

# MALAYSIA

## Patau-Patau Power Station Extension Project

Report Date: November 1998

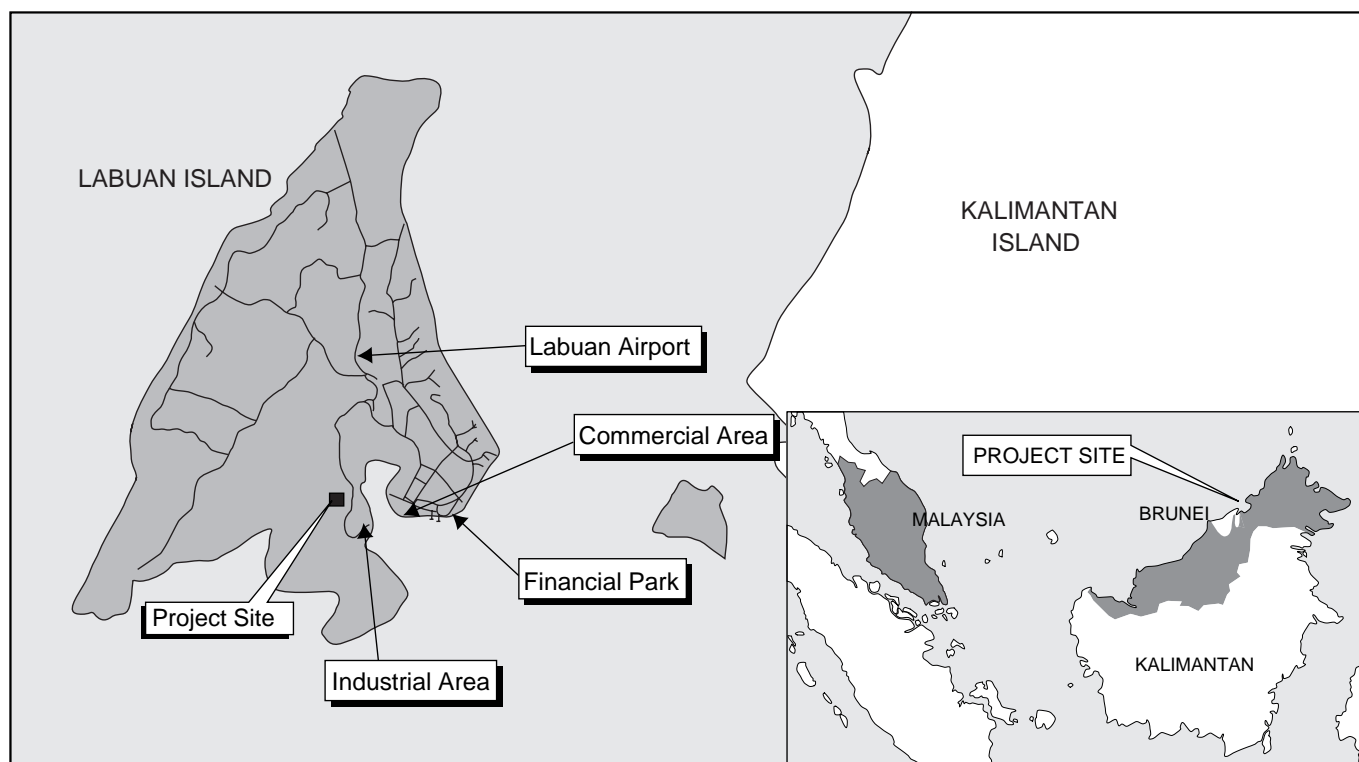
Field Survey: July 1998

### 1 Project Summary and JBIC's Cooperation

This project is aimed to meet increasing demand for electricity (particularly peak demand) in western coast power system of Sabah Province, Malaysia swiftly and economically, to provide stable electrical supply. To that end one additional gas turbine generator (33.2MW) was installed in the Patau Patau Power Plant on Labuan Island, Sabah Province (the island is under direct federal jurisdiction and a financial center etc. are being set up there under government policy).

The ODA loan covers the entire foreign currency portion required for the project.

Borrower / Executing Agency	Sabah Electricity Board: SEB / Sabah Electricity Board
Exchange of Notes / Loan Agreement	December 1992 / September 1993
Loan Amount / Loan Disbursed Amount	· 3,700 million / · 1,761 million
Loan Conditions	Interest: 3.0%, Repayment period: 25 years (7 years for grace period), General untied
Final Disbursement Date	August 1996



### 2 Evaluation Results

#### (1) Project Implementation

##### (i) Project Scope

The scope of the project has been completed mostly in line with the schedule.

With regard to the bidding for the generator facility, as the plan called for the procurement of a ready-built gas turbine under

a full turn-key base contract considering the emergency of the project, the range of the gas turbine specifications were broadened to cover output capabilities of between 28MW to 40MW. As a result of the bidding, the output capability was settled on 33.2MW.

(ii) Implementation Schedule

Installation was completed and test operations started fifteen months after the machinery was ordered in accordance with the schedule, and no particular problems arose regarding implementation schedule.

(ii) Project Cost

As can be seen in the “Comparison of Original Plan and Actual” below, a cost under-run of ¥1.452 billion arose against the original estimation (excluding contingency.) This difference in costs can be attributed to the three elements outlined below:

- Difference in the power of the gas turbine: Although the original plan called for a gas turbine with a maximum power capacity of 40.0MW, a 33.2MW turbine was actually adopted instead, as a result of bidding.
- Competition in bidding: Price competition through international competitive bidding brought about the actual price of the gas turbine per KW capacity below the estimated unit price.
- Fluctuations in the rate of exchange: The rate of exchange when the appraisal was being carried out was ¥122.90 to the U.S. dollar, but this changed to an average of ¥100.49 to the U.S. dollar during the 1994–95 period when the project was being implemented, led by a drastic appreciation of the yen that amounted to approximately twenty percent. This led to a reduction when the cost of the project was calculated in yen-based currency.

<b>Comparison of Original Plan and Actual</b>		
<b>(1) Project Scope</b>	<b>Plan</b>	<b>Actual</b>
¥ Gas turbine generator facility		
Gas turbine generator	1 unit (28-40MW output)	1 unit (33.2MW output)
Non-electrical power start-up generator	1 set (500-550kW, 450V)	
¥ Transformer facility	1 set	No alteration
¥ Civil works and construction	1 set	
<b>(2) Implementation Schedule</b>		
¥ Civil works	February 1994 ~ December 1994	February 1994 ~ December 1994
¥ Equipment manufacturing/transport	February 1994 ~ January 1995	February 1994 ~ February 1995
¥ Installation of equipment	January 1995 ~ April 1995	January 1995 ~ April 1995
¥ Test operation	May 1995	May 1995
<b>(3) Project Cost</b>		
Foreign currency	· 3,700 million	· 1,761 million
Local currency	RM1,682 thousand	RM1,077 thousand
Total	· 3,783 million	· 1,805 million
(excluding contingency)	(· 3,255 million)	(· 1,803 million)
Exchange rate	RM1 = · 49.2	RM1 = · 40.7
(RM: Malaysia Ringgit)	US\$1 = RM2.498	US\$1 = RM2.469

**(2) Organization of the Executing Agency (implementation and operation/maintenance after completion)**

(i) Project Implementation Scheme

The executing agency, SEB, is a Malaysian federal government organization in charge of electrical power development, power generation and electricity distribution in Sabah Province. SEB completed the project without any particular problems, and is thought to have no deficiencies with regard to its implementation capability. This project was evaluated (by SEB itself) as being the most successful amongst their projects implemented. It is thought that such evaluation owes largely to the use of experienced contractors and employment of the full turn-key scheme of bulk procurement.

(ii) Operations and Maintenance

SEB takes control of the project directly and is highly acclaimed for proper operations and maintenance. Although the project was originally planned to cater to peak loads, it is attaining high operation rates for it is actually catering to the base load.

A net operation rate is planned to be reduced by approximately half of the present rate, taking into account the increase of the electricity supply from the private sector.

### (3) Project Effects and Impacts

In comparison with the planned 7%, FIRR of 51% is attained in the case of 70% operation rate, and 37% in the case of 35% operation rate. They are higher than expected because the project cost was kept low and the amount of electricity generated increased for catering to the base load.

The qualitative effects were diversification of energy sources that use domestically produced natural gas and stabilization of the electricity power supply on the province of Sabah's western coast power system.

Movements in the Energy Supply Sources in Malaysia					Unit (Peta Joule: 10 <sup>15</sup> J)	
	1985	1990	1995*	2000P	Average increase rate (1991-95)*	Prediction of average increase rate (1996-2000)P
Petroleum	406 (70.9)	520 (71.4)	746 (55.3)	943 (49.4)	7.5%	4.8%
Natural gas	109 (19.0)	115 (15.7)	456 (33.8)	794 (41.6)	32.0%	11.7%
Hydroelectric	43 (7.4)	38 (5.3)	53 (3.9)	54 (2.8)	6.6%	0.3%
Coal	15 (2.7)	56 (7.6)	93 (7.0)	118 (6.2)	10.9%	4.8%
Total	573 (100.0)	729 (100.0)	1,348 (100.0)	1,909 (100.0)	13.1%	7.2%

(Note) \*: Provisional values. P: Values planned in 1996. Figures in parentheses are shares (%).

(Source) The Sixth and Seventh Malaysian Plan.

Movements in the West Coast Power Supply of Sabah Province									
Year		1990	1991	1992	1993	1994	1995	1996	1997
Generating facility capacity	(MW)	n.a.	n.a.	280.3	281.1	279.1	292.4	306.9	343.8
Maximum load	(MW)	111.7	123.1	150.8	162.4	174.4	193.9	211.9	224.6
Maximum load increase rate	(%)	n.a.	10.2	22.5	7.7	7.4	11.3	9.3	6.0
Power generating volume	(GWh)	698	715	837	942	1,025	1,137	1,228	1,334
Load rate	(%)	71.3	66.3	63.4	66.2	67.1	66.9	66.2	67.8
Selling power volume	(GWh)	539	508	689	758	835	938	1,046	1,139

(Source) SEB

## 3 Lessons Learned

Nothing in particular.



Gas turbine situated by this project