

Country Name	The Project for Formulation of Ramu System Power Development Master Plan and Lae Area Distribution Network Improvement Plan
Independent State of Papua New Guinea	

I. Project Outline

Background	<p>At the time of planning this project, Independent State of Papua New Guinea (hereinafter referred to as “PNG”) maintained high economic growth rate, which meant domestic power demand was also forecasted to increase in future. Especially, in Ramu System, which supplied power to provincial towns including Lae City, the second largest city in PNG, the peak demand was estimated to increase from 74.3 MW in 2012 to 104.8 MW in 2026. However, its power supply and network were insufficient and unstable, and unexpected power outages occurred frequently. In Lae City, the largest demand center in Ramu System, it suffered from frequent blackouts especially due to troubles of distribution network. Considering the future increase in power demand, it was necessary to develop a comprehensive power development master plan for Ramu System and a distribution network improvement plan in the Lae Area. (Figures at the time of ex-ante evaluation.)</p>										
Objectives of the Project	<p>This project aimed to formulate: (i) “Ramu System Power Development Master Plan (2016-2030)” and (ii) “Lae Area Distribution Network Improvement Plan (2016-2030)”, thereby contributing to the stabilization of power supply in the Ramu System Coverage Provinces.</p> <p>1. Expected Goals through the proposed plan¹:</p> <p>(i) In Ramu System, power supply is stabilized, through sustainable power development to meet the increasing power demand.</p> <p>(ii) In the target area of “Lae Area Distribution Network Improvement Plan (2016-2030)”, power is efficiently used with high reliability.</p>										
Activities of the Project	<p>1. Project Site:</p> <p>(i) “Ramu System Power Development Master Plan”: Ramu System Coverage Provinces (Morobe, Madang, East Highland, Western Highlands, Chimbu, Southern Highlands and Enga)</p> <p>(ii) “Lae Area Distribution Network Improvement Plan”: the Lae Area in Morobe Province (Lae City and Nadzab, Erap, Taraka, etc.)</p> <p>2. Main Activities: i) Formulating “Ramu System Power Development Master Plan (2016-2030)” consisting of the power generation development plan and the power network (transmission) expansion plan with environmental and social assessment²; ii-a) formulating “Lae Area Distribution Network Improvement Plan (2016-2030)” consisting of “short-term” and “long-term” development plans with Initial Environmental Examination, and ii-b) conducting on-the-job training for maintaining and managing the distribution network in the Lae Area.</p> <p>3. Inputs (to carry out above activities)</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">PNG Side</td> </tr> <tr> <td>1) Mission Members: 19 persons</td> <td>1) Staff Allocated: 11 persons</td> </tr> <tr> <td>2) Trainees Received: 5 persons</td> <td></td> </tr> <tr> <td>3) Equipment: 1 printer and 1 WIFI router</td> <td></td> </tr> </table>			Japanese Side	PNG Side	1) Mission Members: 19 persons	1) Staff Allocated: 11 persons	2) Trainees Received: 5 persons		3) Equipment: 1 printer and 1 WIFI router	
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Project Period	October 2014 – October 2016	Project Cost	(ex-ante) 406 million yen, (actual) 421 million yen								
Implementing Agency	PNG Power Limited (PPL); Department of Petroleum and Energy (DPE)										
Cooperation Agency in Japan	NEWJEC Inc.										

II. Result of the Evaluation

I Relevance
<p><Consistency with the Development Policy of PNG at the Time of Ex-Ante Evaluation></p> <p>The project was consistent with “Development Strategic Plan (2010-2030)” which aimed to achieve a rural electrification rate of 70 % electricity access to households by 2030. It also aligned with “Vision 2050” which targeted the rate of 100% renewable energy generation by 2050.</p> <p><Consistency with the Development Needs of PNG at the Time of Ex-Ante Evaluation></p> <p>As mentioned in “Background” above, the project was consistent with the development needs of PNG for formulating a master plan for Ramu System as well as a distribution network plan in the Lae Area, so that the power supply could be stabilized in the coverage areas.</p> <p><Consistency with Japan’s ODA Policy at the Time of Ex-Ante Evaluation></p> <p>The project was consistent with “Japan’s ODA Policy for the Independent State of Papua New Guinea (2012)”, focusing on energy/electricity infrastructure development, under a priority area, i.e. “Strengthening of the Foundation of Economic Growth”.</p> <p><Appropriateness of Project Design/ Approach></p> <p>Projects based on “Lae Area Distribution Network Improvement Plan (2016-2030)” were planned to be implemented at the time of</p>

¹ The degree of achievement of expected goals is not to be assessed in principle at the time of ex-post evaluation, since it is defined as the medium-to-long-term goals which will be attained as a result of crystallizing the proposed plan (“output” of the project).

² According to “JICA Guidelines for Environmental and Social Considerations (April 2010)”, this project is classified as “Category B”, i.e. with non-significant but potential adverse impacts.

ex-post evaluation, which was scheduled in three years after project completion. Accordingly, both short- and long-term plans were developed under “Lae Area Distribution Network Improvement Plan (2016-2030)”, and such project approach was appropriate. However, neither short- nor long-term plans were implemented at the time of ex-post evaluation. Especially for the short-term plan, the scope, target year and funding source of projects should have been clarified among stakeholders at project completion. Moreover, implementation of such projects with funding by donors could have been considered and discussed; considering a) power development in PNG had been promoted by donors, and b) the government’s procedure for approval of plans and budget appropriation tended to take a considerable time.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Status of Achievement for the Objectives at the time of Project Completion>

The project achieved the Objectives at the time of project completion. Both (i) “Ramu System Power Development Master Plan (2016-2030)” and (ii) “Lae Area Distribution Network Improvement Plan (2016-2030)” were formulated by reviewing existing facilities and forecasting the electricity demand up to 2030. Regarding (i), the existing “Fifteen-Year Power Development Plan (2014-2028)” was reviewed, and “Optimal Power Generation Development Plan” and “Mid- and Long-term Power System Development Plan” were proposed. Regarding (ii), aside from a long-term plan till 2030, a short-term plan was formulated. The short-term plan proposed four measures to reduce the duration to restore power, one of which was “installation of load-break switches” for de-energizing only damaged sections³. No target year was set for the short-term plan, but the estimated implementation period and cost of each measure ranged from nine to 12 months, and 21 to 134 million yen, respectively.

<Utilization Status of the Proposed Plan at the time of Ex-post Evaluation>

At the time of ex-post evaluation, utilization status of the proposed plan has not achieved its aims, i.e. (i) approval of the Master Plan, and (ii) securing budget and implementing projects based on the Distribution Network Improvement Plan. Likewise, none of the three indicators set at the time of ex-ante evaluation have yet been achieved. Regarding Indicator 1, “Ramu System Power Development Master Plan (2016-2030)” is still under the review of PPL due to frequent changes of the Board members. Regarding Indicator 2, funding allocation for “Lae Area Distribution Network Improvement Plan (2016-2030)” has not yet been requested to the Central government by PPL. Regarding Indicator 3, neither plans developed under the project are updated, whereas study findings reported by the project were incorporated into “Least Cost Power Development Plan (2020-2023)”, which replaced the existing “Fifteen-Year Power Development Plan (2014-2028)”. In addition, none of the four measures proposed by the short-term distribution network plan under the project have yet been implemented. PPL can implement projects in case of using its own budget, but no proposals by the formulated plans have been implemented with PPL’s own budget due to its limited amount.

On the other hand, considering power development in PNG has been promoted by donors and the private sector⁴, and the above indicators (such as the Central government’s approval of the plan and budget) do not capture the whole picture of utilization of the proposed plan. Regarding funding by donors, “Lae Area Distribution Network Improvement Plan (2016-2030)” is being utilized to identify and propose projects for external funding by the Asian Development Bank (ADB), the World Bank and also Japan’s grant aid on rural electrification. For example, improvement of distribution network in the Lae Area is to be implemented as part of the PPL’s urgent rehabilitation project, whose funding is being proposed to ADB under “Power Sector Development Investment Project (PSDIP)”. The proposal for the PSDIP was approved by ADB in February 2019. According to PPL, the PSDIP is currently at the procurement design stage, and improvement of 11 kV distribution network and existing substations in the Lae Area is planned to be implemented. Also, Japan’s grant aid on rural electrification in the Lae Area is planned.

Thus, the proposed plan has been utilized to a certain extent, but project implementation based on the plan has not yet commenced, and therefore the targeted utilization status has not yet been achieved.

<Status of Achievement for Expected Goals through the Proposed Plan at the time of Ex-post Evaluation>

The Expected Goals have been partially achieved. As mentioned above, funding plans have been partially put into shape, through identifying projects to propose for external funding. It is notable that development partners and PEP⁵ including the Government of Japan have formulated and implemented financial cooperation by utilizing the achievement of this project, although non-commencement of project implementation leads to evaluation judgement being still low at the time of ex-post evaluation.

<Other Impacts at the time of Ex-post Evaluation>

This project is under the account of a Japanese ODA loan project, “Ramu Transmission System Reinforcement Project”, which plans installing the second 132 kV transmission line (138 km) to Ramu System as well as constructing/rehabilitating key substations along the grid. Being commenced in March 2019, the construction of these facilities will stabilize the transmission of power in Ramu System, while improvement of the distribution network is a pre-requisite to the stable power supply in the Lae Area. This project led PPL to include distribution network upgrading in the Lae Area as its urgent rehabilitation project, and the funding was proposed to the World Bank as well as ADB. Thus, the interrelationship between this project and the Japanese ODA loan project has been confirmed. At the time of ex-post evaluation, however, it is not yet clear if the transmission and distribution projects will complete in a timely manner to produce synergy effects.

It should be noted that no negative impact has been observed.

<Evaluation Result>

In light of the above, the effectiveness/impact of the project is low.

³ The proposed four measures are: i) Installation of load-break switches (59 units), ii) Introduction of sequential switching systems (34 units), iii) Construction of an interconnection line (3.8 km), and iv) Upsizing of conductors for the trunk line (15.1 km). (Source: Final Report Part B, Chapter 4)

⁴ In 2011, the government of PNG adopted Electricity Industrial Policy, which focused on private-sector participation and competition, particularly in power generation activities. (Source: Final Report Part A, p.2-18)

⁵ PNG Electrification Partnership

Status of Achievement of Utilization Status of the Proposed Plan and Expected Goals through the Proposed Plan

Aim	Indicators	Results
(Utilization Status of the Proposed Plan) (i) “Ramu System Power Development Master Plan (2016-2030)” is approved by the Electricity Management Committee and is made publicly available. (ii) Budget for projects based on “Lae Area Distribution Network Improvement Plan (2016-2030)” is secured by PNG Power Limited (PPL) and the projects are implemented.	1. “Ramu System Power Development Master Plan (2016-2030)” is approved by the Electricity Management Committee, and is made publicly available.	(Ex-post Evaluation) not achieved - The plan has not yet been approved, and not yet made publicly available.
	2. Based on “Lae Area Distribution Network Improvement Plan (2016-2030)”, the budget is requested by PPL appropriately and approved by the government each year.	(Ex-post Evaluation) not achieved - The funding allocation has not yet been requested.
	3. The plans are updated as needed and appropriately, reflecting changes in the situation.	(Ex-post Evaluation) not achieved - Neither plans formulated under the project are updated.
(Expected Goals through the Proposed Plan) (i) In Ramu System, power supply is stabilized, through sustainable power development to meet the increasing power demand. (ii) In the target area of “Distribution Network Improvement Plan in the Lae Area (2016-2030)”, power is efficiently used with high reliability.	1. Funding plan(s), etc. put into shape based on the formulated plans	(Ex-post Evaluation) partially achieved - Funding plans have been partially put into shape, through identifying projects to propose for external funding.
	2. Proper facility standby power secured.	(Ex-post Evaluation) partially achieved - Munum Diesel Engine Generator (30 MW) was installed by an independent power producer, and was commissioned in 2017 as mentioned in the Master Plan.
	3. Coverage of the improved distribution network (e.g. number of districts)	(Ex-post Evaluation) not achieved - Several districts are planned to be covered under the PPL’s urgent rehabilitation project, especially focusing the Lae Top Town area, which, however, is not yet implemented.

Source : Final Report and other JICA documents, and responses to questionnaires to PPL and DPE.

3 Efficiency

While the project period was as planned, the project cost slightly exceeded the plan (ratio against the plan: 100% and 104%, respectively). The outputs of the projects were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

Aside from “Development Strategic Plan (2010-2030)” and “Vision 2050” still being effective, “National Electrification Roll-Out Plan (NEROP)⁶” aims to increase electricity access from 12% (an estimate) to 70% of households by 2030 through both on- and off-grid connections.

<Institutional/Organizational Aspect>

Out of the two implementing agencies of this project, PNG Power Limited (PPL) is in charge of technical aspects of the power sector development, whereas Department of Petroleum and Energy (DPE) is in charge of its policy aspects. Accordingly, PPL is responsible for submission for the approval of the Master Plan formulated under the project through the PPL Board and then to the Central government. Regarding DPE, at the project planning and implementation stages, its roles remained unchanged as DPE was responsible for the overall policy aspects and approval of the Master Plan. After project completion until late 2020, however, DPE’s role and functions on the approval process became limited due to the fact that PPL takes the ownership of the Master Plan and PPL is under the Ministry of State Enterprises, which is responsible for the approval of the Master Plan. DPE at this stage is in the transition period to become National Energy Authority (NEA), most of whose functions will be on the policy and regulatory aspects of the energy sector. Once the Master Plan is approved by the Ministry of State Enterprises, funding through “Public Investment Program⁷” is considered. Despite of such institutional arrangement for approval and budget appropriation, procedure towards them has not taken place.

<Technical Aspect>

To this project, four officials were assigned from DPE, and seven from PPL as the counterpart staff. Those officials are still working with DPE and PPL respectively, and engage in policy development at DPE and planning work at PPL. It is notable that these PPL officials are currently preparing PPL’s “Least Cost Power Development Plan” for the next 15 years. Moreover, under the project, the distribution team members of PPL Lae Regional Office were trained on the job in maintenance and management of distribution network. Those trained staff still engage in maintenance work in the Lae Area, sustaining their skills and knowledge.

<Financial Aspect>

As mentioned above, no government funding was secured specifically for the two plans formulated under the project. According to DPE, the funds can be appropriated, once the plans are approved by the Ministry of State Enterprises. Even without such approval, PPL can implement proposed measures with its own budget, but the amount is quite limited. At the same time, proposals for external funding were made to implement some of the proposed measures by the project. PPL is planning to strengthen its coordination with donors, by establishing the Project Delivery Office.

<Evaluation Result>

In light of the above, problems have been observed in terms of the institutional/organizational and financial aspects of the implementing agencies. Therefore, the sustainability of the project effects is fair.

⁶ Formulated with the assistance of the World Bank in 2013.

⁷ The government program for budgeting, planning and executing the medium- to large-scale impact projects in the country.

5 Summary of the Evaluation

The project achieved the Objectives at the time of project completion, by formulating (i) “Ramu System Power Development Master Plan (2016-2030)” and (ii) “Lae Area Distribution Network Improvement Plan (2016-2030)”. At the time of ex-post evaluation, utilization status of the proposed plan has not achieved its aims, i.e. (i) approval of the Master Plan, and (ii) securing budget and implementing projects based on the Distribution Network Improvement Plan. Nonetheless, both plans have been utilized to some extent: for updating PPL’s development plan, and for proposing projects for external funding. Regarding the Sustainability, problems have been observed in terms of the institutional/organizational and financial aspects of the implementing agencies. As for Efficiency, the project cost slightly exceeded the plan.

Considering all of the above points, this project is evaluated to be unsatisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

- It is recommended that PNG Power Limited (PPL) expedite reviewing “Ramu System Power Development Master Plan (2016-2030)”, and request for the Minister for State Enterprises to approve the plan, which will enable to secure government funding through “Public Investment Program”.
- It is recommended that PPL implement the four short-term measures (including installation of load-break switches) to reduce the duration to restore power, which were proposed by “Lae Area Distribution Network Improvement Plan (2016-2030)”. Such measures are indispensable to better maintenance of existing and expanded distribution network in the Lae Area, and requires relatively short time and low costs. “Lae Area Distribution Network Improvement Plan (2016-2030)” also requires approval by the Minister for State Enterprises for the Central government’s funding. Due to much delay in the approval process, however, PPL is advised to take initiatives to seek funding or to incorporate the measures into the projects to be implemented with funding by ADB, etc.

Lessons Learned for JICA:

- For assuring the approval of a proposed plan by a Development Planning Project, the responsibility and procedures need to be confirmed before commencing the project. In case of this project, PPL was to seek approval through its Board for the Minister responsible to endorse this project. However, PPL is still reviewing the Master Plan due to frequent changes of the Board members, which was unexpected at the time of project implementation. In order to avoid such unexpected situations, it is necessary for JICA to continuously monitor the approval procedure including the internal procedures of PPL as well.
- For Development Planning Projects, approval and/or implementation of the formulated plans are often set as evaluation indicators, as in the case of this project. Even though the achievements of this project have been utilized to formulate and implement financial cooperation by development partners including Japanese government, the practical utilization was not set as an evaluation indicator. Also, it was necessary to set appropriate indicators that take into account of external factors identified at the time of ex-ante evaluation, such as delays/changes in the approval process due to frequent changes of officers of PPL and change of the agency which is responsible for the approval of the Master Plan. Aside from such indicators, it is also important to evaluate the aspects of capacity building through formulation of plans. Under this project, officials assigned from PPL and DPE still engage in policy development or planning work of respective organizations. Moreover, the distribution team members of PPL Lae Regional Office, who were trained on the job under this project, still sustain their skills and knowledge to maintain distribution network in the Lae Area. Thus, it would be meaningful to set indicators for confirming the degree of capacity building, when formulating a Development Planning Project, where applicable.