| Advance contracting | Recruitment of the PICs | | |
| Disbursement | The loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2015, as amended from time to time) and detailed arrangements agreed upon by the government and ADB. | | |

ADB = Asian Development Bank, MEPE = Myanmar Electricity Power Enterprise, MOEP = Ministry of Electric Power, PAM = project administration manual, PIC = project implementation consultant, PIU = project implementation unit, QCBS = quality- and cost-based selection.
[a] Base cost plus taxes and duties.
Source: ADB estimates.

[13] ADB loan may finance local transport and insurance costs.
[14] Taxes and duties are financed by the ADB loan because (i) the amount is within reasonable country thresholds; (ii) the amount of taxes and duties financed by the ADB loan does not represent an excessive share of the project investment plan; (iii) ADB financing will be limited to those taxes and duties that apply only to ADB-financed expenditures; and (iv) the financing of such taxes and duties is material and relevant to the success of the project.
[15] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

### 1. Procurement

17. The project will procure two design–build–supply–install–commission contracts—one for the Thida–Thaketa–Kyaikasan transmission lines; and the other for the construction of the South Okkalapa and West University substations, the extension of the Thaketa substation, and the upgrading of Kyaikasan substation. ADB will use international competitive bidding procedures and a single-stage one-envelope process in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). The government will finance the project administration costs, the environmental and social safeguards measures, and the construction of access roads and staff housing in substation areas with counterpart funds. It will follow its own procurement procedures. Further details are provided in the PAM (footnote 15).

### 2. Implementation Consultants

18. The project will require 209 person-months of consulting services, comprising 117 person-months of international and 92 person-months of national services. The project implementation consultants (PICs) will help manage and implement the project and strengthen MEPE staff capacity. A consulting firm will be engaged in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time), using the quality- and cost-based selection method with a 90:10 ratio and a full technical proposal. The detailed terms of reference for the consultants are in the PAM (footnote 15).

## III. DUE DILIGENCE

### A. Technical

19. The MOEP requires that the project transmission lines be overhead lines. The ADB's technical due diligence recommended the use of aluminum compact core conductors (ACCCs) to increase transmission capacity and of compact monopoles in combination with steel lattice towers where necessary.[16] This approach will make construction easier, lower costs, and ensure that the lines operate reliably. Compact monopoles will also minimize the land requirements for footings. ACCCs can carry a higher electrical load than usual conductors and will reduce transmission losses by one percentage point. The use of n-1 criteria in the power system design will improve the reliability and quality of electricity delivered to customers.[17]

### B. Economic and Financial

20. **Economic analysis.** The economic viability of the project was assessed in accordance with ADB's Guidelines for Economic Analysis of Projects by comparing the societal costs and benefits of the with-project and without-project scenarios.[18] The project will significantly boost the capacity and reliability of the power transmission network in the Yangon region, thereby making greater and more dependable electricity supply available to meet the rapidly increasing load demand.

21. The project will generate incremental benefits and nonincremental benefits. The incremental benefits will accrue from the additional transmission capacity. Power sales will rise

[16] The ACCCs are also being used for the Ahlone–Thida section under MOEP financing, and their use for the Thida–Thaketa section will ensure conductor compatibility.
[17] This gives the transmission and distribution networks the ability to lose a linkage without this causing an overload failure elsewhere.
[18] ADB. 1997. *Guidelines for Economic Analysis of Projects*. Manila.

by 1,000 GWh per year as soon as operations start in 2020, and these incremental sales will reach and level out at 3,300 GWh per year in 2025. The nonincremental benefits will arise from the avoidance of power outages in the Yangon region, and the analysis has estimated that this avoidance of power outages will be equivalent to 1,000 megawatt-hours per year. The incremental electricity sales have been valued at the long-term marginal cost, estimated to be $0.0932 per kWh.

22. The estimated economic internal rate of return is 14.4%. The net present value at a 12% discount rate is estimated to be $11.9 million. Sensitivity analysis confirmed that the project would remain economically viable under several important adverse scenarios.[19]

23. **Financial analysis.** The project's financial viability was examined in accordance with ADB's Financial Management and Analysis of Projects.[20] The MEPE is the sole buyer and wholesaler of electricity in Myanmar and purchases the electricity from all generation sources, including independent power producers. It sells this electricity for distribution to the YESC and the Electricity Supply Enterprise (ESE), which is responsible for electricity distribution outside Yangon region. The key factors determining the MEPE's financial performance are the price of gas used for power generation, the price at which it buys the electricity, and the wholesale electricity tariff. In 2014, the purchasing price was $0.02 per kWh–$0.07 per kWh, the generation price using gas was $0.10 per kWh, and the wholesale tariff was $0.055 per kWh for the YESC and $0.05 per kWh for the ESE.

24. The financial analysis compared in real terms the present values of the future revenue and cost streams of the with-project and without-project scenarios. The incremental project benefits to accrue from the additional electricity sales made possible by the project's transmission network upgrade were compared with the incremental costs of the project. The post-tax financial net present value of the projected incremental cash flows discounted at the weighted average cost of capital is $178 million. The estimated post-tax real financial internal rate of return of the project is 12.15%, higher than the weighted average cost of capital of 0.29%. This confirms that the project is financially viable. It remained so under sensitivity testing.[21]

## C. Governance

25. The government regulates electricity tariffs. The tariff is MK35–MK50 per kWh for residential consumers and MK75–MK150 per kWh for commercial and industrial consumers, depending on the consumption level. These low tariffs require the government to subsidize the cost of fuel for power producers and the operations of the MEPE, the ESE, and the YESC. A new electricity law adopted in 2014 opens the way for unbundling the power subsector, a greater role for the private sector, and the establishment of an independent electricity regulatory commission. Under the law, the electricity regulatory commission will set the electricity tariffs based on the cost recovery principles and in consultation with the government. The tariff reform will aim to improve efficiency and financial sustainability in the power subsector, while also meeting the government's poverty reduction objectives by providing electricity to the poor with affordable price.

26. The government is committed to improving governance and addressing corruption. An anticorruption commission was formed in January 2013, and an anticorruption law was

[19] Economic Analysis (accessible from the list of linked documents in Appendix 2).
[20] ADB. 2005. *Financial Management and Analysis of Projects.* Manila.
[21] Financial Analysis (accessible from the list of linked documents in Appendix 2).

promulgated in July 2013. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the MOEP. ADB will organize training sessions for MOEP and MEPE staff on all aspects of project implementation and ADB guidelines and procedures, including those for implementation, procurement, recruitment of consultants, disbursement, reporting, monitoring by ADB staff and the PICs, and prevention of fraud and corruption by ADB staff.

## D. Poverty and Social

27. By strengthening the power transmission network in the Yangon region, the project will build on ADB's Power Distribution Improvement Project (footnote 6), which is upgrading the distribution network in the region to benefit industry, commercial businesses, and residential consumers. Full realization of the project benefits will depend on the improvements being undertaken across the entire power subsector. More than one million customers in the Yangon region will benefit indirectly.

28. The project does not have a gender component or highly significant gender impacts. The influx of male workers at project construction sites may lead to a high risk of sexually transmitted infections. To mitigate these impacts, the turnkey contracts will include requirements for prevention and other health and safety measures. A code of conduct for workers is included in the environmental management plan (EMP). The PICs will conduct training sessions and information campaigns for the PIU, local communities, and workers on gender issues, including the prevention of HIV/AIDS and human trafficking. The social aspects of the project are described in the Summary Poverty Reduction and Social Strategy.[22]

29. The project is not located in areas where conflict or peace negotiations might affect the pace of project implementation. Consultations with institutional stakeholders from involved ministries, the Yangon city authorities, and the affected people did not identify any conflict-sensitive issues.

## E. Safeguards

30. The project is classified as category B for environment, category B for involuntary resettlement, and category C for indigenous peoples, in accordance with ADB's Safeguard Policy Statement (2009). Relevant safeguard documents have been prepared in accordance with the Myanmar's laws and regulations and the ADB Safeguard Policy Statement. These include (i) an initial environmental examination (IEE)[23] report with EMPs for all the project components, and (ii) a resettlement plan for the Thida–Thaketa transmission line and due diligence reports (DDRs) for the Thaketa–Kyaikasan transmission line and for the South Okkalapa and West University substations.[24] The safeguard documents have been disclosed on the ADB website.

31. **Environmental safeguards.** An IEE was undertaken to identify the potential environmental impacts and the measures needed to mitigate them. It included an environmental compliance audit of existing facilities. The IEE and EMPs were prepared in consultation with affected communities and stakeholders in the Yangon region in accordance with the SPS and Myanmar's laws and regulations. The potential environmental impacts the IEE identified are primarily related to construction. They include noise and dust pollution and sedimentation of a

[22] Summary Poverty Reduction and Social Strategy (accessible from the list of linked documents in Appendix 2).
[23] Initial Environmental Examination (accessible from the list of linked documents in Appendix 2).
[24] Resettlement Plans (accessible from the list of linked documents in Appendix 2).

creek during tower foundation work on its banks. The construction related impacts also include risk of electric shock, increased traffic and risk of traffic accidents near construction sites, concerns over the work camp waste management and workers' health and safety. These impacts are site-specific and can be mitigated and managed by the measures that have been incorporated into the EMPs.

32. The EMPs will form part of the bidding documents. Prior to awarding contracts, the MEPE will reassess the potential environmental impacts and ensure that appropriate mitigation measures are in place. A grievance redress mechanism and monitoring requirements are specified in the IEE and EMPs.

33. **Involuntary resettlement and indigenous peoples**. The project will involve permanent land acquisition for the monopoles and tower footings of the Thida–Thaketa–Kyaikasan transmission lines, the Kyaikasan substation upgrade, the South Okkalapa substation construction, and the access road to the West University substation. A total of 2,640 square meters ($m^2$) of land will be acquired for the Thida–Thaketa transmission line; 2,712 $m^2$ for Thaketa–Kyaikasan transmission line; and 3,875 $m^2$ for upgrading the Kyaikasan substation. Land for the South Okkalapa substation (58,000 $m^2$), belongs to the Ministry of Defense, while land for the West University substation belongs to the MOEP. A 6,782 $m^2$ strip of land cutting through the properties of Ministry of Transport and two private households will be acquired to build an access road to the West University substation. The project will also have temporary impacts during the construction of the transmission lines.

34. The MEPE has prepared one resettlement plan for the Thida–Thaketa transmission line, a DDR for the South Okkalapa and West University substations, and a DDR for the Kyaikasan–Thaketa transmission line. The resettlement plan for the Thida–Thaketa transmission line identifies 25 main structures that will be affected, and an estimated 23 households comprising 120 people will be entitled to compensation at full replacement cost for their lost assets, incomes, and businesses. The resettlement plan also provides the implementation arrangements, monitoring requirements, and a grievance mechanism. The compensation budget is included in the project costs to be financed by the MOEP.

35. No resettlement plan was prepared for the South Okkalapa and West University substations, since their respective DDRs showed that all the land will be acquired through negotiated settlement. The MEPE has committed to independent third-party verification, consistent with the ADB Safeguard Policy Statement. The DDR for the Kyaikasan–Thaketa transmission line found that one household could be affected by the location of a steel lattice tower. The MEPE has confirmed that it will not resort to expropriation should negotiations fail. Instead, it will change the line alignment or the tower location.

36. The project will not lead to any physical relocation or impacts on communities of indigenous people. None live within or close to the substations. Six ethnic minority households were identified along the Thida–Thaketa transmission line corridor, but they are not considered indigenous peoples in the context of the SPS and will not be affected by the project.

37. The MEPE will recruit the PICs with international and national safeguards specialists in environment and resettlement who will provide training and help the PIU implement the EMPs, and resettlement plans. The PICs will also give the PIU environmental management training. The estimated budget for the implementation of the safeguard mitigation plans has been incorporated in the project implementation costs.

## F. Risks and Mitigating Measures

38. The overall project risk is assessed to be medium. The integrated benefits and impacts of the project are expected to outweigh the project costs. The major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[25]

**Table 4: Summary of Risks and Mitigating Measures**

| Risks | Mitigating Measures |
|---|---|
| The government may not be able to establish a mechanism for setting tariff based on cost-recovery principles. Electricity tariffs may not be raised to cost-recovery levels. | ADB helped the government set up the Electricity Regulatory Commission, which will be tasked with establishing and implementing tariffs based on cost-recovery principles. The World Bank is also helping the government to study the impacts of tariff subsidies. Further assistance is planned by both ADB and the World Bank. |
| The large capital investments needed for the long-term expansion of the power subsector may not be available. | Development partners are working closely with the government to prioritize investment needs and help the government mobilize financing resources, including multilateral, bilateral, and private financing. |
| Implementation could be delayed by the government's multilayer approval requirements for evaluating bids and awarding contracts. | The use of one package for transmission lines and one package for substations was determined to be the best way to mitigate delay risks. Advance contracting is to be applied in recruiting the PICs. Consultants working under the project preparatory technical assistance have prepared the draft bidding documents for the two contract packages.[a] |

ADB = Asian Development Bank, PIC = project implementation consultant.
[a] ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for the Power Transmission and Distribution Improvement Project*. Manila (TA 8342).
Source: ADB estimates.

## IV. ASSURANCES AND CONDITIONS

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

## V. RECOMMENDATION

40. 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 in various currencies equivalent to SDR56,678,000 to the Republic of the Union of Myanmar for the Power Transmission Improvement Project, from ADB's Special Funds resources, with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan agreement presented to the Board.

Takehiko Nakao
President

30 October 2015

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

## DESIGN AND MONITORING FRAMEWORK

**Impacts of the Project is aligned with:**

Economic and social benefits to residential, commercial, and industrial consumers in the Yangon region from reliable and adequate supply of electricity (National Energy Policy, National Electrification Plan, Country Operations Business Plan, 2015–2017 for Myanmar)[a]

| Results Chain | Performance Indicators with Targets and Baselines | Data Sources and Reporting | Risks |
|---|---|---|---|
| **Outcome**<br>Improved reliability of the Yangon region's power transmission network | By 2020<br>a. Power transmission capacity increased by 900 MVA (2014 baseline: 1,315 MVA)<br>b. Transmission loss reduced by one percentage point (2014 baseline = 5.7%)<br>c. Electricity consumption increased by 1,200 GWh (2014 baseline = 6,000 GWh) | a–c. Annual reports of MEPE and YESC<br>a–c. Project benefit monitoring and post evaluation reports | The large capital investments needed for the long-term expansion of the power subsector may not be available |
| **Outputs**<br>1. A 230 kV power transmission ring, including 230 kV transmission lines and substations, developed for the Yangon region | By December 2019<br>(2014 baseline: 0)<br>1a. 8.2 km 230 kV double-circuit transmission line between Thida and Thaketa substations constructed and operational<br>1b. 8.6 km 230 kV single-circuit transmission line between Thaketa and Kyaikasan substations constructed and operational<br>1c. Thaketa substation extended to accommodate incoming and outgoing 230 kV transmission lines<br>1d. Kyaikasan substation upgraded to a full 230/66/11 kV 2 x 150 MVA substation and operational<br>1e. A 230/66/11 kV 2 x 150 MVA substation at South Okkalapa constructed and operational<br>1f. A 230/33/11 kV 2 x 150 MVA substation at West University constructed and operational | 1a–f. MOEP and MEPE annual reports<br>1a–f. ADB review missions<br>1a–f. ADB project completion report | Cost overruns |
| 2. Capacity of MEPE staff to implement ADB-financed projects strengthened | 2a. MEPE staff of PIU capable of (i) preparing resettlement plans and initial environment examinations in accordance with the ADB Safeguard Policy | | |

| Results Chain | Performance Indicators with Targets and Baselines | Data Sources and Reporting | Risks |
|---|---|---|---|
| | Statement (2009);<br>(ii) implementing resettlement plans, DDRs, and EMPs as approved;<br>(iii) conducting bidding and bid evaluation in accordance with ADB's Procurement Guidelines (2015, as amended from time to time);<br>(iv) contract award and signing;<br>(v) contract management; and<br>(vi) preparing project implementation monitoring reports and withdrawal application | | |

**Key Activities with Milestones**

1. **Output 1: A 230 kV power transmission ring, including 230 kV transmission line and substations, developed for the Yangon region**
   - 1.1 Complete first bidding documents (by October 2015)
   - 1.2 Recruit PICs (by March 2016)
   - 1.3 Update bidding documents and update and implement resettlement plans and DDRs (by September 2016)
   - 1.4 Award contract for transmission lines package (by March 2017)
   - 1.5 Award contract for substations package (by March 2017)
   - 1.6 Construct 230 kV transmission lines (by March 2019)
   - 1.7 Construct 230 kV substations (by March 2019)
   - 1.8 Complete testing and commissioning (by June 2019)
2. **Output 2: Capacity of MEPE staff to implement ADB-financed projects strengthened**
   - 2.1 Establish fully staffed PIU (by September 2015)
   - 2.2 Recruit PICs (by March 2016)
   - 2.3 Update and implement resettlement plans and DDRs for project area (by September 2016)
   - 2.4 Work with PICs to award contracts for transmission lines package and for substation package by March 2017
   - 2.5 Monitor project implementation (until December 2019)
   - 2.6 Complete project implementation monitoring (December 2019)

**Inputs:**

| | |
|---|---|
| ADB: | $80,000,000 |
| Government: | $ 3,300,000 |

**Assumptions for Partner Financing**

Outputs necessary to reach DMF outcome that are not administered by ADB include (i) upgrading Ahlone–Thida transmission line to full 230 kV system, (ii) construction of transmission lines to connect West University substation with the future 500/230 kV Hlang Thayar substation, and (iii) rerouting the current 230 kV transmission line between Hlawga and Thaketa via South Okkalapa substation. All will be financed by the government.

ADB = Asian Development Bank, DDR = due diligence report, DMF = design and monitoring framework, GWh = gigawatt-hour, kV = kilovolt, MEPE = Myanmar Electric Power Enterprise, MOEP = Ministry of Electric Power, MVA = megavolt-ampere, PIC = project implementation consultant, PIU = project implementation unit, YESC = Yangon Electricity Supply Corporation.

[a] ADB. 2015. *Country Operations Business Plan: Myanmar, 2015–2017*. Manila; MOEP. Forthcoming. *Myanmar National Electrification Plan*. Nay Pi Taw.

Source: ADB estimates.

## LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=46390-002-3

1. Loan Agreement
2. Sector Assessment (Summary): Energy
3. Project Administration Manual
4. Contribution to the ADB Results Framework
5. Development Coordination
6. Financial Analysis
7. Economic Analysis
8. Country Economic Indicators
9. Summary Poverty Reduction and Social Strategy
10. Initial Environmental Examination
11. Resettlement Plan: Due Diligence Report on South Okkalapa Substation and West University Substation Resettlement
12. Resettlement Plan: Due Diligence Report on Thaketa–Kyaikasan Transmission Line Resettlement
13. Resettlement Plan: Thida–Thaketa Transmission Line
14. Risk Assessment and Risk Management Plan