

Mid-Term Review Report of Japanese ODA Loan Project for FY2012

External Evaluator: Hiroshi Oita (OPMAC Corporation)

Field Study: October, 2012

Project Name: Indonesia “PLN Operation Improvement System Project for Supporting Generation Facilities” (L/A No. IP-537)

[Project Description]

Loan Amount / Disbursed Amount : 4,498 Million Japanese Yen / 184 Million Japanese Yen (as of July 31, 2012)

Loan Agreement Signing Date : March 2007

Original Date of Project Completion : September 2013

Project Completion Date after review : April 2015

Loan Expiry Date : January 2018

Executing Agency : Perusahaan Listrik Negara (Persero) (PLN)

Operation and Maintenance Organization:

(1) Enterprise Asset Management System Component: GENCO Shared Service Center (GSSC) to be established in the Project.

(2) Transformation Component: P3B Java-Bali in PLN (This component is under consideration by PLN and JICA for implementation with PLN’s own funds.)

[Project Objectives]

The objectives of PLN Generation Operation Improvement System Project for Supporting Generation Facilities (hereinafter referred to as “the Project”) is to establish an accurate data collection system for electricity generation facilities for PLN and its generation subsidiaries, to execute the training for personnel in charge of operation and maintenance in power plants, and to replace equipments in substations; thus optimize the efficient utilization of existing generation facilities in the whole system of Indonesia and improve reliability in Java-Bali system, thereby contributing to economic development through the improvement of investment climate.

Consultant : Nippon Koei Co., Ltd.

Contractor¹ : not yet decided

¹ The names and nationalities of consultants and contractors are entered only when they have been made public in JICA’s annual statistical report “List of Names of Major Companies and their Contract Amount of Japanese ODA Loan” (these are names for which the contract amount is not less than 1 billion Japanese Yen for contractors and not less than 100 million Japanese Yen for consultants). Where names have not been entered in JICA’s annual statistical report, they are described only as “local contractors/consultants” or “Japanese contractors/consultants”. These names can be provided by JICA.

Item	Ex-Ante Evaluation (2007)	Mid-Term Review results and Ex-Post Evaluation results estimated at the time of Mid-Term Review (2012)
Relevance	<p>(1) Relevance to development policy</p> <p>According to the National Electricity General Plan (RUKN) produced by the Ministry of Energy and Mineral Resources in June 2006 and covers the period between 2006 and 2026, peak demand is expected to grow at an annual average of about 6.9%. Therefore, alleviating the demand for power, which will become acute, is a pressing issue for Indonesia.</p> <p>In addition, RUKN recognizes that structural reforms based on the fundamental principle of improving efficiency, transparency and competitiveness, are necessary to establish the efficient and autonomous power sector.</p> <p>The Government of Indonesia announced a reorganization policy for the power sector in 1998 and initiated reforms for the introduction of a market mechanism and the participation of the private sector in order to establish a competitive power market and to improve the efficiency of the power sector. Although the new power laws have not been established, PLN has promoted the development of new power sources together with reductions in fuel costs for a generation.</p> <p>(2) Relevance to development needs</p> <p>PLN is organized into 32 business units nationwide, inclusive of power generation, transmission, transformation and distribution units. In 1955 the assets and operation, maintenance and management of the Java-Bali System were divided and transferred into two generation subsidiaries, Java-Bali Power Co., (PJB) and Indonesia Power Co., (IP), to promote efficiency in the power sector and related operations.</p>	<p>(1) Relevance to development policy</p> <p>PLN is the entity responsible for power supply in accordance with Law No.30/2009.</p> <p>Referring to the National Electricity General Plan (RUKN), PLN has produced the “PLN Company Plan to Supply Electric Power” (RUPTL) as a guide for power development for the next 10 years. PLN also has produced the “Long Term Corporate Plan” (RJPP) which shows the annual investment plans in detail. The most recent RUPTL covers 2011 to 2020 and RJPP covers from 2011 to 2015. (The 2012-2016 RJPP will be issued soon.)</p> <p>To date, this Project is recognized as one of the major projects under RJPP and this status will remain unchanged. Similarly, this can apply to the Enterprise Resource Planning (ERP) Project financed by the World Bank.</p> <p>PLN has advocated in RUPTL one of the targets for the saving of production costs by a more appropriate energy mix; it will reduce the ratio of power generation using fuel oil from 21% in 2011 to 1% in 2020 out of the total power generation. This target is consistent with the purpose of the Project which aims at the reduction of generation costs through an optimum composition of energy consumption. Thus, importance of the Project has been attached to the Project.</p> <p>(2) Relevance to development needs</p> <p>Major issues that face PLN are coping with the eastern and western areas where the power supply is insufficient, changing the powerhouses that use fuel oil to those with non-oil fuel, and to electrify rural areas where there is no power supply. In addition, it has been a long standing organizational issue that PLN should strengthen its financial position independent of subsidies from the government.</p>

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	<p>At present, however, information on the operation and maintenance of the various power plants, which would serve as basic data for responding to issues such as cost cutting of power generation and the improvement of operation ratios, is poor in reliability, and data collection is inadequate. Therefore, the establishment of a framework for accurate data collection and analysis and the efficient management of existing generating facilities through staff training are required.</p> <p>In addition, in the transmission and transformer sector, significant forced outages occur due to malfunctions of equipment in substations in the Java-Bali System. To improve the reliability of the system, the replacement of equipment in these substations is required.</p>	<p>Efficient operation through fuel management and other measures for existing power facilities based on accurate data and the improvement of reliability through the replacement of transformation equipment under the Project will meet the future power demand and contribute to the improvement of the financial management setup of PLN through the improvements in the shortages of power supply and cost reduction by efficient management.</p> <p>Particularly, the Java-Bali Power Co., (PJB) and Indonesia Power Co., (IP) which are included in this Project, account for about 70% of the total power facilities in the Java and Bali islands. The efficient operation of powerhouses using fuel oil, therefore, is the most important issue for those companies.</p>																																																						
Effectiveness	<p>(1) Quantitative Effects <u>Operation and Effect Indicators</u></p> <table border="1" data-bbox="423 842 1196 1315"> <thead> <tr> <th data-bbox="423 842 864 927">Indicator</th> <th data-bbox="864 842 981 927">Baseline (2006)</th> <th data-bbox="981 842 1196 927">Target (2018) 5 years after completion</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="423 927 1196 959"><u>Enterprise Asset Management (EAM) component</u></td> </tr> <tr> <td data-bbox="423 959 864 1011">No. of power plant sites collecting accurate data</td> <td data-bbox="864 959 981 1011">—</td> <td data-bbox="981 959 1196 1011">19*</td> </tr> <tr> <td data-bbox="423 1011 864 1096">No. of trained employees who responsible for generation operation</td> <td data-bbox="864 1011 981 1096">—</td> <td data-bbox="981 1011 1196 1096">All staff involved in operation and maintenance*</td> </tr> <tr> <td data-bbox="423 1096 864 1128">Maintenance material cost (%)</td> <td data-bbox="864 1096 981 1128">—</td> <td data-bbox="981 1096 1196 1128">2.5</td> </tr> <tr> <td data-bbox="423 1128 864 1160">Forced outage hours (%)</td> <td data-bbox="864 1128 981 1160">—</td> <td data-bbox="981 1128 1196 1160">7.5</td> </tr> <tr> <td data-bbox="423 1160 864 1192">Additional energy sales (million yen/year)</td> <td data-bbox="864 1160 981 1192">—</td> <td data-bbox="981 1160 1196 1192">61.5</td> </tr> <tr> <td data-bbox="423 1192 864 1224">Reduction of fuel cost (million yen/year)</td> <td data-bbox="864 1192 981 1224">—</td> <td data-bbox="981 1192 1196 1224">122.8</td> </tr> <tr> <td colspan="3" data-bbox="423 1224 1196 1256"><u>Reliability Improvement Component</u></td> </tr> <tr> <td data-bbox="423 1256 864 1315">Forced outage caused by malfunction of circuit breaker (No. of times/year)</td> <td data-bbox="864 1256 981 1315">2</td> <td data-bbox="981 1256 1196 1315">0*</td> </tr> </tbody> </table>	Indicator	Baseline (2006)	Target (2018) 5 years after completion	<u>Enterprise Asset Management (EAM) component</u>			No. of power plant sites collecting accurate data	—	19*	No. of trained employees who responsible for generation operation	—	All staff involved in operation and maintenance*	Maintenance material cost (%)	—	2.5	Forced outage hours (%)	—	7.5	Additional energy sales (million yen/year)	—	61.5	Reduction of fuel cost (million yen/year)	—	122.8	<u>Reliability Improvement Component</u>			Forced outage caused by malfunction of circuit breaker (No. of times/year)	2	0*	<p>(1) Quantitative Effects <u>Operation and Effect Indicators</u></p> <table border="1" data-bbox="1225 842 2002 1227"> <thead> <tr> <th data-bbox="1225 842 1653 927">Indicator</th> <th data-bbox="1653 842 1778 927">Baseline (2006)</th> <th data-bbox="1778 842 2002 927">Target (2018) 5 years after completion</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="1225 927 2002 959"><u>Enterprise Asset Management (EAM) component</u></td> </tr> <tr> <td data-bbox="1225 959 1653 1011">No. of power plant sites collecting accurate data</td> <td data-bbox="1653 959 1778 1011">—</td> <td data-bbox="1778 959 2002 1011">19*</td> </tr> <tr> <td data-bbox="1225 1011 1653 1096">No. of trained employees who responsible for generation operations</td> <td data-bbox="1653 1011 1778 1096">—</td> <td data-bbox="1778 1011 2002 1096">All staff involved in operation and maintenance*</td> </tr> <tr> <td data-bbox="1225 1096 1653 1128">Maintenance material cost (%)</td> <td data-bbox="1653 1096 1778 1128">—</td> <td data-bbox="1778 1096 2002 1128">2.5</td> </tr> <tr> <td data-bbox="1225 1128 1653 1160">Forced outage hours (%)</td> <td data-bbox="1653 1128 1778 1160">—</td> <td data-bbox="1778 1128 2002 1160">7.5</td> </tr> <tr> <td data-bbox="1225 1160 1653 1192">Additional energy sales (million yen/year)</td> <td data-bbox="1653 1160 1778 1192">—</td> <td data-bbox="1778 1160 2002 1192">61.5</td> </tr> <tr> <td data-bbox="1225 1192 1653 1227">Reduction in fuel cost (million yen/year)</td> <td data-bbox="1653 1192 1778 1227">—</td> <td data-bbox="1778 1192 2002 1227">122.8</td> </tr> </tbody> </table> <p>Note: *Target values are expected to be reached two years after completion of the project.</p>	Indicator	Baseline (2006)	Target (2018) 5 years after completion	<u>Enterprise Asset Management (EAM) component</u>			No. of power plant sites collecting accurate data	—	19*	No. of trained employees who responsible for generation operations	—	All staff involved in operation and maintenance*	Maintenance material cost (%)	—	2.5	Forced outage hours (%)	—	7.5	Additional energy sales (million yen/year)	—	61.5	Reduction in fuel cost (million yen/year)	—	122.8
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	<p>which come from three departments of PLN (generation and primary energy, commerce and customer service and finance).</p> <p>At the implementation stage, a project execution team, which consists of staff from PLN and GENCO (IP and PJB), has responsibility.</p> <p>This team takes the same form as the one under the ERP pilot project of the World Bank.</p> <p><<Transformation component>></p> <p>The project implementation unit (PIU) is to be established in PLN and is responsible for implementation. The transmission, transformation and distribution section (P3B Java-Bali) advises on the implementation of the project.</p> <p>2) Cooperation with NGO, universities etc. There is nothing to mention.</p> <p>3) Cooperation with Japanese grant aid and/or technical cooperation There is nothing to mention.</p> <p>4) Cooperation with other donors Under the “Java-Bali Power Sector Restructuring and Strengthening Project” financed by the World Bank, the Enterprise Resource Planning (ERP) system has been introduced as a pilot project for strengthening the finance and personnel sections of the</p>	<p>Java-Bali generation sector, who is responsible for overall procurement, and the staff from PJB and IP as support members. Since procurement procedures have not yet started, neither has the implementation system been set up. PLN can, however, utilize experience of the World Bank project. From now on the consultant hired for the Project will give PLN technical support in procurement and implementation up to the completion of the Project. At the implementation stage there is no financial problems as PLN has total responsibility on it.</p> <p><<Transformation component>></p> <p>With regard to relays and circuit breakers to be procured as soon as possible in order to avoid outages, PLN is considering using its own fund for procurement. In this case there will be no problem which might affect the effectiveness of the Project from the point of view of the implementation system and the technical and financial aspects.</p> <p>2) Cooperation with NGO, universities etc. There is nothing to mention.</p> <p>3) Cooperation with Japanese grant aid and/or technical cooperation There is nothing to mention.</p> <p>4) Cooperation with other donors PLN has strengthened the finance and personnel sections of the transmission sector through the introduction of ERP under the “Java-Bali Power Sector Restructuring and Strengthening Project” financed by the World Bank. ERP has been developed from its pilot</p>

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	<p>transmission sector in PLN. There will be synergy between ERP system and EAM system.</p> <p>5) Effect on the natural environment Category C in accordance with JBIC Guidelines for Confirmation of Environmental and Social Considerations (2003)</p> <p>6) Land Acquisition There is nothing to mention.</p> <p>7) Operation and maintenance structure and the technical and financial aspects of the executing agency <<EAM component>> Genco Shared Service Center (GSCC) to be established by this project will operate and maintain the EAM system. GSCC is expected to be established by 2013.</p> <p><<Transformation component>> P3B Java-Bali of PLN will maintain the transformation component.</p>	<p>stage to a fully-fledged operation in Sumatra and Sulawesi islands. With regard to cooperation between EAM system and ERP, EAM system improves the technical aspects, whereas ERP focuses on efficient management. Therefore the relation between the two is complementary.</p> <p>From the point of view of human resource development, strengthening management personnel under ERP and technical personnel under EAM system will lead to an upgrade of the total capacity of PLN.</p> <p>5) Effect on the natural environment There is nothing to mention.</p> <p>6) Land Acquisition There is nothing to mention.</p> <p>7) Operation and maintenance structure and the technical and financial aspects of the executing agency <<EAM component>> A clear-cut decision has not been made on the EAM operation and maintenance structure, including the set-up of GSCC, because the issue is still under consideration internally in PLN.</p> <p><<Transformation component>> Use of PLN's own fund for this portion is under consideration. Operation and maintenance will be carried out by P3B.</p>

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Efficiency	<p>(1) Project Outputs (a) Equipment</p> <p><<EAM system component>> 1) Introduction of EAM system 2) Installation and upgrading of monitoring devices 3) Establishment of GSSC 4) Reinforcement of the network capacity 5) Capacity building to improve power plant operations and maintenance</p> <p><<Transformation component>> 1) Replacement of equipment in substation</p> <p>(b) Consulting Service 1) Concept design 2) Assistance in bidding</p> <p>3) Implementation supervision</p>	<p>(1) Project Outputs (a) Equipment At the time of the mid-term review, the pre-qualification (PQ) documents on the following component were in the stage of finalization.</p> <p><<EAM system component>> 1) Introduction of EAM system 2) Installation and upgrading of monitoring devices 3) Establishment of GSSC 4) Reinforcement of the network capacity 5) Capacity building to improve power plant operations and maintenance</p> <p><<Transformation component>> 1) Replacement of equipment in substation As stated above, PLN is considering using its own fund.</p> <p>(b) Consulting Service 1) Concept design: Completed 2) Assistance in bidding Consultants will support procurement procedures such as the preparation of PQ documents, PQ and bidding procedures until the signing of contracts. As counterparts of the consultants PLN has assigned two staff members under the supervision of the person responsible for procurement. They are supervised by the board of directors.</p> <p>3) Implementation supervision Supervision works start after the selected contractor starts its</p>

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	<p>(2) Project Inputs</p> <p>1) Project Cost (Million yen)</p> <table border="1" data-bbox="425 555 1198 818"> <thead> <tr> <th>Item</th> <th>Total Cost</th> <th>Yen Loan</th> </tr> </thead> <tbody> <tr> <td>EAM system component</td> <td>3,241</td> <td>2,648</td> </tr> <tr> <td>Transformation component</td> <td>897</td> <td>897</td> </tr> <tr> <td>Price escalation</td> <td>413</td> <td>276</td> </tr> <tr> <td>Physical contingency</td> <td>228</td> <td>192</td> </tr> <tr> <td>Consulting service</td> <td>485</td> <td>485</td> </tr> <tr> <td>General administration cost</td> <td>218</td> <td>0</td> </tr> <tr> <td>Taxes</td> <td>526</td> <td>0</td> </tr> <tr> <td>Total</td> <td>6,008</td> <td>4,498</td> </tr> </tbody> </table> <p>2) Implementation Schedule</p> <p>a) Selection of consultant From January 2007 to September 2007 (9 months)</p>	Item	Total Cost	Yen Loan	EAM system component	3,241	2,648	Transformation component	897	897	Price escalation	413	276	Physical contingency	228	192	Consulting service	485	485	General administration cost	218	0	Taxes	526	0	Total	6,008	4,498	<p>business.</p> <p>(2) Project Inputs</p> <p>1) Project Cost (Million yen)</p> <p>In the Japanese ODA Loan column “consulting service” shows the actual contract amount. The other costs of the items are original estimates because procurement has not yet started.</p> <table border="1" data-bbox="1225 555 2004 847"> <thead> <tr> <th>Item</th> <th>Total Cost</th> <th>Japanese ODA Loan</th> </tr> </thead> <tbody> <tr> <td>EAM system component</td> <td>3,241</td> <td>2,648</td> </tr> <tr> <td>Transformation component</td> <td>897</td> <td>0</td> </tr> <tr> <td>Price escalation</td> <td>413</td> <td>276</td> </tr> <tr> <td>Physical contingency</td> <td>228</td> <td>192</td> </tr> <tr> <td>Consulting service</td> <td>485</td> <td>485</td> </tr> <tr> <td>General administration cost</td> <td>218</td> <td>0</td> </tr> <tr> <td>Taxes</td> <td>526</td> <td>0</td> </tr> <tr> <td>Unused balance</td> <td>-</td> <td>897</td> </tr> <tr> <td>Total</td> <td>6,008</td> <td>4,498</td> </tr> </tbody> </table> <p>2) Implementation Schedule</p> <p>After the signing of the Loan Agreement in March 2007, the Board of Commissioners approved the Project in January 2008 and the Ministry of State Owned Enterprises and the Ministry of Finance approved the Sub-Loan Agreement with PLN in November and December respectively. This resulted in the concurrence of the short lists of consulting firms by JICA in February 2009.</p> <p>a) Selection of consultant From March 2009 to May 2010 (15 months)</p> <p>JICA concurred with the result of the evaluation of proposals in September 2009. Since only one consulting firm submitted a proposal, it took some time for the negotiation of a contract with</p>	Item	Total Cost	Japanese ODA Loan	EAM system component	3,241	2,648	Transformation component	897	0	Price escalation	413	276	Physical contingency	228	192	Consulting service	485	485	General administration cost	218	0	Taxes	526	0	Unused balance	-	897	Total	6,008	4,498
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	<p>b) Consulting service From October 2007 to September 2013 (72 months)</p> <p>c) Procurement period From August 2007 to July 2009 (24 months)</p>	<p>regard to unit cost and man- months. A change of the president director at PLN and a reorganization which took place early in 2010 delayed the decision making on PLN and the conclusion of the contract was in May 2010.</p> <p>As a result, the selection of consultant was delayed by 2 years and 8 months compared to the original estimate. Of this delay, 2 years and 2 months were caused by the procedures before the selection of consultant and 6 months can be attributed to the selection process.</p> <p>b) Consulting service From July 2010 to June 2016 (schedule) (72 months) EAM System will be completed in May 2015. Supervisory services for improvement of the system will end in June 2016. If the Project is implemented in accordance with this schedule, the consulting services will be completed with a 2 years and 9 months delay from the original schedule.</p> <p>c) Procurement period From December 2012 to September 2013 (schedule) (10 months) The PQ announcement was delayed because it took about 1 year to scrutinize the PQ documents. Due to the fact that there are little precedent of IT system developments in Japanese ODA loan projects, it took a long time to confirm and set the criteria for the participation of IT firms in bidding, which needed to be reflected in PQ documents. It is expected that PQ will be conducted from December 2012 to January 2013 and bidding will be carried out from March to June 2013. Based on this schedule the delay from the original schedule is 4 years and 2 months at the end of procurement period.</p>

Item	Ex-Ante Evaluation (2007)	Mid-Term Review results and Ex-Post Evaluation results estimated at the time of Mid-Term Review (2012)
	<p>d) Installation of EAM system From August 2009 to September 2013 (50 months)</p> <p>e) Replacement of equipment in substations From December 2008 to April 2010 (17 months)</p> <p>f) Training for staff From August 2009 to September 2013 (50 months)</p> <p>(3) Internal Rate of Return FIRR: 12.4% Cost: Project cost, Operation and maintenance expenses Benefit: Increase in income from electricity charges, saving of costs for maintenance materials and equipment, saving of additional investment cost for IT, decrease in fuel oil costs Project life: 30 years</p> <p>EIRR: 13.4% Cost: Project cost (excluding taxes), operation and maintenance expenses Benefit: Increase in income from electricity charges, saving of maintenance equipment cost, saving of incremental investment cost for IT, increase in oil export income Project life: 30 years</p>	<p>d) Installation of EAM system From October 2013 to May 2015 (schedule) (20 months) 1 year and 8 months delay from the schedule set at the ex-ante evaluation.</p> <p>e) Replacement of equipment in substations PLN is considering using its own fund.</p> <p>f) Training for staff From November 2013 to May 2015 (schedule) (19months) 1 year and 8 months delay from the schedule set at the ex-ante evaluation.</p> <p>(3) Internal Rate of Return This is excluded from the mid-term review because no data is available for calculation at this time.</p>

Item	Ex-Ante Evaluation (2007)	Mid-Term Review results and Ex-Post Evaluation results estimated at the time of Mid-Term Review (2012)
	Replacement of equipment in substations is not included in the analysis of the above internal rate of return because of difficulties of quantitative evaluation.	
Lessons learned and Recommendations	<p>Lessons learned to JICA</p> <ul style="list-style-type: none"> ● To enrich Terms of Reference (TOR) for consulting services at the time of the selection procedure: In Japan, EAM system is used at CHUBU Electric Power Co., Inc. but not common among other power companies. If the information of TOR included in the Request for Proposal should not be enough, consulting firms face constraints to prepare a proposal. In the case of procurement like the EAM system which needs technical details, attention should be paid to the procurement system including support of a procurement expert hired by JICA to the executing agency before they will prepare TOR. ● To strengthen the appraisal of procurement and its support for the IT project: In this Project the two envelop procurement method was adopted on the assumption that the same procurement method as ordinary infrastructure projects can be applied. In the case of the ERP project under the World Bank financing in which the IT system was introduced prior to the EAM system and the loan agreement was signed in June 2003, the two stage bidding method^{*)} was applied. Since technological advances in IT are fast, it seems to be more efficient and effective if bidding is invited after the executing agency decides on the final specification based on proposals made by the bidders at the first stage. In the case of such a project as the introduction of an IT system, it is important that JICA and the executing agency study and discuss the procurement method fully in order to apply the appropriate procurement method with due consideration of its technological advances. <p>^{*)} Under this procedure, bidders will first be invited to submit technical proposals without prices on the basis of the minimum operating and performance requirements. After technical and commercial clarifications and adjustments, followed by amended bidding documents, the bidders will be invited to submit final technical bids and financial bids in the second stage.</p>	

Item	Ex-Ante Evaluation (2007)	Mid-Term Review results and Ex-Post Evaluation results estimated at the time of Mid-Term Review (2012)
Indicators for the Ex-post Evaluation	Indicators at the time of Ex-Ante Evaluation (1) The number of power plant sites collecting accurate data (2) The number of trained employees who responsible for generation operation (3) Maintenance material cost (%) (4) Forced outage hours (%) (5) Additional energy sales (million yen / year) (6) Reduction of fuel cost (million yen / year) (7) Forced outage caused by malfunction of circuit breaker (No. of times / year) (8) No. of forced outage caused by malfunctions of protection relay (No. of times / year) (9) Internal rate of return (%)	Regarding the transformation component, PLN is considering using its own fund. PLN has no objection to using the indicators set for the other components at the ex-post evaluation.