

Republic of Indonesia

FY 2015 Ex-Post Evaluation of Japanese ODA Loan Project
“South Sumatra–West Java Gas Pipeline Project”

External Evaluator: Masumi Shimamura,
Mitsubishi UFJ Research and Consulting Co., Ltd.

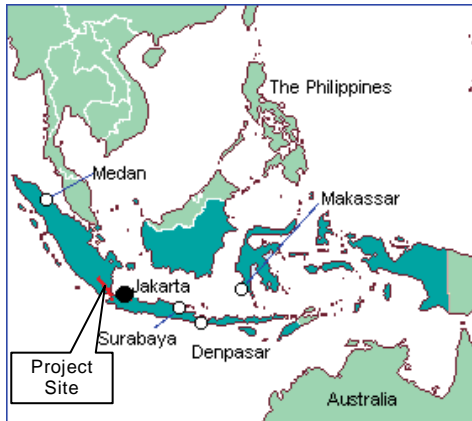
0. Summary

This project constructed gas transmission pipelines from Sumatra to West Java with the aim of facilitating effective utilization of unused gas in Sumatra and dealing with the problems of gas supply shortage in West Java. The project is consistent with Indonesia’s energy policy and with the development needs at the time of appraisal and ex-post evaluation, as well as Japan’s ODA policy at the time of appraisal; thus, the relevance of the project is high. Project cost exceeded the plan and project period significantly exceeded the plan. Therefore, efficiency of the project is low. Operation and Effect Indicator – transmission volume of gas – set at the time of appraisal has considerably exceeded the target figure. In addition, the project has been contributing to effective use of unused gas and increase of gas supply in West Java. Furthermore, employment generation and benefits to local residents and companies after the project completion have been confirmed. The project has largely generated its planned effects; thus, effectiveness and impact of the project are high. No negative impact on natural environment has been pointed out. Relocation and land acquisition processes have been implemented properly without any problems. As regards impacts of four ODA loan projects¹ including this project, it can be pointed out that conversion of energy source from oil to gas has been encouraged, and past achievements of gas-fired combined cycle power plant projects utilizing ODA loans have facilitated introduction of Japan’s high quality infrastructure technology in Indonesia. No major problem has been observed in the institutional, technical and financial aspects of the operation and maintenance system as well as in the current status; thus, sustainability of the project effects is high.

In light of the above, this project is evaluated to be satisfactory.

¹ Four projects are: “South Sumatra-West Java Gas Pipeline Project”, “Tanjung Priok Gas Fired Power Plant Extension Project”, “Muara Karang Gas Power Plant Project”, and “Muara Tawar Gas Fired Power Plant Extension Project”.

1. Project Description



Project Locations



Pagardewa Station

1.1. Background

The Indonesian government has been promoting the development of alternative energy resources of oil in its energy policy. Natural gas, of all other fuel, has enough reserves, and is superior fuel in terms of energy efficiency, safety, and environmental aspects; thus it is considered to be the most promising alternative energy. Under such situation, it was necessary to construct West Java gas pipelines in West Java where consumption of gas is the most in Indonesia, transport gas from Sumatra where it has excess supply capacity to West Java where it has great demand, utilize unused gas, facilitate effective use of resources, and cope with gas supply shortage problems in West Java where Capital Jakarta is located.

1.2 Project Outline

The objective of this project is to enhance unused gas utilization by constructing gas transmission pipelines to transport natural gas produced at gas fields in Sumatra to Java, and developing gas supply networks in West Java, thereby contributing to dealing with the problems of gas supply shortage in West Java and to the development of competitive gas market.

Loan Approved Amount/ Disbursed Amount	49,088million yen / 48,538million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January, 2003 / March, 2003
Terms and Conditions	Interest Rate 0.95% (0.75% for Consulting Services)

	Repayment Period 40years (Grace Period) (10years) Conditions for Procurement Japan Tied (Special Yen Loan) (Bilateral Tied for Consulting Services)
Borrower / Executing Agency	Republic of Indonesia / PT Perusahaan Gas Negara (Persero) (PGN)
Final Disbursement Date	July, 2013
Main Contractor (Over 1 billion yen)	Nippon Steel Corporation (Japan), JFE Engineering Corporation (Japan)
Main Consultant (Over 100 million yen)	PT. Connusa Energindo (Indonesia) / Osaka Gas Engineering Co., Ltd. (Japan) / Oriental Consultants Co., Ltd. (Japan) / Japan Oil Engineering Co., Ltd. (Japan) (JV)
Feasibility Studies, etc.	<ul style="list-style-type: none"> · F/S (University of Indonesia, 1996) · Implementation Plan (PGN, 1999)
Related Projects	Japanese ODA Loan (Loan Agreement signing year and month in parentheses) <ul style="list-style-type: none"> · Muara Karang Gas Power Plant Project (July, 2003) · Muara Tawar Gas Fired Power Plant Extension Project (July, 2003) · Tanjung Priok Gas Fired Power Plant Extension Project (March, 2004) World Bank <ul style="list-style-type: none"> · Support for Energy Sector Reform including Securing Market Mechanism in Oil and Gas Market (Domestic Gas Market Development Project) · Gas Distribution Project in Java Island Asian Development Bank, European Investment Bank <ul style="list-style-type: none"> · Gas Transmission and Distribution Project between Duri in Sumatra Island and Grissik and between Grissik and Singapore

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: October, 2015 – December, 2016

Duration of the Field Study: February 18, 2016 – March 25, 2016, June 16, 2016 – June 29, 2016

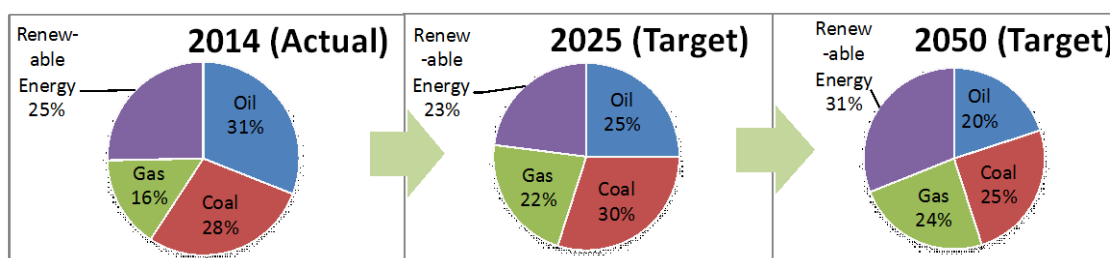
3. Results of the Evaluation (Overall Rating: B²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance to the Development Plan of Indonesia

At the time of appraisal, the five-year National Development Program (PROPENAS) 2000-2004 put up utilization of relatively inexpensive, environmentally friendly energy, maintenance of sound and fair competition, correction of monopolistic market system, and gradual reduction of subsidy to energy such as light and heavy oil for industrial use and fuel for consumer use in order to achieve fiscal soundness of the country. In line with this policy, Oil and Gas Law was enforced in November, 2001 with the aim of fostering competitive gas market and under this legal framework, the Ministry of Energy and Mineral Resources prepared Gas Pipeline Network Development Plan. This project was regarded as a second phase initiative in this plan and the Indonesian government highly prioritized the project.

At the time of ex-post evaluation, the Indonesian government sets its national target for primary energy mix in the National Energy Policy – the government states that gas consumption to be increased to 22% in 2025 and to 24% in 2050 (refer to Figure 1). In addition, the Indonesian government stipulates in the National Medium Term Development Plan (RPJMN) 2015-2019 the necessity for infrastructure development to facilitate gas utilization including construction of gas pipelines. The importance of this is project is unchanged at the time of ex-post evaluation.



Source: Prepared by the evaluator based on information provided by executing agency and National Energy Policy

Figure 1: Targets for Primary Energy Mix in Indonesia

3.1.2 Relevance to the Development Needs of Indonesia

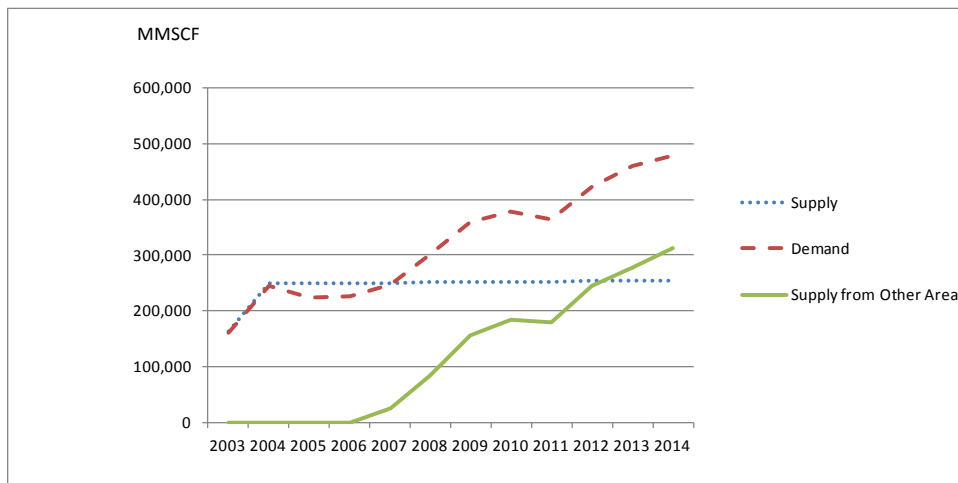
At the time of project appraisal, the necessity to cope with issues on effective utilization of unused gas in Sumatra, facilitation of efficient use of natural resources through converting energy sources from oil to gas, tackling with insufficient gas supply problems in West Java, and development of competitive energy sector was pointed out. In this regard,

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ③: High, ②: Fair, ①: Low

the Indonesian government put high priority to this project.

At the time of ex-post evaluation, demand for natural gas and liquefied natural gas (hereinafter referred to as “LNG”) in West Java continues to increase significantly and the area is highly dependent on gas supply from Sumatra to fill the gap. Figure 2 shows that gas demand has largely increased while supply from West Java has remained flat since 2004, and thus the gap has been filled by the natural gas supply from other areas, including South and Central Sumatra (approximately 65.6% (equivalent to 313,518MMSCF⁴) of the demand in 2014 (equivalent to 477,768MMSCF) has been supplied from South and Central Sumatra). Natural gas has been transported to West Java through the gas pipelines constructed by this project, which has played an extremely important role at the time of ex-post evaluation.



Source: Results from questionnaire survey of executing agency

Figure 2: Supply and Demand Trend of Natural Gas and LNG in West Java

3.1.3 Relevance to Japan’s ODA Policy

The ODA Country Data Book for Indonesia (2002) by the Japanese Ministry of Foreign Affairs pointed out economic recovery and stability of people’s livelihood as issues to cope with since the Asian economic crisis. In addition, the Medium-Term Strategy for Overseas Economic Cooperation Operations of JICA (April, 2002) indicated “economic infrastructure development” as priority area for assistance in Indonesia. Furthermore, JICA put up its policy to cope with development issues that would contribute to resolve bottlenecks of economic activities in its Country Assistance Strategy for Indonesia (September, 2001). It is consistent with the above policy to facilitate energy sector reform in Indonesia and to develop core infrastructure facilities that would contribute to resolve

⁴ Million Standard Cubic Feet.

bottlenecks to private investment through the project.

This project has been highly relevant to the country’s development plan and development needs, as well as Japan’s ODA policy. Therefore its relevance is high.

3.2 Efficiency (Rating: ①)

3.2.1 Project Outputs

The project constructed gas transmission pipelines to transport natural gas produced at gas fields in Sumatra to Java. Table 1 shows the comparison of planned and actual project outputs.

Table 1: Comparison of Planned and Actual Project Outputs

Plan	Actual
Civil Works (EPC⁵ Contract)	
(1) Onshore gas transmission pipeline from Pagardewa Station to Labuhan Maringgai Station (distance: 270km/diameter: 32 inch)	(1) As planned ⁶
(2) Submarine gas transmission pipeline from Labuhan Maringgai Station to Cilegon (distance: 105km/diameter:32 inch)	(2) As planned
(3) Onshore gas transmission pipeline from Cilegon in West Java to Cimanggis	(3) Installation of pipeline section was reduced to “Bojonegara (Cilegon) – Cikande and Cikande – Bitung” ⁷
(4) West Java (Cilegon area) gas distribution pipeline	(4) As planned
(5) Compressor Stations	(5) As planned
Consulting Services	
(6) Project Management Consultancy (PMC) Services - Detail design, review of bid documents, assistance in tendering, construction supervision, and environmental monitoring	(6) As planned

⁵ EPC (Engineering, Procurement, and Construction) Contract is a form of contracting arrangement where the contractor is made responsible for all the activities from design, procurement of equipments to construction.

⁶ The executing agency implemented a part of project scope (as listed below) utilizing its own funds in “Phase 2” project (refer to BOX 1 to be described later), removing the scope from ODA loan portion, in the face of the soaring price of steel materials.

- Onshore gas transmission pipeline (distance: about 4km/diameter: 28inch) from Pertamina’s (*) Pagardewa Station to the executing agency’s Pagardewa Station. (*) Pertamina is the state’s largest oil and gas company owned by the government of Indonesia.
- Pipeline Stations (four stations).
- Installation of SCADA (Supervisory Control and Data Acquisition Facilities).

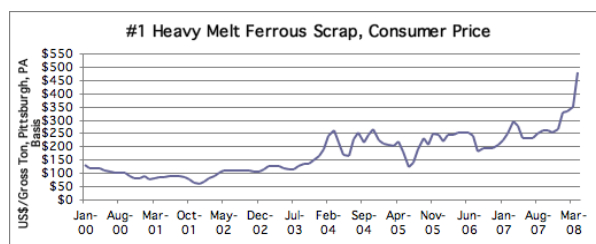
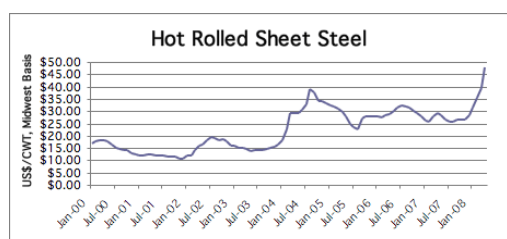
⁷ The executing agency removed this project scope from the ODA loan portion due to soaring price of steel materials, and implemented the reduced scope utilizing its own funds in other project.

(7) Operation and Maintenance Consulting Services - Necessary technical support and training for safe and stable operation and maintenance activities during operation	(7) Deleted
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Source: Results from questionnaire survey of executing agency

A part of project scope for (1) as well as (3) were removed from ODA loan portion, and the Operation and Maintenance Consulting Services, (7) were deleted from the project scope. The executing agency took such measures in order to cope with the increasing project cost due to the soaring price of steel materials etc. during the project implementation period. (Refer to Figures 3 and 4 for trends in hot rolled steel sheet price and heavy melting scrap price.) The executing agency adopted this measure to avoid project cost-overrun due to unforeseen circumstances beyond its control, and implemented a part of the project scope which was removed from ODA loan portion with its own funds – such as through “Phase 2” project – in order to generate project effectiveness. (Refer to BOX 1.) As regards Operation and Maintenance Consulting Services, the executing agency has had experiences of gas pipeline operation and maintenance work⁸, and no particular problem due to the cancellation was identified.

As regards Table 1 (2), additional work (pre-study) was conducted regarding feasibility and profitability of the project as a result of drastic changes of gas fuel price. Regarding (4), pipeline construction route was modified as a result of adjustment with local residents, and an additional work such as soil investigation and survey was conducted as a result. The additional work is deemed appropriate, commensurate with inputs, in light of ensuring smooth implementation of the project.



Source: Information provided by executing agency

Figure 3: Trends in Hot Rolled Steel Sheet Price Figure 4: Trends in Heavy Melting Scrap Price

Table 2 summarizes the inputs for consulting services man-month (MM). While the initial plan was 1,686MM, it turned out to be 5,584.08MM in actuality – significant increase of total MM. This was due to the additional work as mentioned above and

⁸ The executing agency has had experiences of gas pipeline operation and maintenance work between Grissik and Duri (within Sumatra Island) since 1998, and between Sakernan, Batam and Singapore (connecting Sumatra Island and Singapore) since 2003.

extended project period. For the latter, although the situation can not necessarily be regarded as efficient, it was deemed necessary for consultants to be on board including prolonged project period in order to secure quality of project implementation, which resulted in increase of their inputs.

Table 2: Comparison of Planned and Actual Inputs of Consulting Services

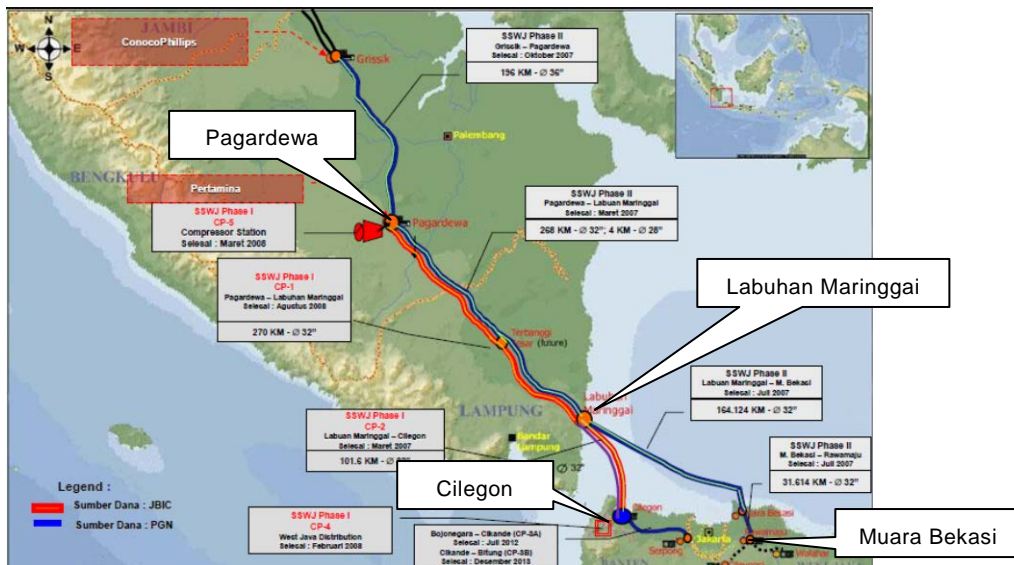
Unit: M/M

	Plan	Actual	Comparison
International Consultants	272.5	710.10	Increased by 437.60
Local Consultants	1,413.5	4,873.98	Increased by 3,460.48
Total	1,686.0	5,584.08	Increased by 3,898.08

Source: Results from questionnaire survey of executing agency

BOX 1: “Phase 2” Project Implemented by the Executing Agency

The executing agency has implemented “Phase 2” project utilizing its own funds, almost in parallel with this project. (In Figure 5, the red line indicates the ODA loan project and the blue line indicates the “Phase 2” project, which has been implemented by the executing agency.) According to the executing agency, the gas pipeline development plan was initially considered as one project since 1995, but because of change of situations (effects of the Asian currency crisis in 1997, and emerging chance of implementing the project utilizing ODA loan), it was decided that the project would be divided into two phases – Phase 1 to be implemented by ODA loan and Phase 2 to be carried out by the executing agency’s own funds.



Source: Information provided by executing agency

Figure 5: Project Locations for This Project and “Phase 2” Project

“Phase 2” project constructed gas transmission pipelines from Pagardewa to Labuhan Maringgai in South Sumatra, in parallel with this project, and supplies gas to Muara Bekasi near Jakarta in the end. As regards project period for “Phase 2” project, the “Phase 2” project has commenced slightly later than this project, however, selection of contractors and civil works have completed earlier than this project as shown in Table 3. (Although selection of contractors for “Phase 2” project has commenced one month later than that of this project, selection process has completed five months earlier, and civil works has completed about two years earlier than this project.) As mentioned above, the executing agency has implemented a part of the project scope utilizing its own funds, including “Phase 2” project and others, in the face of the soaring price of steel materials during the project.

Table 3: Comparison of Schedule for Selection of Contractors and Civil Works between This Project and “Phase 2” Project

<p>This Project</p> <ul style="list-style-type: none"> • Selection of Contractors: May, 2004 – Jul., 2006 (27months) • Civil Works (EPC Contract): Feb., 2006 – Jul., 2009 (42months) <p>“Phase 2” Project</p> <ul style="list-style-type: none"> • Selection of Contractors: Jun., 2004 – Feb., 2006 (21months) • Civil Works (PCC⁹ Contract): Nov., 2005 – Jul., 2007 (21months)

Source: Results from questionnaire survey of executing agency

Note) The schedule mentioned above indicates the period between “the package which has commenced the earliest” and “the package which has completed the latest” within different packages.

The executing agency considers this project and “Phase 2” project as one, and has concluded gas purchase agreement contract with different gas companies and has undertaken operation and maintenance (including budgeting and staff assignment) for both projects in an integrated manner.

Natural gas transmitted through the gas pipelines of both projects is integrated at Labuhan Maringgai and gas supply from Labuhan Maringgai is adjusted in accordance with the demand of final supply destination in Cilegon and Muara Bekasi. In this regard, gas supplied to Cilegon has been transmitted through gas pipelines constructed not only by this project but also by “Phase 2” project. On the other hand, gas supplied to Muara Bekasi has been transmitted through gas pipelines constructed not only by “Phase 2” project but also by this project.

⁹ Under PCC (Pipeline Construction Contract), the contractor is responsible for civil works and installation of equipments, whereas the executing agency itself undertakes design and procurement of equipments. Project period can be shortened since selection of contractors and procurement of equipments can be carried out in parallel. Compared to EPC Contract where responsibility of the contractors are comprehensive, the scope of works for PCC contractors are partial. Therefore, PCC is advantageous from the stand point of competitiveness in bidding in the sense that more contractors can participate in the bid. On the other hand, EPC Contract has an advantage for the executing agency in the sense that it can save the executing agency’s work load to contract out design, procurement of equipments, construction etc. in several different packages, which enables the executing agency to supervise the project in a comprehensive manner.



Labuhan Maringgai Station



Bojonegara Station (Cilegon)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was initially planned to be 59,079million yen (out of which 49,088million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 59,957million yen (out of which 48,538million yen was covered by Japanese ODA loan), which is higher than planned (101% of the planned amount). The project cost increased mainly due to increase in steel materials price as well as input cost increase due to significant increase in consulting service man-month.

By the way, the total project cost includes cost related with project scope which has been implemented by the executing agency's own fund, in other words, project scope which was removed from ODA loan portion. Because this project is a pipeline development project, project scope which has been removed from ODA loan portion should be regarded as an integral part of this project. Therefore, above measure has taken place for calculating project cost with a judgment that the expected project purpose would not be achieved unless all the original project scope is completed.

3.2.2.2 Project Period

The overall project period was planned as 59months, from March, 2003 (conclusion of Loan Agreement) to January, 2008 (completion of PMC services) as opposed to 109months in actuality, from March, 2003 (conclusion of Loan Agreement) to March, 2012 (completion of PMC services), which is significantly longer than planned (185% of the initial plan). (Refer to Table 4)

Table 4: Comparison of Planned and Actual Project Period

Item	Plan (At Project Appraisal)	Actual (At Ex-post Evaluation)
Right of Way Acquisition	Mar., 2003 – Mar., 2004 (13months)	Jul., 2004 – Jan., 2007 (31months)
Selection of PMC Consultants	Mar., 2003 – Jan., 2004 (11months)	Apr., 2003 – Jan., 2004 (10months)
Detailed Design	Jan., 2004 – Jul., 2004 (7months)	N.A.
PMC Services	N.A.	Jan., 2004 – Mar., 2012 (99months)
Selection of Contractors	Feb., 2004 – Jul., 2005 (18months)	May, 2004 – Jul., 2006 (27months)
Construction/Installation Work (EPC Contract)	Mar., 2005 – Dec., 2006 (22months)	Feb., 2006 – Jul., 2009 (42months)
Selection of O&M Consultants	Feb., 2005 – Jan., 2006 (12months)	Cancelled
O&M Consulting Services	Jan., 2006 – Jan., 2008 (25months)	Cancelled

Source: Information provided by JICA, and results from questionnaire survey of executing agency

Main reasons for project delay were: (1) delay of selection of contractors and (2) prolonged implementation period for civil works. According to the executing agency, PMC services significantly delayed as a result. In addition, the reason for continued PMC services for 33months after project completion was due to the necessity for consultants to be on-board in order to cope with technical issues during warranty period as well as to deal with financial and accounting issues. (By the way, land acquisition delayed because adjustments with local residents regarding pipeline routes in gas supply development section in West Java (in Cilegon area) took time, and settlement among local residents regarding ownership of the land also delayed. However, the main reasons for project delay – (1) and (2) above – incorporated the delay of land acquisition.)

For the same reason as project cost, length of time required to implement project scope which has been removed from ODA loan portion was also taken into consideration to calculate project period. However, the scope implemented by the executing agency's own funds has been virtually completed prior to the civil works eligible for ODA loan, therefore, comparison was made between actual period to implement ODA eligible project scope and planned period at the time of appraisal as a result.

Customer satisfaction survey on special yen loan¹⁰ was conducted for the executing agency since this project was implemented as a special yen loan project. The results showed that effects on project cost and project period attributable to special yen loan were seen to some extent. This project is comparable to "Phase 2" project implemented at the same time by the executing agency utilizing its own funds. Accordingly, limitation of this

¹⁰ Special yen loan was introduced in December, 1998 in order to support economic structural reform of developing countries mainly in Asia, which had been affected directly and indirectly by the Asian currency crisis in 1997. Basic condition for procurement of main contractor is Japan tide. In addition, rules regarding country of origin are applied under the special yen loan system.

project due to special yen loan conditions was brought into sharp relief. The executing agency pointed out the following: (1) regarding selection of contractors, options for eligible contractors were limited because procurement condition was Japan tied, which affected the selection period of contractors and the price competitiveness for bid, and (2) regarding period for civil works, long time was spent for confirmation of specific conditions, and coordination and adjustment with relevant parties including manufacturers in order for contractors to fulfill Japanese content requirements¹¹. In fact, the executing agency pointed out that selection period for contractors for “Phase 2” project became shorter than that of this project because of larger number of participants in the bid and competitiveness was secured¹². Moreover, the executing agency explained that “Phase 2” project did not take much time compared with the ODA project since Japanese content requirements for civil works did not exist, and the form of contracting arrangement was PCC. (Refer to Table 3)

In implementing the project, necessity to secure consistent schedule between pipeline construction by this project and gas field development was pointed out during project planning stage. Regarding this, a part of information regarding progress of gas field development could not be obtained from Pertamina (Pertagas, an affiliate company of Pertamina, is in charge at the time of ex-post evaluation). Therefore, it was impossible to fully grasp the facts. The processes leading to the conclusion of gas purchase and sale agreement between the executing agency and Pertamina are as follows. Gas purchase and sale agreement was concluded and went into force prior to the selection of contractors.

- September 13, 2001: Heads of Agreement (HoA) was concluded regarding gas supply
- November 20, 2002: HoA was extended
- December 11, 2002: Basic agreement was made regarding important matters
- June 26, 2003: Gas purchase and sale agreement was concluded (contract period is until December 31, 2025)
- December, 2003: Gas purchase and sale agreement entered into force

3.2.3 Results of Calculations of Internal Rates of Return (Reference only)

Financial Internal Rate of Return

Table 5 shows the result of recalculation of the financial internal rate of return (FIRR). The FIRR assessed at the time of ex-post evaluation was significantly higher than the figure at the time of appraisal. This was primarily because revenue from gas transmission and gas sales has increased.

¹¹ Ratio of the goods and services procured from Japan.

¹² According to the executing agency, when the number of bidders was limited, it took time for selection because careful judgment had to be made whether the bid documents fall within the acceptable range in case partial inconsistency was found between bid documents and bid requirements.

Table 5: Assumption and Results of FIRR Recalculation

	At Project Appraisal	At Ex-post Evaluation
FIRR	9.6%	18.2%
Benefit	Revenue from gas transmission and gas sales	
Cost	Construction cost, gas purchase cost, and operation and maintenance cost	
Project Life	20years after project completion	

Project cost exceeded the plan and project period significantly exceeded the plan. Therefore, efficiency of the project is low.

3.3 Effectiveness¹³ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

Table 6 summarizes the operation and effect indicators with targets set at the time of project appraisal and their actual figures in 2014 and 2015.

Table 6: Operation and Effect Indicators

Unit: MMSCFD¹⁴

	Baseline	Target	Actual Note1)	
	2002	2011	2014 Note 2)	2015 Note 2)
	Baseline at the time of appraisal	(6 years after the commencement of gas transmission)		
Transmission Volume of Gas	—	200	299.25 Note 3)	259.77

Source: Information provided by JICA, and results from questionnaire survey of executing agency

Note 1) Actual volume includes volume of gas transmitted through the pipelines constructed by this project (the onshore gas pipeline from Pagardewa to Labuhan Maringgai) and gas transmitted from Labuhan Maringgai to Muara Bekasi through the pipeline constructed by “Phase 2” project.

Note 2) As regards commencement of gas transmission, the earliest was on April, 2007, the submarine gas pipeline from Labuhan Maringgai to Cilegon, and the latest was on September, 2008, the onshore gas pipeline from Pagardewa to Labuhan Maringgai.

Note 3) Figures are not necessarily consistent with those in Table 7 due to rounding error.

Since the commencement of gas transmission, state of gas transportation (for both this project and “Phase 2” project) up to the time of ex-post evaluation is satisfactory. Actual figures in 2014 and 2015 significantly exceed the target figure (200MMSCFD) set at the time of appraisal.

Table 7 shows gas demand and supply data regarding this project (projection and actual).

¹³ Sub-rating for Effectiveness is to be put with consideration of Impact.

¹⁴ Million Standard Cubic Feet per day.

When looking into future projection, gas demand and supply is steadily increasing. Therefore, it is expected that this project will maintain high effectiveness in the future.

Table 7: Gas Demand and Supply Data regarding This Project (Projection and Actual)

Unit: MMSCFD

Year	Supply		Demand	
	Actual (Pertamina)	Actual (From Other Sources)	Actual Sales (Cilegon)	Actual Sales (Muara Bekasi) Note 3)
2006	-	-	-	-
2007	60.59	0.00	34.26	26.33
2008	140.90	0.00	64.75	76.15
2009	182.62	30.67	49.74	163.55
2010	167.60	84.02	90.96	160.66
2011	133.34	112.87	81.90	164.31
2012	115.90	162.71	87.95	190.67
2013	110.86	173.93	109.73	175.06
2014	130.32	168.94	146.91	152.36
2015	147.56	112.21	166.80	92.98
	Projected Supply Note 1)		Projected Sales Note 2)	
2016	256.79		235.04	
2017	261.93		249.46	
2018	269.80		256.95	
2019	277.89		264.66	
2020	286.23		272.60	
2021	294.81		280.77	
2022	303.66		289.20	
2023	312.76		297.87	
2024	322.15		306.81	
2025	331.81		316.01	

Source: Prepared by the evaluator based on the results from questionnaire survey of executing agency

Note 1) Actual supply between 2016 and 2025 is projected supply. (Gas supply contract with Pertamina is expected to expire in the end of 2017. At the time of ex-post evaluation, the executing agency is negotiating with potential gas suppliers including suppliers other than Pertamina for new contracts.)

Note 2) Projected sales is the total projected sales to both Cilegon and Bitung in Muara Bekasi.

Note 3) Actual sales of gas transmitted through the pipelines constructed by this project (the onshore gas pipeline from Pagardewa to Labuhan Maringgai) and gas transmitted from Labuhan Maringgai to Muara Bekasi through the pipeline constructed by "Phase 2" project.

3.3.2 Qualitative Effects

According to the Ministry of Energy and Mineral Resources, natural gas reserve of existing gas fields in South and Central Sumatra, West Java and the Riau Islands is said to decrease in the future in order to cover domestic demand and export to Singapore. When taking into consideration the decrease of future production of existing gas fields¹⁵ as well as Figure 2 above (Supply and Demand Trend of Natural Gas and LNG in West Java¹⁶), it

¹⁵ According to the Ministry of Energy and Mineral Resources, production of natural gas in these areas is said to decrease from 238MMSCFD in 2016 to 159MMSCFD in 2022.

¹⁶ Gas demand has almost tripled between 2003 and 2014.

can be said that the gas pipelines constructed by this project has been contributing to an effective utilization of unused gas in Sumatra Island.

3.4 Impacts

3.4.1 Intended Impacts

Breakdown of volume of gas supplied to West Java Area (including breakdown of volume of natural gas supplied through gas pipelines constructed by this project and “Phase 2” project) is shown in Table 8. After 2008 when the entire gas pipelines developed by this project started operation, total volume of natural gas and LNG supplied to West Java has significantly increased, and about 80 to 90% of which has been transmitted through the pipelines developed by this project and “Phase 2” project. (Of which, about half of natural gas has been transmitted by the pipelines developed by this project.) From this, it can be understood that the project has been greatly contributing to the increase of gas supply in West Java area. Furthermore, from Table 8 and Figure 2 above (Supply and Demand Trend of Natural Gas and LNG in West Java), it can be also considered that the project has been contributing to cope with gas supply shortage problems in West Java.

Table 8: Breakdown of Volume of Gas Supplied to West Java Area

Unit: MMSCFD

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Natural Gas and LNG Supply in West Java	269	533	596	596	652	626	673	601	580	700	750	790
Of which Volume of Gas Transmission by the Pipeline Constructed by this Project and “Phase 2 project	227	427	503	493	557	570	650	591	580	700	750	790
Of which Volume of Natural Gas Transmission by the Pipeline Constructed by this project	141	213	252	246	279	285	299	260	235	250	257	265

Source: Prepared by the evaluator based on results from questionnaire survey of executing agency

Note) Total volume of natural gas and LNG supply in West Java between 2016 and 2019 is the projected volume. (Volume of gas supply other than through gas pipelines is not reflected because of unavailability of data. On the other hand, volume of LNG (150-280MMSCFD) via LNG terminal (FSRU) is included in the table.)

Table 9 shows gas supply (volume of gas supply to the executing agency’s customers) to Bojonegara (Cilegon) area. The executing agency has been supplying gas to the area since 2007, and by 2020, gas supply is expected to triple the volume of gas supply when the service initially started.

Table 9: Gas Supply to Bojonegara (Cilegon) Area

Unit: MMSCFD

Customers Note 1)	Actual		Projection
	2007	2015	2020
Power Plant Industry Sector Commercial	34.42	80.39	102

Source: Prepared by the evaluator based on results from questionnaire survey of executing agency
 Note: Breakdown according to customers is not available.

Table 10 shows gas supply (volume of gas supply to the executing agency’s customers) to Lampung area in South Sumatra (refer to Figure 7). The executing agency has been supplying gas to the area since 2015, and by 2020, gas supply is expected to become 50times the volume of gas supply when the service started – about 4.5times the volume of actual gas supply in 2016.

Table 10: Gas Supply to Lampung Area

Unit: MMSCFD

Customers Note 1)	Actual		Projection
	2015	2016	2020
Power Plant Industry Sector Commercial Domestic & Small Scale Customer	1	11	50

Source: Prepared by the evaluator based on results from questionnaire survey of executing agency
 Note: Breakdown according to customers is not available.

According to the above, it can be understood that the project has been contributing to the increase of gas supply (acquisition of new customers and expansion of gas supply) in these areas.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

The project falls under A category of “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (established in April, 2002) because it is a development project of a large-scale gas pipelines.

Environmental Impact Assessment Report (AMDAL) has been approved on August, 1999 by the Ministry of Environment after examination by the Environmental Impact Analysis Committee established under the Ministry of Energy and Mineral Resources, Directorate General of Oil and Gas. During project implementation, environmental check list was prepared and environmental monitoring was conducted based on AMDAL. As regards consideration of wildlife resource protection and conservation which has been pointed out as an issue to be noted at the time of appraisal, measures such as installation of fences and signs as well as provision of environmental education to civil workers have been taken place, and monitoring of such countermeasures has been conducted.

During and after project completion, the executing agency has been reporting the results of environmental monitoring to the Ministry of Environment every six months based on its regulation. In addition, the executing agency has been reporting the results of environmental monitoring to all the provincial and city governments where the gas pipelines pass through. Furthermore, during project implementation, validation of environmental monitoring results has been conducted by a third party organization. Table 11 shows the results of environmental monitoring and validation. Adequate measures have been taken place in accordance with the regulations of the Ministry of Environment and no particular environmental impact has been reported. In addition, no negative project effect has been identified from the results of interview with the executing agency and local residents.

Table 11: Environmental Checklist, Monitoring and Verification Results/Countermeasures

Environmental Checklist	Monitoring and Verification Results
Impact of land clearance on vegetation	Restoration to original state (mangrove plantation)
Impact of pipe installation on noise	No problem
Impact of pipe installation on soil erosion	Slope protection and restoration to original state
Impact of pipe installation on drainage	Maintaining drainage and irrigation facilities or restoration to original state
Impact of pipe installation on road traffic	Restoration to original state
Impact of pipe installation on aesthetics	No problem
Impact on sea bed/shore crossing	Restoration to original state
Impact on sea water quality	No problem
Impact on marine life	No problem

Source: Prepared by the evaluator based on results from questionnaire survey of executing agency

3.4.2.2 Land Acquisition and Resettlement

Table 12 summarizes the comparison of planned and actual resettlement and land acquisition. Areas of land acquisition have slightly decreased and number of resettled

households has increased compared with the plan. This was due to the result of detailed design and adjustments made with local residents after project commencement, upon decision of the concrete project sites (with partial changes of pipeline routes).

Table 12: Comparison of Planned and Actual Resettlement and Land Acquisition

Plan		Actual	
Areas of Land Acquisition	Number of Resettled Households	Areas of Land Acquisition	Number of Resettled Households
678ha	About 20	645.9ha	47

Source: Results from questionnaire survey of executing agency

Land acquisition has been adequately conducted in accordance with the Indonesian regulations¹⁷. A land acquisition committee called “Panitia Sembilan” (Committee 9), in which the executing agency became the responsible agency, was established, and repeated consultation with affected local residents was conducted with the Committee’s mediation. The members of the Committee were composed of those related to local governments and police. According to the executing agency, a part of pipeline routes in gas supply development section in West Java (in Cilegon area) was changed as a result of adjustment with the local residents. In addition, settlement among local residents regarding ownership of the land was necessary, and there were cases for which the court arbitrated conflicts. However, land acquisition process (including payment of compensation) was completed before the start of civil works for each construction package in the end. Residents who needed to be resettled received compensation and desired to move to the nearby land on their own, therefore, development of alternative land was not necessary for the executing agency. According to the interview survey with the residents, no particular problem was pointed out regarding process for land acquisition and payment of compensation.

3.4.2.3 Impacts on Local Residents and Local Business

Through interview survey with the executing agency and local residents, creation of employment after project completion and benefits to the local community, generated from CSR (Corporate Social Responsibility) activities by the executing agency, were confirmed. After the completion of gas pipeline construction, local residents have been newly hired as security guards, cleaners, drivers, office boys and so on. In addition, as part of its CSR services, the executing agency has provided support for construction of nursery schools, kindergartens and elementary schools as well as construction and improvement of mosques,

¹⁷ In conformity with the Presidential Degree No.55-1993.

development of wells and bridges for the community, and rehabilitation of roads for local residents. Such activities have also been contributing to reinforce unity among residents and activate interaction among residents.

Furthermore, through interview survey with several local companies (manufacturing companies) it became evident that these companies converted their fuel from traditional high speed diesel (hereinafter referred to as “HSD”) to natural gas, and significant savings of fuel costs have been realized (30 to 38% cost reduction) as a result, after the project. Additionally, it was also confirmed from the data provided by a food and beverage company in Lampung that emission of nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and particles has decreased, leading to alleviation of environmental burden as a result of fuel conversion.



A Mosque constructed by Executing Agency
(Pagar Dewa)



Newly Planted Mangrove
(Labuhan Maringgai)

3.4.2.4 Impacts of Four ODA Loan Projects in Package

In addition to this project, three gas-fired combined cycle generation projects supported by Japanese ODA loan around the same time in Indonesia – “Tanjung Priok Gas Fired Power Plant Extension Project”, “Muara Karang Gas Power Plant Project”, and “Muara Tawar Gas Fired Power Plant Extension Project” – were taken up to analyze their integrated impacts. The analysis revealed that gas-fired combined cycle power plant projects utilizing ODA loans have set a precedent for introducing Japan’s high quality infrastructure technology in Indonesia. Also, a gas pipeline project utilizing ODA loan has encouraged conversion of energy source from oil to gas, through facilitation of domestically produced gas in Indonesia.

Table 13 shows the energy production of Muara Tawar, Muara Karang and Tanjung Priok Power Plants. When looking at the Table over time, it can be observed that conversion of energy source from oil to gas has been facilitated, since volume of gas

utilization (total volume) has shown increasing trend for these power plants as implementation of ODA loan projects proceeds. By the way, at the time of ex-post evaluation, Muara Tawar Gas Fired Power Plant is the only power plant which utilizes natural gas fuel transmitted through South Sumatra-West Java Gas Pipeline. On the other hand, Pertamina, an affiliate company of Pertamina, is constructing an open access gas pipeline connecting Muara Tawar Power Plant and Muara Karang Power Plant (expected to be completed in August, 2016). When construction of this gas pipeline is completed, three power plants, Muara Tawar, Muara Karang and Tanjung Priok, will be connected physically¹⁸. This will enable three power plants to utilize natural gas transmitted from Sumatra Island through South Sumatra-West Java Gas Pipeline¹⁹. Through new power plant construction, further utilization of gas is expected in the future.

Table 13: Energy Production of Muara Tawar, Muara Karang and Tanjung Priok Power Plants

Unit: GWh

Power Plant	Fuel	2008	2009	2010	2011	2012	2013	2014	2015
Muara Tawar	Gas ²⁰	3,199	8,973	6,894	6,026	7,266	7,662	8,606	5,737
	Of which, energy production from the power plant constructed by Japanese ODA loan (natural gas)	-	-	-	573	1,483	1,596	1,696	1,490
	HSD	2,419	423	1,049	2,548	654	189	70	103
Muara Karang	Gas	2,223	2,156	4,470	4,745	5,710	7,766	7,704	7,929
	Of which, energy production from the power plant constructed by Japanese ODA loan (LNG)	-	603	3,086	4,084	3,554	3,954	3,869	3,902
	HSD	3,473	3,577	1,438	2,610	1,482	32	46	37
Tanjung Priok	Gas	3,501	2,634	2,732	1,770	4,678	6,693	7,331	7,227
	Of which, energy production from the power plant	-	-	-	-	1,588	3,002	3,747	3,865

¹⁸ Tanjung Priok Power Plant is already connected to Muara Karang Power Plant through an existing pipeline.

¹⁹ Various adjustments, including gas pressure, are necessary for the pipeline to become available. According to National Electricity Company (PLN), which is the executing agency of the three gas-fired combined cycle power plant projects, negotiations between PLN and Pertamina are carried out regarding amount of gas supply, gas prices and so on.

²⁰ Gas includes both natural gas and LNG.

	constructed by Japanese ODA loan (LNG)								
	HSD	3,517	3,360	3,399	3,584	1,367	436	183	29
Total	Gas	8,923	13,763	14,096	12,541	17,654	22,121	23,641	20,893
	HSD	9,409	7,360	5,886	8,742	3,503	657	299	169

Source: Prepared by the evaluator based on the information provided by PLN

The National Electricity Company²¹ (hereinafter referred to as “PLN²²”) is planning to construct 800MW class gas-fired combined cycle power plant (Block 4), utilizing its own funds plus private funds in Tanjung Priok Power Plant compartment. A joint venture consisting of Japanese and local companies has been awarded from PLN to undertake the construction work etc. with full turnkey contract, and operation is expected to start in 2018. Following Muara Karang Gas Power Plant (Block 2) and Tanjung Priok Gas Power Plant (Block 3), which have been constructed utilizing the ODA loans, Japanese gas turbine combined cycle technology, the world’s highest technology, will be introduced in Tanjung Priok Gas Power Plant Block4. It can be pointed out that past achievements of gas-fired combined cycle power plant projects utilizing ODA loans have facilitated introduction of Japan’s high quality infrastructure technology in Indonesia²³.

This project has largely achieved its objectives. Therefore effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The operation and maintenance of gas pipelines, gas distribution network, related equipments etc. after project completion is controlled by Business Unit Infrastructure Operations Department (hereinafter referred to as “BUIO²⁴”), which is the operation and maintenance department of the executing agency, National Gas Company (hereinafter referred to as “PGN²⁵”) at the head office level. The organizational structure of BUIO, consisting of five departments and about 140staffs, is shown in Figure 6. Among these, Gas Transmission Management Department is in charge of operation and maintenance of gas

²¹ National Electricity Company is the executing agency of the above-mentioned three gas-fired combined cycle power plant projects.

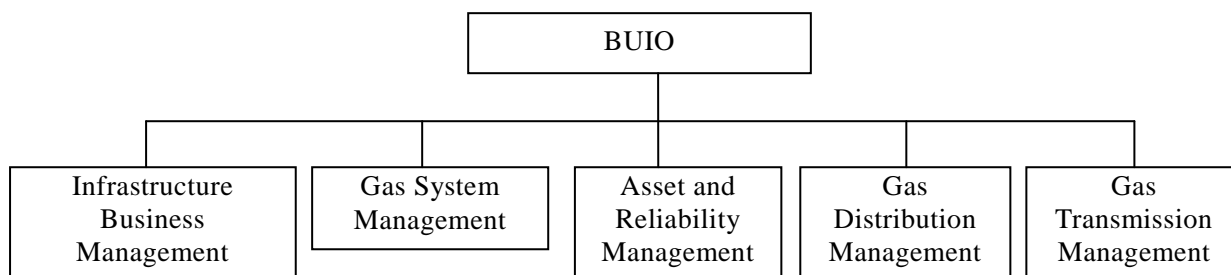
²² PT. Perusahaan Listrik Negara (Persero)

²³ Refer to the website of Ministry of Foreign Affairs of Japan. <http://www.mofa.go.jp/files/000095681.pdf>

²⁴ Business Unit Infrastructure Operations

²⁵ PT. Perusahaan Gas Negara (Persero)

pipelines and related equipments constructed by this project and “Phase 2” project, and Gas Distribution Management Department is in charge of operation and maintenance of gas distribution network developed by this project in Cilegon area.

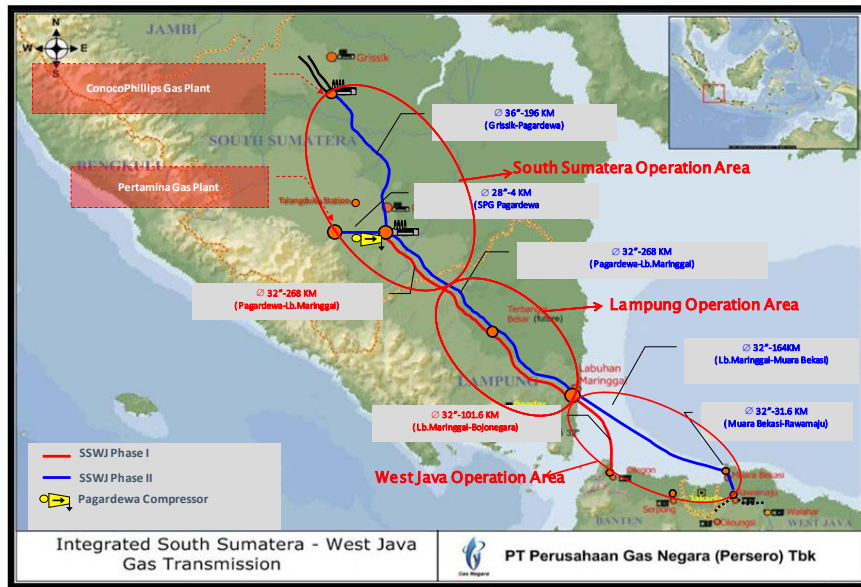


Source: Prepared by the evaluator based on the information provided by executing agency

Figure 6: Organizational Structure of Business Unit Infrastructure Operations

PGN started its organizational change since July, 2015, and reorganization mainly at the head office is still continuing at the time of ex-post evaluation. Prior to organizational change, operation and maintenance work of this project was controlled by Strategic Business Unit (hereinafter referred to as “SBU”) at the head office. SBU belonged under the Directorate of Commerce, but after restructuring, BUIO, which was established under the Directorate of Infrastructure and Technology, took over this responsibility. According to PGN, BUIO consists mainly of engineers, and operation and maintenance work including technical aspects was strengthened as a result of restructuring.

This organizational change has been undertaken at the head office level, not affecting the organizational structure of the three Operation Areas (South Sumatra, Lampung, and West Java) in charge of operation and maintenance at the project site. (Refer to Figure 7.) Each Operation Area has been in close coordination with BUIO for actual operation and maintenance work. It is pointed out that smooth communication and coordination between BUIO and each Operation Area have been facilitated after restructuring. Also, responsibilities and decision making process within the organization are clear.



Source: Information provided by executing agency

Figure 7: Three Operation Areas in Charge of Operation and Maintenance of This Project

Table 14 summarizes the breakdown of number of staffs and engineers in charge of operation and maintenance deployed in each Operation Area (as of March, 2016). According to the interview survey with each Operation Area, number of engineers necessary for operation and maintenance has been secured.

Table 14: Breakdown of Number of Staffs and Engineers in Charge of Operation and Maintenance Deployed in Each Operation Area Note 1)

Operation Areas	South Sumatra	Lampung	West Java
Total number of staffs	212	186	137
Of which, number of engineers in charge of operation and maintenance Note 2)	61	43	35

Source: Prepared by the evaluator based on the information provided by executing agency

Note 1) Staffs and engineers in charge of operation and maintenance are covering their work for both this project and “Phase 2” project. (Staffs/engineers only in charge of this project cannot be separated out.)

Note 2) The number of engineers in charge of operation and maintenance was calculated by subtracting the number of supporting teams (administrators, security guards, drivers etc.) from sub-total of the number of staffs in each Operation Area.

Therefore, no particular problem has been identified regarding the institutional structures of operation and maintenance of the gas pipeline.

3.5.2 Technical Aspects of Operation and Maintenance

Engineers in charge of operation and maintenance at the project site have gained sufficient experiences and technology through eight to nine years of operation and

maintenance work experience since the start of operation of the gas pipelines developed by this project. On the job training and training in Japan by contractors are provided to engineers in charge of operation and maintenance work, and among them, there are engineers who acquired master's degree, utilizing studying-abroad program of the executing agency. In addition, based on the human resource development strategy of the executing agency, all the PGN staffs including staffs in charge of operation and maintenance of this project are required to attend training for at least 6.5 days a year. Therefore, it can be observed that adequate management system for human resource development has been established. According to the interview survey with staffs in charge of operation and maintenance work on site, necessary training to carry out operation of this project has been appropriately conducted, and no particular problem has been identified regarding its technical aspect.

According to PGN, no negative impact has been observed due to the deletion of operation and maintenance consulting services from this project. The operation and maintenance staffs of the project also answered to the same question that they found no particular problem.

Each Regional Operation Area has prepared standard operation procedures and operation guidelines, and operation and maintenance staffs have been utilizing them for their daily work. The operation procedures and guidelines have been reviewed and revised every year in accordance with the actual situation and needs at the project site.

According to the interview survey with each Regional Operation Area, maintenance management plans have been prepared according to frequency of maintenance (daily, weekly, monthly, every three months, every six months and yearly), and the number of total maintenance items exceeds 1,000. These plans have also been reviewed and revised every year, and utilized by operation and maintenance staffs on the ground.

Therefore, no particular problem has been identified regarding the technical aspects of operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

The operation and maintenance costs are estimated by each Regional Operation Area, and then the estimation will be reviewed by PGN head office, which approves the budget. According to the interview survey with each Regional Operation Area and PGN head office, budget has been approved almost according to the requested amount, and no particular problem has been identified regarding the financial aspects of operation and maintenance. Table 15 shows the actual expenditures for operation and maintenance after completion of the project.

Table 15: Annual Operation and Maintenance Expenditure for this Project
(Actual Expenditures) Note1)

Unit: million Yen

2007	2008	2009	2010	2011	2012	2013	2014	2015
272	465	958	1,277	1,557	1,655	2,063	2,673	1,408 Note 2)

Source: Prepared by the evaluator based on the information provided by executing agency

Note 1) Although operation and maintenance costs for this project and “Phase 2” project are integrated, the divided cost for this project (calculation made by the executing agency) is provided in the table. Only the figures for actual expenditures are provided since it was difficult to extract the amount of requested and allocated budget for this project.

Note 2) Operation and maintenance cost increased in 2013 and 2014 because improvement maintenance work, replacement of some parts²⁶, and checking of installation state of submarine pipeline were carried out. In addition, preliminary maintenance²⁷ for a gas turbine compressor was conducted in 2013. The actual expenditure decreased in 2015 compared to the previous year because operation and maintenance resumed to the ordinary situation.

Income statement and balance sheet of PGN are shown in the tables below.

Table 16: Income Statement of PGN Note 1)

Unit: million USD

	2012	2013	2014
Gross Profit	1,472	1,418	1,465
Other Income	21	27	50
Distribution and Transmission Expense	270	293	301
General and Administrative Expense, Other Expenses	205	219	232
Operating Profit	1,018	933	982
Non-Operating Profit and Loss Note 2)	130	132	-3
Tax Expense	233	228	231
Profit for the Year	915	838	748
Other Comprehensive Income After Tax	-0.1	-6	0.1
Income for the Year	914	832	748

Source: PGN Financial Statements

Note 1) Partial inconsistency of figures exists due to rounding error

Note 2) Interest Income and Cost, Gain and Loss on Foreign Exchange etc.

Table 17: Balance Sheet of PGN Note 1)

Unit: million USD

	2012	2013	2014
Total Assets	3,908	4,318	6,215
Total Non-Current Assets	1,924	2,537	4,355
Total Current Assets	1,983	1,781	1,861
Total Liabilities and Equity	3,908	4,318	6,215
Total Equity	2,354	2,671	2,963
Total Non-Current Liabilities	1,081	761	2,162
Total Current Liabilities	473	886	1,091

Source: PGN Financial Statements

Note 1) Partial inconsistency of figures exists due to rounding error

²⁶ Precise cleaning within the pipelines (Intelligent Pigging, carried out every five years) was implemented in 2012, and as a result, improvement maintenance work and partial replacement of parts were conducted in 2013 and 2014 in order to cope with potential problems which may occur in the future.

²⁷ Preliminary maintenance is carried out for every 20,000hour of compressor operation.

Although PGN is a state owned company, government subsidy is not injected. While gross profit generally continues to be constant between 2012-2014, distribution and transmission expense as well as general and administrative expense, and other expenses show increasing trend year after year. In recent years, total non-current assets are significantly increasing, and its figure in 2014 is about 2.3times the figure of two years ago.

On the other hand, operation and maintenance cost for this project has been appropriately financed and the gas pipelines have been well operated and maintained. Therefore, PGN's overall financial situation will not directly affect financial aspect of the project.

Therefore, no particular problem has been identified regarding the financial aspects of operation and maintenance.

3.5.4 Current Status of Operation and Maintenance

The facilities developed by the project have been maintained well and operated smoothly. Major operation and maintenance activities are as follows.

- Daily patrol of pipelines (submarine and onshore).
- Inspection of compressor stations (Pagardewa), metering stations, gas filters etc.
- Reparative maintenance (such as pipeline coating)
- Pipeline cleaning (Conducted every two years. more precise cleaning to be conducted every five years.)

As regards spare parts, according to PGN, it has established an inventory management system, by developing a list of necessary spare parts in accordance with (1) consumables for daily use, (2) spare parts necessary for replacement in medium-term and (3) spare parts necessary for replacement in long-term, and stocktaking and necessary measures have always been carried out. Major consumables for daily use are kept in storages of Regional Operation Areas. As regards other individual spare parts, the executing agency has concluded a comprehensive contract with the manufacturers, therefore a system has been secured to procure necessary spare parts in a timely manner.

SBU has conducted an analysis in its "Pipeline Integrity Management and Risk Assessment" regarding risks to be considered during operation and maintenance (probability of occurrence of pipeline damages by earthquakes or arrhythmic pressures etc.). According to the results of analysis, about 75% of problems which had occurred during operation and maintenance were related with various "activities" by local residents and third parties within the pipeline sites. In other words, not only technical aspects but

also communication and adjustments with local residents are important for operation and maintenance of the project and therefore, daily patrol is crucial. According to the Regional Operation Areas, each Regional Operation Area has considered measures for local residents based on the results of analysis and has reflected them into its operation and maintenance plan.

Therefore, no particular problem has been identified regarding the current status of operation and maintenance.

No major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore sustainability of the project effects is high.



Gas Compressor (Pagardewa)



Spare Pipe (Cilegon)

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project constructed gas transmission pipelines from Sumatra to West Java with the aim of facilitating effective utilization of unused gas in Sumatra and dealing with the problems of gas supply shortage in West Java. The project is consistent with Indonesia's energy policy and with the development needs at the time of appraisal and ex-post evaluation, as well as Japan's ODA policy at the time of appraisal; thus, the relevance of the project is high. Project cost exceeded the plan and project period significantly exceeded the plan. Therefore, efficiency of the project is low. Operation and Effect Indicator – transmission volume of gas – set at the time of appraisal has considerably exceeded the target figure. In addition, the project has been contributing to effective use of unused gas and increase of gas supply in West Java. Furthermore, employment generation and benefits to local residents and companies after the project completion have been confirmed. The project has largely generated its planned effects; thus, effectiveness and impact of the

project are high. No negative impact on natural environment has been pointed out. Relocation and land acquisition processes have been implemented properly without any problems. As regards impacts of four ODA loan projects including this project, it can be pointed out that conversion of energy source from oil to gas has been encouraged, and past achievements of gas-fired combined cycle power plant projects utilizing ODA loans have facilitated introduction of Japan's high quality infrastructure technology in Indonesia. No major problem has been observed in the institutional, technical and financial aspects of the operation and maintenance system as well as in the current status; thus, sustainability of the project effects is high.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

None

End

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p>1) Civil Works</p> <ul style="list-style-type: none"> • Onshore gas transmission pipeline from Pagardewa Station to Labuhan Maringgai Station (distance: 270km/diameter: 32 inch) • Submarine gas transmission pipeline from Labuhan Maringgai Station to Cilegon (distance: 105km/diameter: 32 inch) • Onshore gas transmission pipeline from Cilegon in West Java to Cimanggis • West Java (Cilegon area) gas distribution pipeline • Compressor Stations <p>2) Consulting Services</p> <ul style="list-style-type: none"> • Project Management Consultancy (PMC) Services • Operation and Maintenance Consulting Services 	<p>1) Construction and Related Works</p> <ul style="list-style-type: none"> • As planned • As planned • Installation of pipeline section was reduced to “Bojonegara (Cilegon) – Cikande and Cikande – Bitung” • As planned • As planned <p>2) Consulting Services</p> <ul style="list-style-type: none"> • As planned • Deleted
2. Project Period	March, 2003 – January, 2008 (59months)	March, 2003 – March, 2012 (109months)
3. Project Cost		
Amount Paid in Foreign Currency	42,005million yen	47,148million yen
Amount Paid in Local Currency	17,074million yen (1,219,571million IDR)	12,809million yen (1,280,900million IDR)
Total	59,079million yen	59,957million yen
Japanese ODA Loan Portion	49,088million yen	48,538million yen
Exchange Rate	1IDR=0.014yen (As of March, 2002)	1IDR=0.010yen (Average between 2003 and 2012)