

INDONESIA

Gas Firing Modification Works of Gresik Steam Power Plant Units III and IV

Report Date: March 1999

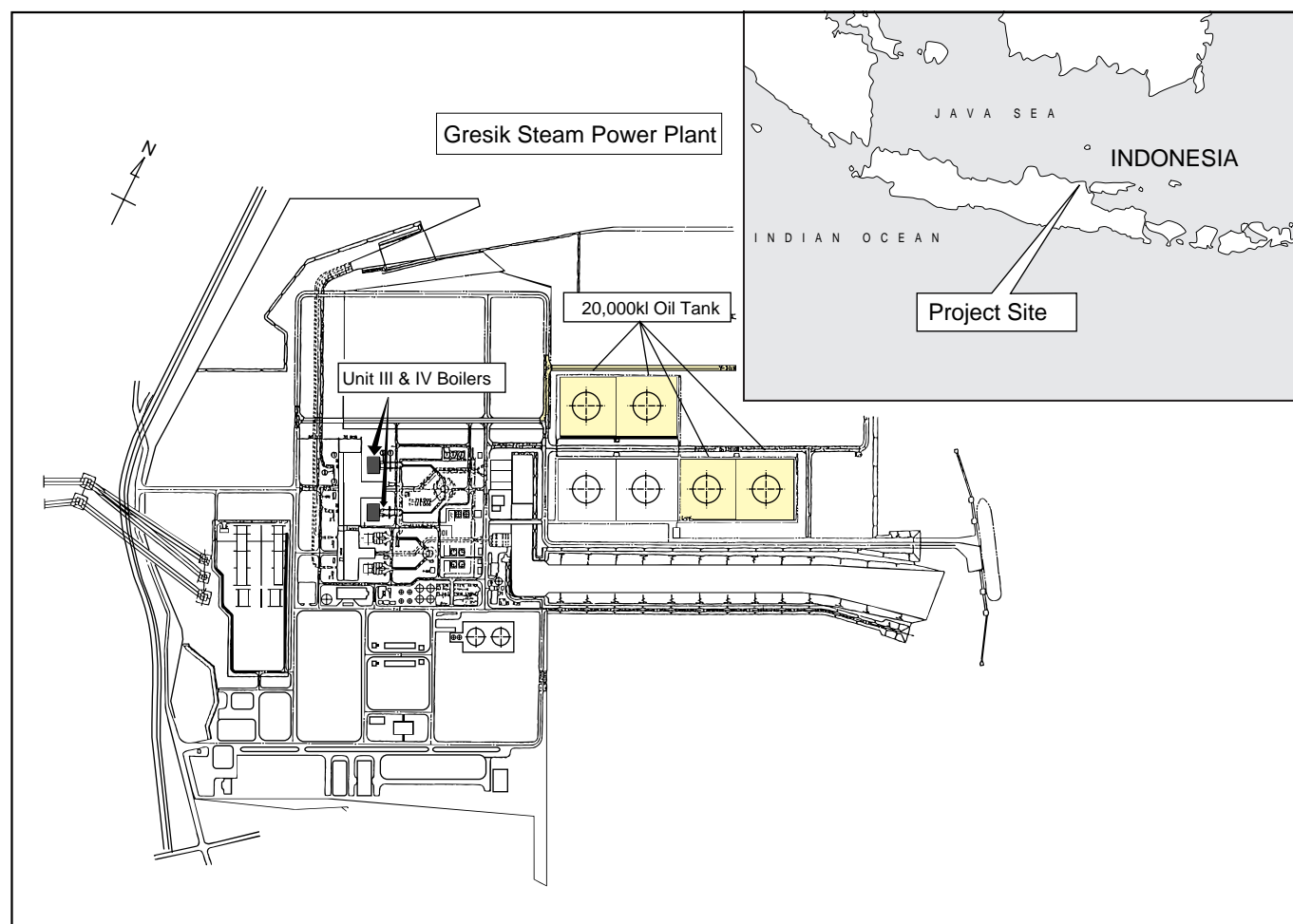
Field Survey: Not implemented

1 Project Summary and JBIC's Cooperation

This project is based on the "Reduction in Oil-Reliance Through the Diversification of Energy Sources" as the national policy of Indonesia since the 1970s, and is designed to improve the Unit III and IV heavy oil boilers (both with a 200MW capacity) operating in the Gresik Steam Power Plant located 20km northwest of the city of Surabaya in the eastern part of Java Province, to enable them to burn both heavy oil and gas.

The ODA loan covers the entire foreign currency portion for modification of Unit III and IV boilers to gas/heavy oil boilers and consulting services.

Borrower / Executing Agency	Government of the Republic of Indonesia / Perusahaan Umum Listrik Negara (PLN)
Exchange of Notes / Loan Agreement	December 1989 / December 1989
Loan Amount / Loan Disbursed Amount	· 4,445 million / · 4,314 million (excluding charges)
Loan Conditions	Interest: 2.5%, Repayment period: 30 years (10 years for grace period), Partial untied
Final Disbursement Date	December 1994



2 Evaluation Results

(1) Project Implementation

(i) Project Scope

No amendments were made to the project scope, and the Unit III and IV were converted to burn both gas and heavy oil in accordance with the plan. Contract period of the foreign consultants was added (extended) in accordance with the extension of implementation schedule. This was to ensure the smooth implementation of the project and is considered to be valid.

(ii) Implementation Schedule

The project was completed approximately three years behind the plan at the time of appraisal. The causes for this were the stringency of a balance between the supply and demand of electricity in Indonesia, and delays of the construction of the gas pipelines that supply fuel to the Unit III and IV (not covered by the ODA loan.) (Plant operations could not be halted for the former, and test operations for the remodeled Units was delayed for the latter.) Both of these are external causes, and no delays resulting from problems of the project itself occurred.

(iii) Project Cost

There were no major changes in the foreign currency portion for the conversion to dual-burning boilers. On the other hand, there was a vast increase for the local currency portion. This was because local currency was used to cover a certain amount of the foreign currency portion included in the initial calculation. Consequently, the entire project cost was mostly contained within budget.

As explained in the section on the project scope, there was a slight overrun in the foreign currency portion for consulting services, but this was covered by contingency. The local currency portion for consulting services experienced a cost under-run. Although both had slight fluctuations, this did not cause any particular problems.

Comparison of Original Plan and Actual

(1) Project Scope	Plan	Actual
Remodeling construction of gas/ heavy oil burning		
(i) Installation of gas/heavy oil burner	20 units	Same as planned
(ii) Gas supply facility	Gas piping	Same as planned
(iii) Incidental electric facility	1 set	Same as planned
Consulting service	167.5 M/M	135.49 M/M
Foreign	92.0 M/M	99.64 M/M
Local	75.5 M/M	35.85 M/M
(2) Implementation Schedule		
Contract signing of consultant	January 1990	January 1990
Contract signing for remodeling	June 1990	May 1991
Equipment design, manufacturing, shipping	June 1990 ~ February 1991	May 1991 ~ February 1993
Remodeling construction of Unit III	March 1991 ~ September 1991	March 1993 ~ August 1994
Remodeling construction of Unit IV	August 1991 ~ February 1992	March 1993 ~ August 1994
Consulting service	February 1990 ~ February 1992	February 1990 ~ August 1994
(3) Project Cost		
Total project cost	· 4,960 million	· 4,978 million
Foreign currency	· 4,445 million	· 4,314 million
Local currency	Rp.7,059 million	Rp.11,857 million
Exchange rate	Rp.1 = · 0.073	Rp.1 = · 0.056

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

(i) Implementation Scheme

The executing agency is PLN under the jurisdiction of the Ministry of Mining and Energy. PLN was engaged in several ODA loan projects at that time. As the consultants and contractors had a firm knowledge of the existing facilities in the Gresik Steam Power Plant, the remodeling work was completed without any problems. As the delay in the implementation schedule was due to external causes, it resulted in no major performance problems for PLN, the consultants and the contractors.

(ii) Operations and Maintenance Scheme

PLN was altered by the state-owned power company (P.T.PLN (Persero)) in August of 1994, and the power generation section was divided into two and reorganized into subsidiary companies. The Gresik Steam Power Plant belongs to the Java-

Bali Power Generation Company II (PJB-II). This power plant employs 234 staff, of which fourteen are involved in daily maintenance.

(iii) Operations and Maintenance

Ever since commencing operations of the remodeled Units in August '94, Unit III and IV have managed to continually achieve good results with around 60% usage rates against the planned figure of 75.0% and around 90% operation rates against the planned figure of 75.0%. These rates include the periods when operations were systematically stopped for inspections and repairs, and both Unit III and IV can be said to be experiencing favorable power generation and maintenance performances.

Status of Power Generation for Gresik Steam Power Plant Units III and IV									
		FY	Planned value	1992	1993	1994	1995	1996	1997
Item									
Unit III	Power generation volume (GWh)		1,314.00	1,416.66	789.14	929.07	1,421.48	1,074.56	898.72
	Operating hours (h)		6,570.00	8,693.70	4,856.40	5,389.60	8,290.50	8,121.90	7,536.40
	Planned stoppage hours (h)		—	66.30	3,901.90	3,369.60	469.50	638.10	1,072.20
	Accident stoppage hours (h)		—	0.00	1.70	0.80	0.00	0.00	6.60
	Operating ratio (%)		75.00	99.24	55.44	61.53	94.64	92.72	86.03
	Usage rate (%)		75.00	80.85	45.04	53.03	81.13	61.33	51.30
Unit VI	Power generation volume (GWh)		1,314.00	1,198.99	564.57	747.79	1,245.20	1,113.80	1,010.33
	Operating hours (h)		6,570.00	7,634.00	4,592.00	N.A.	8,237.60	N.A.	8,589.20
	Planned stoppage hours (h)		—	987.00	4,168.00	N.A.	522.40	N.A.	0.00
	Accident stoppage hours (h)		—	139.00	0.00	N.A.	0.00	N.A.	170.80
	Operating ratio (%)		75.00	87.15	52.42	N.A.	94.04	N.A.	98.05
	Usage rate (%)		75.00	68.44	32.22	42.68	71.07	63.57	57.67

(Source) PLN

(Note) Usage rate: Power generation volume / power generation facility capacity (regular output × 8,760 hours)
Operating ratio: Annual operating hours / 8,760 hours

(iv) Financial Status

Consolidated financial reports for the whole of P.T.PLN (Persero) for fiscal '96 and '97 show an increase in operation profits, and there seem to be no problems with the revenue of the project itself. However, losses were recorded owing to weak rupee which led to the loss by the exchange rate fluctuation (a drop of approximately 20% against the dollar in comparison with 1996 (IFS yearly average)) and overall profits entered minus figures.

(3) Project Effects and Impacts

- (i) The financial internal rate of return (FIRR) at the planning stage was calculated at 15.8% on the assumption that the ratio for gas burning would be 60%. However, the actual gas burning ratio of Unit III and IV is almost 100%. Recalculating FIRR by 100% of gas burning ratio based on the same assumption of costs at the time of appraisal resulted in 25.9% of FIRR. On the other hand, calculating the FIRR based on the actual results of construction costs and maintenance costs for the project, a figure of 28.7% is reached.
- (ii) In the final year of Indonesia's 5th Five-Year Plan, which fell within the implementation period of this project, the proportion of electricity generated using non-petroleum energy sources reached 42.6%, exceeding the 42% target value set in the plan. It is difficult to grasp the direct effectiveness of this project, but from the point of view of effective use of resources, it is highly significant.
- (iii) The conversion of fuel to gas greatly reduces the emissions of SOx and NOx from Gresik Steam Power Plant which means the conversion has a positive environmental impact.

Power from Each Energy Source in the Final Year (1993/1994) of 5th Five-Year Plan in Indonesia						
Energy source	Oil	Natural Gas	Coal	Geothermal	Hydraulic	Total of Non-oil
Oil equivalent, 1 million barrels	82.60	10.00	21.50	2.03	27.88	61.41
%	57.4	6.9	14.9	1.4	19.4	42.6

(Source) 5th Five-Year Plan in Indonesia

3 Lessons Learned

Nothing in particular.



Power Generator
(Left: Unit III, Right: Unit IV)