

MALAYSIA

Engkilili Sibul Transmission Line Construction Project

Report Date: March 1999

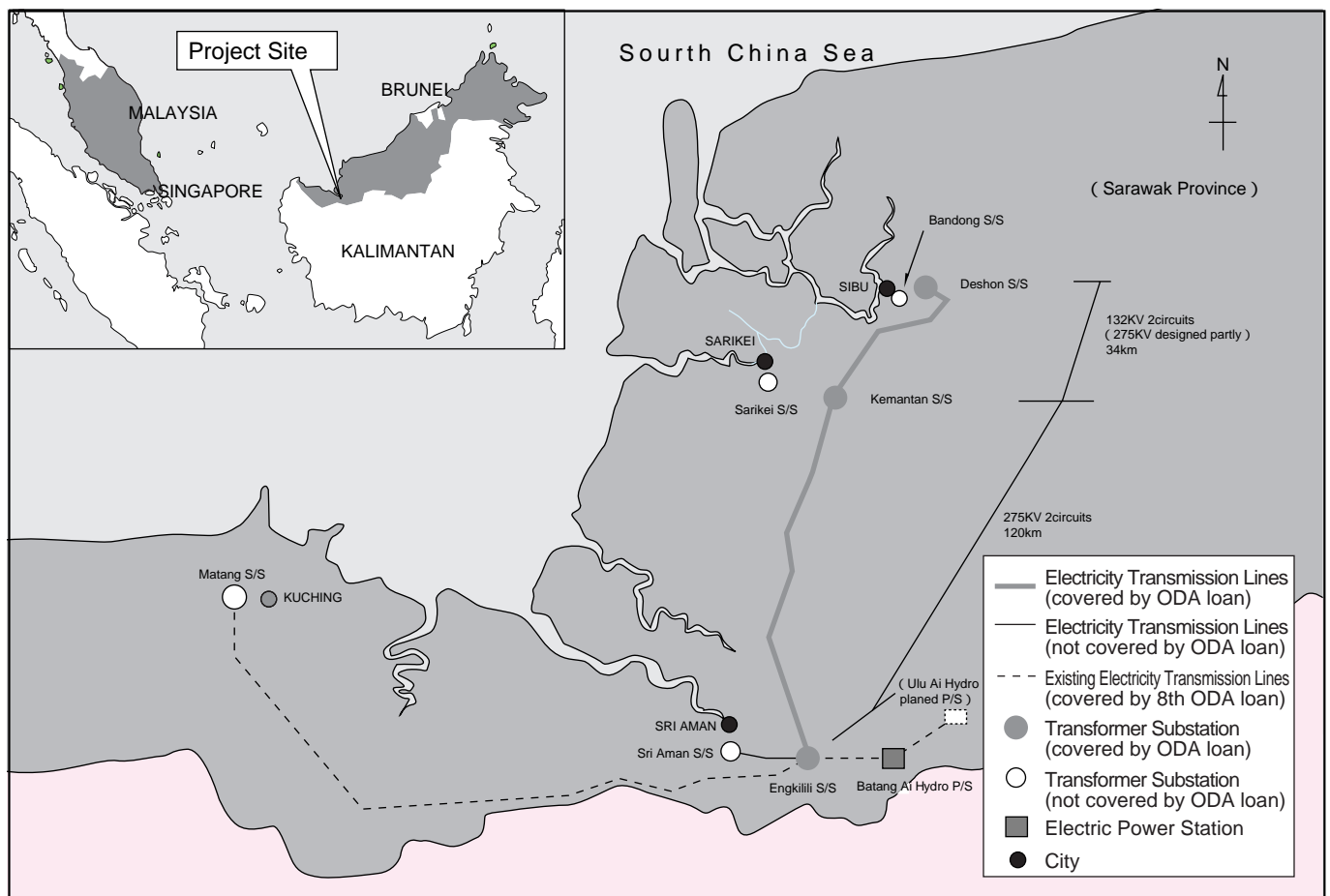
Field Survey: Not implemented

1 Project Summary and JBIC's Cooperation

This project is designed to make more effective use of the electrical power generators in the Batang Ai Hydro Power Plant in Sarawak Province, Malaysia, and is aimed to respond to the increase in the demand on electricity in the Sibul region of Sarawak and improve the electrical power supply system in the western part of Sarawak Province, such as the Sarikei, Sri Aman and other regions.

The ODA loan covers the entire foreign currency portion for the electricity transmission lines (275, 132kV) and a part of the equipment for the transformer substation (275, 132kV voltage transformers and shunt reactors.)

Borrower / Executing Agency	Sarawak Electricity Supply Corporation / Sarawak Electricity Supply Corporation (Guarantor: Malaysia)
Exchange of Notes / Loan Agreement	October 1986 / November 1986
Loan Amount / Loan Disbursed Amount	· 4,357 million / · 3,811 million
Loan Conditions	Interest: 5%, Repayment period: 25 years (7 years for grace period), Partial untied
Final Disbursement Date	May 1990



2 Evaluation Results

(1) Project Implementation

(i) Project Scope

The scope of this as a whole project was completed mostly in accordance with the original plan.

(ii) Implementation Schedule

Of the portions in the implementation schedule of this project, the portion covered by the ODA loan was commenced immediately after concluding the loan agreement. While in the original plan the project would be completed by March 1988, it was actually completed in May 1988, which was mostly in accordance with the original plan.

(iii) Project Cost

The total project costs experienced a 14% overrun of RM154,417 thousand against the RM135,173 thousand of the original plan. On the other hand, the costs of the portion covered by the ODA loan was lower at ¥3,811 million, as opposed to the ¥4,357 million of the original plan. However, ¥458 million was calculated as contingency in the original plan, and if this is subtracted from the total, the actual cost was almost the same as the original plan.

Comparison of Original Plan and Actual

(1) Project Scope	Plan * Underlined parts show the Scope covered by ODA loan	Actual
(i) Transmission lines	(1) <u>275kV X 2 lines</u> ...Engkilili ~ Kemantan section 120km (2) <u>132kV X 2 lines</u> ...Kemantan ~ Deshon section 34km (275kV design for 26km section from Kemantan) (3) 33kV X 1 line...Engkilili ~ Sri Aman section (2 routes) 37+37km, Kemantan ~ Sarikei section (2 routes) 35+38km (4) 33kV X 2 lines...Deshon ~ Bandong section 6km	Implemented as planned
(ii) Transformer substation	(1) Engkilili Transformer Substation... <u>275/33kV, 30MVA</u> transformer X 1, 33/11kV, 2.5MVA transformer X 1 (2) Kemantan Transformer Substation... <u>275/132kV, 30MVA</u> transformer X 2, <u>132/33kV, 20MVA</u> transformer X 1, 33/11kV, 2.5MVA transformer X 1, 11/0.415kV, 200kVA transformer X 2 (3) Deshon Transformer Substation... <u>132/33kV, 75MVA X 2</u> , 33/11kV, 10/15MVA transformer X 2 (4) Sri Aman Transformer Substation...33/11kV, 7.5/10MVA transformer X 2 (5) Sarikei Transformer Substation...33/11kV, 7.5/10MVA transformer X 2 (6) Bandong Transformer Substation...33/11kV, 10/15MVA transformer X 2	Implemented as planned
(iii) Electric-power/transfer equipment	1 set	Implemented as planned
(iv) Engineering service	171M/M (Design, preparation of bidding documents & contract, technical guidance, construction supervision)	Implemented as planned
(2) Implementation Schedule (Start of construction ~ Completion of construction)		
Overall project	January 1985 ~ December 1987	January 1985 ~ August 1988
ODA loan portion	November 1986 ~ March 1988	November 1986 ~ May 1998
(3) Project Cost		
Total project cost	RM135,173 thousand	RM154,417 thousand
Covered by ODA loan	· 4,357 million	· 3,811 million
Exchange Rate (RM = Malaysian Ringgit)	RM1 = · 87	RM1 = · 56.78 (weighted average value)

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

(i) Implementation Schem

The executing agency for this project was the Sarawak Electricity Supply Corporation (SESCO). SESO is solely responsible for electricity generation and transmission/distribution projects in Sarawak Province and played the major role as the executing agency in the Batang Ai Hydro Power Plant project, which is the electric source of this project. No particular problems were recognized with SESO's implementation capabilities.

A British company was hired to act as a consultant (not covered by the ODA loan,) and took charge of the design, the preparation of bidding documents and contracts, technical guidance and other matters. No problems were noted with the performance of the consultants.

Foreign companies were hired as the contractors and carry out a foreign currency portion of the procurement and installation of equipment. Japanese company was contracted for the metal towers, cables, insulators and other areas related to the transmission lines as one package. A Swiss company was contracted for the 275 and 132kV switching devices used in the transformer substations. Another Japanese company was contracted for the 275 and 132kV transformers and shunt reactors, and a Swedish company was contracted for the 33 and 11kV transformers. A local Malaysian company was contracted for the civil works in the transformer substations. No problems were noted with the performance of these contractors.

(ii) Operations and Maintenance

The transmission line route constructed in the project were split into five sections of maintenance, and a total of sixteen personnel perform visual inspections for maintenance at least once per year. Regular inspections at a rate of three times per year are carried out on the transformers and other equipment installed in the transformer substations.

A crack was discovered in the cross arm in the metal tower during one of the regular inspections of the 275kV Batang Ai transmission lines (the eighth ODA loan project that commenced operations in March 1985: A separate project from this project) and JBIC implemented SAPS including this project in 1993. Having assumed the cause of the crack, SAPS suggested that SESCO should carry out the inspection patrols of transmission lines, and replacement of the cross arms if necessary. SESCO reported that since then, inspection patrols have been carried out on the transmission lines in this project three times and one of the cross arms was replaced in March 1995.

(3) Project Effects and Impacts

Incorporating a 275kV/132kV grid through this project has enabled the city of Sibul, Sarawak’s second largest city to receive electricity from five major power stations (as of 1996), and the level of reliability of the power supply to the city has been increased.

As the table below shows, the transmission and distribution loss rate was around 15% between 1994 and 1996. This is similar to the levels in other Asian countries such as the Philippines (17% in 1990) and Thailand (11% in 1990).

The electrification rate was 64% in 1994 (for the whole of SESCO). The maximum electrical power and the quantity of power generated both increased as predicted at the time of the appraisal.

Summary of Electrical Power Supply											
Item/Year	Unit	87	88	89	90	91	92	93	94	95	96
Maximum power	MW			121	136				(*2)	219	260
Prediction at the time of appraisal		112	135	149	165	182	200	219	239		
Quantity generated	GWh			456	514				(*2)	1,250	1,451
Prediction at the time of appraisal		529	591	659	733	813	898	989	1,086		
Transmission and distribution losses (*1)	%	16	20	18	15	15	17	16	15	14	15
Electrification rate	%	52	53	55	58	59	60	62	64		
Prediction at the time of appraisal		54.6	57.7	60.9	64.3	68.4	72.9	77.6	82.3		
Power outage time	(Hour/year)				6	1	0	0	1		
Number of users	1,000 households			71	114					179	193

(Source) Follow-up Studies of Completed Projects (1990), Annual Report of SESCO (1996).

(*1) Transmission losses are for the whole of SESCO.

(*2) The prediction at the time of the appraisal did not include Bintulu in the grid. Therefore it is excluded here for the sake of comparison.

The FIRR, recalculated according to the recorded results, was 8.16%. The reasons why FIRR fell below the 17.3% calculated at the time of the appraisal were that (1) the area supplied with electricity by the Batang Ai Hydropower Plant was smaller than planned, (2) electricity charges were set aside, and (3) the indirect costs and operation and maintenance costs were higher than predicted at the time of the appraisal.

3 Lessons Learned

Nothing in particular.