

Country Name	The Project for the Upgrading of Electric Power Supply in Funafuti Atoll
Tuvalu	

I. Project Outline

Project Cost	E/N Grant Limit: 925 million yen	Contract Amount: 925 million yen
E/N Date	July, 2005	
Completion Date	December 2006	
Implementing Agency	Tuvalu Electricity Corporation (TEC)	
Related Studies	Basic Design Study: November 2004 – May 2005	
Contracted Agencies	Consultant	Yachiyo Engineering Co., Ltd
	Contractors	Mitsubishi Corporation and Dai Nippon Construction
	Suppliers	Mitsubishi Corporation and Dai Nippon Construction
Related Projects	Non-Project Grant Aid (FY2005 to FY2011)	
Background	Power supply for Funafuti, the capital of Tuvalu, was provided by a single diesel power station - Fogafale Power Station – with total output of 2,045k. However, due to the deterioration of facilities and equipment, the total output of existing generating units (No. 3, No. 4 and No. 5 units) had decreased to 840 kW (40% of full capacity). To make the situation worse, the peak power demand had doubled in the period from 1993 to 2003 with an average annual increase rate of as high as 7.46% while the increase of the supply capacity had fallen short of the demand increase, necessitating regular power cuts. The stable power supply was also needed to respond to expected demand growth for infrastructure development including government offices and others, to vitalize economic activities, and to stabilize social and welfare services.	
Project Objectives	Outcome To ensure stable power supply in Funafuti by installing new generating units at the Fogafale Power Station and upgrading 11 kV distribution facilities and cables.	
	Outputs(s) Japanese Side <ul style="list-style-type: none"> • Installation of new generating units (600kW x 3) at Fogafale Power Station • Construction of a power house at Fogafale Power Station • Procurement and installation for auxiliary electrical equipment • Installation of 11 kV distribution cables Tuvalu Side <ul style="list-style-type: none"> • Removal the existing TEC office on the Fogafale Power Station site • Securing or obtaining and clearing land for the new power house and new distribution equipment 	

II. Result of the Evaluation

Summary of the Evaluation
<p>Funafuti, the capital of Tuvalu, suffered frequent power failure due to the deterioration of power generation facilities and equipment and needed a stable power supply to respond to growing power demand accompanying with infrastructure development including government offices and others, economic vitalization, and stability in social and welfare services.</p> <p>The project has somewhat achieved its objectives. After the project completion, there has been no power failure, and the project has vitalized retailing industries and has supplied stable and quality power to public/welfare facilities in Funafuti, including hospitals. However, due to the limited demand growth, the facilities have not been fully utilized and therefore parts of objectives were not successfully achieved. As for sustainability, some problems have been observed in terms of technical and financial aspects as well as the current status of operation and maintenance. TEC needs technical support for alternate maintenance, and faces financial problems of high fuel costs, inappropriate pricing and others. In addition, salt corrosion has hampered the output of facilities installed by the project.</p> <p>For relevance, the project has been highly relevant with Tuvalu's development policy, development needs, and Japan's ODA policy at the time of ex-ante evaluation and ex-post evaluation. For efficiency, both the project cost and the project period were within the plan.</p> <p>In the light of above, the project is evaluated to be satisfactory.</p>

1 Relevance

<p>This project has been highly relevant with Tuvalu's development policy "development of basic infrastructure", which is one of the five priority areas of development programmes under the national development strategy, and power supply is an important part of those programmes, as well as Japan's ODA policy at the time of both ex-ante and ex-post evaluation. The project satisfies development needs in terms of stable power supply in Funafuti. The actual peak demand in 2011 was approximately 1MW which is lower than the forecast at the time of ex-ante evaluation (1,848kW peak demand in 2012).</p>
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This discrepancy occurs because the initial forecast was made based on the past actual demand trends due to difficulty of obtaining GDP forecast, while actual demand did not reach the target because of the global economic downturn. However,, the project satisfies the development needs at the time of both ex-ante and ex-post evaluation because it supplies stable power supply while there are no power supply sources other than the generating units installed by the project in Funafuti. Therefore, relevance of this project is high.

2 Effectiveness/Impact

This project has somewhat achieved its objectives. After the project completion, there has been no power failure, and the project has supplied stable and quality power to public/welfare facilities in Funafuti, including administrative offices, schools and hospitals. However, available supply capacity has not achieved the target due to the operational problem of existing generating units, although the capacity of generating units installed by the project is in line with the project target. The existing generators have not been in operation because their parts were removed and have not been replaced due to budget constraint. In addition, actual planned load factor of the three generating units installed by the project is 27 to 28 % as a result of low demand, while 79% was anticipated. As to the impact, the stable power supply by the project has vitalized retail business such as cold storage business since companies are able to use more refrigerating equipment. The project also has contributed to stabilized operation of public/welfare facilities, as the adverse effect by the power failure to the medical practices has been resolved. According to the implementing agency, there is no negative impact on natural environment since measures for air pollution and noises have been taken. There is no case of land acquisition and involuntary resettlement.

Therefore, effectiveness/impact of this project is fair.

	2003 Actual (BD)	2007 Planned (Year of completion)	2012 Planned	2007 Actual	2011 Actual	2012 Actual
Indicator 1 Available supply capacity (Reserve capacity)	820kW (0kW)	2,550kW (1,169kW)	2,460kW (612kW)	1,800 kW (950kW)	1,680kW (687kW)	1,650 kW (627 k w)
Indicator 2 Power failures caused by the aging and/or insufficient capacity of the distribution equipment	63times/yea r	0time/year	0time/year	0time/year	0time/year	0time/year
Indicator 3 (supplementary indicator) Annual operating hours of the facilities installed by the Project (hours) ①No.6 ②No.7 ③No.8	n.a.	8,000 hours is expected	n.a.	①5,188 ②5,093 ③5,195	①4,940 ②4,510 ③4,660	n.a.
Indicator 4 (supplementary indicator) Planned load factor of the facilities installed by the Project (Source) TEC	n.a.	52.5% is expected	78.7% is expected	28.26%	27.15%	n.a.

3 Efficiency

The outputs of the project were produced as planned, and both the project cost and the project period were within the plan (ratio against the plan: 100%, 97.1%). Therefore, efficiency of this project is high.

4 Sustainability

The facilities and equipment provided by the project are maintained by TEC, the implementing agency, and no problem in structural aspect is observed because a system is established and human resources required is secured. Currently, the government plans to nationalize TEC as a result of TEC's suspension of power supply to government offices due to nonpayment of electricity bills. However, few changes in operation and maintenance system are anticipated since when TEC was privatized, there were few changes in operation and maintenance system. The project has some problems in technical and financial aspects and current status of operation and maintenance. On the technical aspect, although TEC carries out regular training and tries to acquire technical skills through on-the-job training by engineers who implements regular check-ups, TEC needs more technical support in terms of alternate maintenance because TEC has not carried out proper alternate maintenance due to lack of initial on-the-job training. TEC faces financial problems such as high fuel costs, difficulty of setting adequate electricity prices, and high percentage of uncollected bills mainly from the government. Currently TEC has profit after tax thanks to Japan's Non-Project Grant Aid for fuel cost support, however, TEC might generate loss in the future because it is uncertain whether the Grant Aid continues. As to operation and maintenance status, although TEC carries out regular check-ups based on the annual operation plan, it faces various problems. Output

has been hampered to some extent due to the salt corrosion of radiator fin which was not anticipated at the time of the planning. TEC tried its best to maintain the radiator by scoring the rust off and painting. Operational status of existing three generating units is also a problem. Those generating units were not in operation because parts were removed and have not been replaced due to budget constraint.

Therefore, sustainability of this project is fair.

III. Recommendations & Lessons Learned

Recommendations for Implementing agency

1. Sales prices should be set to cover the cost sufficiently. Although people might be against for raising the prices, TEC needs to obtain understanding from people by setting the basic rate low with the promotion of Demand Side Management and by carrying out awareness promotion activities.
2. The output of the generating units installed by the project may decrease in the near future due to the salt corrosion and due to the nature of a diesel generator. Although current reserve capacity is sufficient, TEC needs to take measures for continues stable supply by procuring spare parts systematically, recovering the function of the existing generating units (No.3, 4 and 5), and carrying out repair and maintenance of the generating units installed by the project well in advance.

Lessons learned for JICA

1. Basically, economy in an island nation is dependent on international economy because it imports most of the domestically consumed goods. Because of international economic downturn since 2007, already plunged Tuvalu Trust Fund further worsened and therefore government revenue fell. As a result, energy demand fell below the forecast as construction of government buildings – the government is the main electricity consumer in Tuvalu - was cancelled. Electricity demand of a small island nation like Tuvalu with only 12,000 population is very small and fragile to any small outside conditions. Ex-ante evaluation needs to take such aspect into consideration and more strict demand forecast with sensitivity analysis should be carried out.
2. Economic foundation of a small island nation in the Pacific like Tuvalu which has limited industries and resources is very weak. In that case, JICA and a recipient country need to agree making an arrangement for the benefits to be sustainable including operation and maintenance system.



Generating units



Radiator