

Socialist Republic of Viet Nam

FY2017 Ex-Post Evaluation of Japanese ODA Loan Project

“Power Transmission and Distribution Network Development Project”

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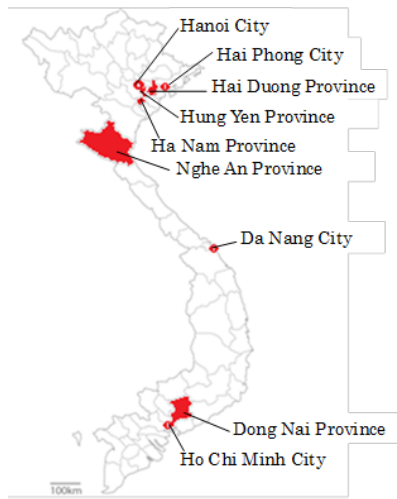
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0. Summary

This project newly constructed and strengthened power transmission and substation facilities and as well as improved distribution lines in industrial zones and the surrounding areas of Vietnam’s principal urban areas with the aim of ensuring stable power supply to meet the rapidly growing power demand and reducing loss in power transmission and distribution. The objective of the project aiming at providing efficient and stable power supply to build a foundation for achieving Vietnam’s industrialization is well consistent with the development policy and development needs of the country, as well as with Japan’s ODA policy which put up active support for economic infrastructure development. Therefore, the relevance of the project is high. Regarding project implementation, both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair. Regarding project effectiveness, availability factor indicating the operation status against the rated value of facilities in the pilot area (Yen My District, Hung Yen Province) temporarily achieved the target, but the rate of load has been increasing given the background of rapidly increasing power demand in the area. However, actual figures of availability factor, annual forced outage hours per user and power transmission and distribution loss rates of other project target areas have all improved and users’ satisfaction level is also generally high. Thus, it is judged that project effects have sufficiently generated. In addition, impacts of the project contributing to investment promotion and improved standard of living in project surrounding areas have also seen. Thus, its effectiveness and impact are high. No negative impact on natural environment has been reported, and land acquisition process has taken place appropriately based on the relevant regulations in Vietnam; thus, no problem has been seen. No major problem has been observed in the institutional, technical and financial aspects of operation and maintenance as well as in the current status. In addition, maintenance situation of transmission and substation facilities as well as distribution facilities is also good and the facilities are operating smoothly. Therefore, sustainability of the project effects is high.

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

1. Project Description



Project Locations



Building of a substation constructed in this project (Yen My Substation, Hung Yen province)

1.1. Background

As a result of the high rate of economic growth in Vietnam, the demand for electric power was rapidly increasing, and the *Sixth Power Development Master Plan (2006-2015)* approved in July 2007 pointed out that power demand would increase at an annual average of about 17.0% towards 2015. In the Master Plan, 13,720 MW of new power supply development was planned between 2007 and 2010 in order to respond to the urgent issue of power demand increase. In addition, the Master Plan pointed out that construction and expansion of the power transmission and distribution network needed to be advanced in tandem with the development of power sources, and that a reduction of loss in power transmission and distribution should also be pursued. It pointed out that providing efficient and stable power supply was essential by developing transmission and substation equipment and distribution network. As for electrification, the electrification rate was approximately 90% on a household level at the end of 2005, and it was achieved almost nationwide, but overloading facilities due to increasing power demands was a problem especially in urban areas. For this reason, many facilities were operating in excess of their normal utilization rate, which made it difficult to deliver stable power. The World Bank, which had been supporting mainly in rural electrification, gradually shifted its focus to power development support, and the Asian Development Bank also had a policy to strengthen support for power generation and high-voltage system divisions. Through this project, it was expected that efficient and stable power supply to meet the rapidly increasing power demand to be secured as well as reduction of transmission and distribution loss contributing to reduction of fuel consumption of power plants to be advanced, while major donors shifted their focus to power development.

1.2 Project Outline

The objective of this project is to ensure a stable power supply to meet the rapidly growing power demand and to reduce loss in power transmission and distribution by constructing and strengthening power transmission and substation facilities as well as improving distribution lines in industrial zones and the surrounding areas of Vietnam's principal urban areas, thereby contributing to the economic growth and the improvement of living standards in the region.

Loan Approved Amount/ Disbursed Amount	10,906 million yen / 10,648 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2008 / March, 2008
Terms and Conditions	Interest Rate 1.2% Repayment Period 30 years (Grace Period 10 years) Conditions for Procurement General Untied
Borrower / Executing Agencies	The Government of the Socialist Republic of Viet Nam / Northern Power Corporation, Hanoi Power Corporation, Hai Duong Power Corporation, Hai Phong Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation, Dong Nai Power Corporation
Project Completion	December, 2015
Main Contractor (Over 1 billion yen)	-
Main Consultant (Over 100 million yen)	-
Related Studies (Feasibility Studies, etc.)	-
Related Projects	<ul style="list-style-type: none"> • Technical Cooperation <ul style="list-style-type: none"> - The study on National Power Development Plan (2005 – 2006) • Japanese ODA Loan <ul style="list-style-type: none"> - Phu My Thermal Power Plant Project

	<p>(1)(2)(3)(4) (January, 1994, April, 1995, March, 1997, March 1999)</p> <p>- Pha Lai Thermal Power Plant Project (1)(2)(3)(4) (April, 1995, March, 1996, March, 1997, March, 1999)</p>
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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

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August, 2017 – September, 2018

Duration of the Field Study: October 29 – November 25, 2017, December 3 – December 23, 2017, March 18 – April 16, 2018

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of Vietnam

At the time of appraisal, the Government of Vietnam set the foundation for industrialization until 2020 as its primary goal in the *Socio-Economic Development 10-Year Strategy* (hereinafter referred to as “SEDS”) (2001-2010), emphasized in ensuring stable supply of electric power through the development of power supply, transmission and distribution in the *Eighth Social Economic Development Five-Year Plan* (hereinafter referred to as “SEDP”) (2006-2010). Also, in the *Sixth Power Development Master Plan* (2006-2015), it is pointed out the necessity of power supply development, construction and expansion of transmission and distribution networks, reduction of transmission and distribution losses. The importance of efficient and stable supply of electricity was raised by improving transmission and transformation equipment and distribution network

At the time of ex-post evaluation, "infrastructure construction" has been proposed as one of the pillars to realize industrialization until 2020 in SEDS (2011-2020) and SEDP (2016-2020), and thus it has been required to accelerate the infrastructure development even. Furthermore, with the ever-increasing demand for electricity, the Vietnamese Government emphasizes securing electricity supply necessary for development by rapidly developing electricity supply sources while introducing energy-saving

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③:High, ②:Fair, ①:Low

technology. Also, in the *Seventh Power Development Master Plan* (2011-2020), the Vietnamese Government declares to increase the capacity of power generation facilities and aims to achieve stable power supply through the new establishment and expansion of power transmission and distribution equipment. In addition, the Government shows to strengthen the backup function of transmission and distribution network to improve distribution facilities with high reliability and quality, and it is required at the time of ex-post evaluation to secure stable electric power supply and reduce transmission and distribution loss.

3.1.2 Consistency with the Development Needs of Vietnam

Electricity demand in Vietnam highly increased with high economic growth at the time of appraisal, but power supply facilities capable of responding to the demand were not in place and the power supply was insufficient. Also, the lower transmission and distribution network was not developed and it was operated with an overload, resulting in transmission and distribution loss. Especially in the industrial zones in the major urban areas and the surrounding areas, many facilities were operated beyond the usual operating rate, and the stabilization of power supply was a problem. As electricity demand in Vietnam rapidly rose, it took time to construct power generation facilities, so it was an urgent task to reduce power plant fuel consumption and to reduce transmission and distribution losses. This project aims to secure stable electric power supply corresponding to the rapidly increasing electric power demand and to reduce transmission and distribution losses by newly establishing and strengthening the transmission facilities in major cities of Vietnam, which is consistent with the development needs.

Even at the time of ex-post evaluation, the electric power demand in the area under the authority of the executing agency, the power corporation, has been increasing year by year, and securing stable and reliable power supply continues to be an important issue. For example, Table 1 shows the trends in power sales in Nghe An Province, Hung Yen Province, and Ha Nam Province under the jurisdiction of Northern Power Corporation. The annual average rate of increase in 2011 to 2017 is extremely high as Nghe An Province: 14.2%, Hung Yen Province: 17.3%, Ha Nam Province: 22.1%, which requires to continue to construct and strengthen transmission and distribution facilities, and to prevent overload operation in order to ensure efficient and stable power supply. Along with further economic growth in Vietnam, the importance of this project remains unchanged at the time of ex-post evaluation.

Table 1: Trend of Power Sales in Nghe An Province, Hung Yen Province, Ha Nam Province

(Unit: million kWh)

	2011	2012	2013	2014	2015	2016	2017 (Estimation)
Nghe An Province							
Power Sales	1,204.69	1,372.40	1,498.36	1,701.32	1,918.30	2,382.15	2,771.09
Growth Rate (%)	9.3%	13.9%	9.2%	13.5%	12.8%	24.2%	16.3%
Hung Yen Province							
Power Sales	1,290.04	1,512.04	1,975.97	2,305.67	2,740.88	3,109.36	3,477.55
Growth Rate (%)	12.4%	17.2%	30.7%	16.7%	18.9%	13.4%	11.8%
Ha Nam Province							
Power Sales	652.40	755.03	886.84	1,011.56	1,239.52	2,093.79	2,347.14
Growth Rate (%)	3.9%	15.7%	17.5%	14.1%	22.5%	68.9%	12.1%

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

3.1.3 Consistency with Japan's ODA Policy

The *Country Assistance Program for Vietnam (April 2004)* positioned growth promotion as a priority field, and indicated a policy for the active support to develop economic infrastructure including electric power as well as for the engagement in the power transmission and distribution business to promote private investment and improve efficiency. This project is consistent with the above policy in a way that aims at stable supply of power and reduction of transmission and distribution loss by newly installing and enhancing transmission facilities as well as establishing distribution line.

Also, the *Medium-Term Strategy for Overseas Economic Cooperation Operations (FY2005-FY2007)* positioned the “infrastructure development for sustainable economic growth” as an important field of assistance to Vietnam and indicated a policy to support economic and social infrastructure development such as energy as a pillar. Furthermore, the *Country Assistance Strategy (April 2004)* looked for the importance to provide support for power generation, stable and efficient supply of electric power and support of power distribution system that contributes to rural electrification to rectify disparities between cities and rural areas. This project is consistent with the above policies.

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: ②)

3.2.1 Project Outputs

All the outputs developed in the subprojects of this project fall under the project scope of the initial plan as below.

- Construction and reinforcement of 110 kV power transmission lines
- Construction and expansion of 110 kV substations
- Expansion and rehabilitation of distribution line network

On the other hand, the number of subprojects that have been developed has increased substantially from the initial plan (25 subprojects) to 63 (2.52 times). This is because project cost was reduced as a result of competitive bidding – bid price fell below the planned price – and because unused ODA loan balance has occurred due to depreciation of local currency Vietnam Dong against Japanese yen. Therefore, each executing agency made use of this and implemented additional subprojects. Further, the allocated amount under the Contingency category of the Loan was utilized to maximize the use of the Loan. Table 2 shows the comparison of planned and actual number of subprojects in this project.

Table 2: Comparison of Planned and Actual Number of Subprojects

Executing Agencies	Number of Subprojects		
	Plan	Actual	Comparison
Northern Power Corporation	2	4	+2
Hanoi Power Corporation	2	12	+10
Hai Duong Power Corporation	4	9	+5
Hai Phong Power Corporation	2	10	+8
Da Nang Power Corporation	2	9	+7
Ho Chi Minh City Power Corporation	9	13	+4
Dong Nai Power Corporation	4	6	+2
Total	25	63	+38

Source: Results from questionnaire survey of each executing agency

All the additional subprojects are consistent with the project purpose as well as with high importance and urgency, meeting JICA requirements³. Thus, they are deemed

³ According to Ho Chi Minh City Power Corporation, for example, following 12 requirements were necessary to be fulfilled in order for subprojects to be added. (Source: Document submitted by the executing agency)

(1) The subprojects should be listed in the Power Network Development Plan of Ho Chi Minh City.

(2) Subprojects shall supply power to Districts of Ho Chi Minh City where multiple industrial zones are located.

(3) Subprojects shall not be financed by external financial sources other than JICA.

(4) The eligible portion for the contract to be financed by JICA has not been nor will not be financed by any

appropriate, commensurate with inputs.

This project is a sector loan project with following features: ① not all the planned number of individual subprojects are grasped in advance before the loan approval (modification and changes of project scope are likely to occur) and ② the project targets multiple subprojects, and the target subprojects are decided during project implementation. The increase in the number of subprojects can be said to be the result of successful utilization of the features of sector loan.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was initially planned to be 12,685 million yen (out of which 10,906 million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 13,576 million yen (out of which 10,648 million yen was covered by Japanese ODA loan), which is higher than planned (107% of the planned amount). This is due to an increase in Vietnamese government expenditure portion (locally funded portion) as a result of additional implementation of subprojects utilizing the unused ODA loan balance. In other words, despite reduction of project cost as a result of competitive bidding as well as incidence of exchange rate fluctuation (yen appreciation, Dong depreciation), it is considered that the project cost increased beyond this reduction due to implementation of additional subprojects.

3.2.2.2 Project Period

Regarding project period, comparison of planned and actual project period was made also applying the rate of increase of outputs (2.52 times) to the planned project period in consideration of the fact that the number of subprojects implemented has increased substantially, and many additional subprojects (33 out of 38 additional subprojects) started after March 2011, which is after the construction period of the original plan. As a result, planned project period became 93 months, 2.52 times the

other financial sources including EVN.

(5) The contract amount for all contracts of the projects to be financed by JICA shall be less than 1 billion Japanese yen

(6) Procurement of contractors shall be basically Local Competitive Bidding to ensure prompt implementation. In the cases where International Competitive Bidding is applied, "Guidelines for Procurement under Japanese ODA Loans" (1999 edition) shall be followed.

(7) The implementation periods of the subprojects shall be no more than five years.

(8) Subprojects shall not require resettlement.

(9) Subprojects shall not be located in "sensitive areas" indicated in the JBIC Guidelines for Confirmation of Environmental and Social Considerations.

(10) Subprojects shall be in compliance with related laws and regulations of Vietnam.

(11) Any subprojects whose result of bidding evaluation of contractor had completed prior to the date of Pledge by the government of Japan shall be excluded.

(12) In case the total costs exceed the loan allocated amount under Ho Chi Minh City Power Corporation, the shortage amount shall be funded by Ho Chi Minh City Power Corporation.

original project period of 37 months, from March 2008 (conclusion of Loan Agreement) to March, 2011 (completion of construction). On the other hand, the actual project period was seven years and ten months (94 months) from March, 2008 (conclusion of Loan Agreement) to December, 2015 (completion of actual construction), which is longer than planned (101% of the plan). Main reason for the delay is due to extension of construction period as a result of addition of subprojects. When looking at the implementation status of individual subprojects, reasons for their delay can be attributed to the delay in land acquisition (cumbersome coordination and procedures with local governments took time and consensus process on compensation amount with project affected residents took time). However, overall, because the effect of extension of construction period due to increase in the number of subprojects was significant, delay due to land acquisition was absorbed by this.

Table 3: Comparison of Planned and Actual Project Period

Plan (At Project Appraisal)	Plan Considering the Rate of Increase of Outputs	Actual (At Ex-post Evaluation)	Comparison of Planned and Actual Period Considering the Rate of Increase of Outputs
Mar. 2008 – Mar. 2011 (37 months)	$37 \times 2.52 =$ 93 months	Mar. 2008 – Dec. 2015 (94 months)	$94/93 = 101\%$

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

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

Because subprojects are small in scale and numerous, and because they were not identified at the time of appraisal, it was difficult to calculate the internal rate of return. Consequently, it was not calculated. For this reason, recalculation was not conducted in this study.

Both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair.

BOX1: Role of Vietnam Electricity (hereinafter referred to as “EVN”) in this Project

In this project, subprojects were implemented independently by seven Power Corporations⁴ (the executing agencies), which are subsidiaries of EVN. (See Figure 1 below for the organization chart showing the relationship between EVN and each Power Corporation.) Among the seven Power Corporations, six Power Corporations, except for Northern Power Corporation, had no experience of becoming an executing agency for ODA loan projects. Therefore, EVN was to supervise and coordinate with them for smooth project implementation. The role of EVN in the project implementation is summarized below.

- Guidance and coordination utilizing the existing institution and systems within the EVN group

In respect to guidance and coordination etc. by EVN regarding project implementation, institution and systems within the EVN group have already been developed and established, and projects supported by donors including JICA were also carried out utilizing this existing system. In other words, special systems have not been developed regarding implementation of donor supported projects, including operation and maintenance after project completion, but donor supported projects were carried out by effectively utilizing the existing systems within the EVN group. For example, when executing agencies added subprojects by utilizing unused ODA loan balance, each executing agency contacted and informed EVN about this in advance and then submitted request letters to JICA. After concurrence letter was issued from JICA, each executing agency reported again to EVN, and based on that, EVN sent official letters concerning commencement of procedures for implementing additional projects as well as management of accounts/disbursement of funds to The Vietnam Development Bank, which is responsible for fund management of executing agencies for this project. Such series of communication and coordination process was carried out utilizing the existing systems within the EVN group. In addition, each executing agency reports to EVN quarterly regarding progress of implementation of subprojects and fund expenditure status during project implementation. This is not limited to this project – the same communication and reporting systems have been taken place for other donor supported projects as well as EVN own-funded projects.

⁴ Seven Power Corporations are: Northern Power Corporation, Hanoi Power Corporation, Hai Duong Power Corporation, Hai Phong Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation, and Dong Nai Power Corporation

- Training with the arrangement of EVN

A training program on the implementation of this project was carried out in July 2008 for seven executing agencies and The Ministry of Finance of Vietnam with the arrangement of EVN. Instructors were representatives and national staffs of JBIC Office at the time, and lectures were held on procurement supervision, opening of accounts, disbursement of funds, issues to be noted on project implementation, and so on regarding this project. According to the interviews with the executing agencies, they have pointed out that the training was very useful to them for project implementation.

- Preparation of instructions/guidelines by EVN on the implementation of JICA projects

Based on the experience of this project, EVN has prepared and distributed instructions/guidelines for each executing agency for successive on-going JICA project at the time of ex-post evaluation (i.e., Second Power Transmission and Distribution Network Development Project) and they are utilized by the executing agencies. Not only for JICA projects, such instructions/guidelines are prepared by EVN for each on-going project supported by other donors such as the World Bank and the Asian Development Bank, and are shared with relevant organizations. Following issues are covered in the instructions/guidelines of the subsequent project.

- Criteria for selecting subprojects⁵
- Coordination process within EVN and among related organizations
- Responsibilities and roles of each related organization
- Organization/institutional structure related to project implementation
- Financial management (regarding financial management report) etc.

Such initiative carried out by EVN is extremely helpful in facilitating project implementation and it can be noted as a good practice case.

⁵ Following contents are listed as the main selection criteria.

- Subprojects shall be consistent with the project purpose (i.e., to ensure a stable power supply to meet the rapidly growing power demand and to stabilize economic activities by constructing and strengthening power transmission and substation facilities as well as improving distribution lines in industrial zones, its surrounding area and major cities of Vietnam).
- Necessity, importance, urgency, feasibility, etc., are confirmed in the feasibility study. (Each power corporation has prepared a priority list of transmission and substation facilities and distribution lines that need to be improved and strengthened from the viewpoint of securing stable power supply and improving reliability, and are reviewing the list based on the situation of power demand etc. Thus, subprojects shall be included in the priority list.)
- Subprojects shall be directly and indirectly beneficial to Japanese companies. (Subprojects shall supply power to industrial zones where many Japanese companies are located or supplies power to Japanese companies.)

3.3 Effectiveness and Impacts⁶ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Regarding operation and effect indicators of the project, project on strengthening of transmission and substation facilities in Yen My District, Hung Yen Province was selected as a pilot region at the time of appraisal. Table 4 shows the actual figures of operation and effect indicators of the subproject on strengthening of power transmission and substation facilities in the same District (110 kV Yen My Substation) under the jurisdiction of Northern Power Corporation.

Table 4: Operation and Effect Indicators in Pilot Area (Yen My District, Hung Yen Province)

	Baseline	Target	Actual			
	2006	2012	2014	2015	2016	2017 (Estimation)
		2 Years After Completion of the Project	2 Years After Completion of this Subproject	3 Years After Completion of this Subproject	4 Years After Completion of this Subproject	5 Years After Completion of this Subproject
			—	Completion Year of the Project	1 Year After Completion of the Project	2 Years After Completion of the Project
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	89.4	81.0	76.4	88.6	106.4	102.9
Annual forced outage time per user due to accident (minutes/year-user)	521	416	N.A.	N.A.	N.A.	N.A.

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

⁶ Sub-rating for Effectiveness is to be put with consideration of Impact.

Note 1) Availability factor is the ratio of the maximum load to the maximum output of the facility. It is desirable to keep the figure to about 80% at the maximum so that power can be stably supplied even in unforeseen circumstances.

Note 2) In regard to annual forced outage time per user due to accident, according to the executing agency, the actual figure is unknown since there is no data only for this subproject.

Availability factor was 76.4% in 2014, two years after completion of this subproject, achieving the target set at the time of appraisal (81.0%). However, the figure was 102.9% in 2017, two years after completion of this entire project – ratio of maximum load to maximum output of facilities exceeded the target. This indicates that there is need for further improvement in the same area since development of substation facilities has not kept up with the rapidly increasing power demand. According to the executing agency, with respect to Yen My District covered by this subproject, development of Yen My industrial cluster



Yen My Substation (Hung Yen Province)

was decided after planning this subproject, which led to rapid increase in power demand in this district. Furthermore, due to the rapid increase in power demand in the industrial zones around the area (Pho Noi Industrial Zone and Thang Long Industrial Zone No.2), Yen My Substation, controlled by dispatchers, also supplies power to these industrial zones in the surrounding areas. It is said that such factors also contributed to the increase of availability factor of the substation. According to the executing agency, the above-mentioned rapid increase in power demand due to industrial cluster development etc. was not predictable at the time of appraisal in 2007.

As regards annual forced outage time per user due to accident, it was not possible to compare with the target figure at the time of appraisal since there was no data only for this subproject. However, the actual figures of entire Hung Yen Province are shown in Table 5 for reference, which has decreased sharply. (The data of the entire Hung Yen Province was not measured in 2006.)

Table 5: Actual Figures of Annual Forced Outage Time per User Due to Accident (minutes/year-user) in Hung Yen Province

	Actual			
	2014	2015	2016	2017 (Estimation)
Annual forced outage time per user due to accident (minutes/year-user)	3,262	2,103	1,338	746

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

For reference, availability factor of the substation of other subproject (110 kV Khoai Chau substation) implemented by the Northern Power Corporation in the same Hung Yen Province (Table 6) was 60.2% in 2014, whereas 2017 forecast increased drastically to 98.6% (growth rate: approximately 64%), for which vigorous power demand of the Province can be inferred.

Table 6: Actual Figures of Availability Factor of Other Subproject in Hung Yen Province

	Actual			
	2014	2015	2016	2017 (Estimation)
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	60.2	93.4	94.0	98.6

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

Furthermore, when looking at the trend of power sales in Hung Yen Province (Table 1 aforementioned), the annual average growth rate between 2011 and 2017 is 17.3%, which is a very high growth rate. Thus, it can be considered that development of substation facilities is an urgent matter in the face of rapidly increasing power demand. If this project was not implemented, the actual figure of availability factor would have been even higher.

In addition, when looking at the actual figures (Table 7) of other power corporations (Hanoi Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation) in each jurisdiction over the years obtained as reference information, both availability factor and annual forced outage time per user due to accident are decreasing, and it can be considered that this project has contributed to this.

Table 7: Actual Figures under the Jurisdiction of Other Power Corporations

	Actual			
	2014	2015	2016	2017 (Estimation)
Jurisdiction of Hanoi Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	86	76	79	82
Annual forced outage time per user due to accident (minutes/year-user)	2,026	1,360	965	741
Jurisdiction of Da Nang Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	67.4	70.5	63.0	59.6
Annual forced outage time per user due to accident (minutes/year-user)	1,829	1,093	920	860
Jurisdiction of Ho Chi Minh City Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	95	95	85	75
Annual forced outage time per user due to accident (minutes/year-user)	1,285	720	514	245

Source: Results from questionnaire survey of each executing agency

In addition, transmission and distribution loss rates⁷ (Table 8) are also decreasing in the jurisdiction of each executing agency, and it can be considered that this project

⁷ Loss rates of power when transmitting power from power plants to users (customers) through transmission lines/distribution lines.

is contributing to the reduction of loss rates.

Table 8: Actual Figures of Transmission and Distribution Loss Rates under the Jurisdiction of Each Power Corporation

	Actual			
	2014	2015	2016	2017 (Estimation)
Jurisdiction of Northern Power Corporation	7.39	6.68	6.09	5.78
Jurisdiction of Hanoi Power Corporation	5.83	5.71	5.22	4.97
Jurisdiction of Da Nang Power Corporation	3.76	3.59	3.22	3.22
Jurisdiction of Ho Chi Minh City Power Corporation	5.08	4.66	4.16	4.11

Source: Results from questionnaire survey of each executing agency

3.3.1.2 Qualitative Effects (Other Effects)

Regarding qualitative effects of this project, realization of stable power supply, meeting the power demand in the project target areas (the areas where the subprojects are implemented) was anticipated. In order to verify this assumption, interview survey was carried out with beneficiaries surrounding the subprojects⁸ where site survey was conducted (management offices of industrial zones, companies in industrial zones (all were Japanese companies), commercial facilities, local residents, total of 11 interview cases for 20 beneficiaries).

As a result, all the interviewees have indicated that there is no particular significant problem concerning power supply at the time of ex-post evaluation, and that stable power supply has realized. A management office of an industrial zone mentioned that, prior to the project, power was supplied from the existing substation, and voltage drops of 20 to 30% occurred frequently and power supply was unstable.

⁸ Following are the subprojects where site survey and interviews were conducted.

- Yen My Substation (Hung Yen Province)
- Chau Son Substation and Transmission Line (Ha Nam Province)
- Quang Minh Substation (Hanoi City)
- Dong Anh-Chem Transmission Line (Hanoi City)
- Phuc Dien Substation (Hai Duong Province)
- Ben Rung-Bac Song Cam Transmission Line (Hai Phong City)
- Hoa Khanh 2 Substation (Da Nang City)
- Distribution Lines in Lien Chieu Area (Da Nang City)
- Binh Tri Dong Substation and installation of the second transformer (Ho Chi Minh City)
- An Phuoc Substation and installation of the second transformer (Dong Nai Province)

However, after the project, power is supplied from the new substation – power supply is stable without problem, and power demand of tenant companies is also increasing due to expansion of production lines of factories in the industrial zone. A management office of another industrial zone said that after the project implementation, it is now possible to receive power supply at high pressure and there is no problem regarding quality of power. A Japanese company (manufacturing industry), mentioned that although there are instantaneous blackouts or instantaneous voltage drops several times a month after the project, they do not affect their production line, and that they are generally satisfied with the supply of power. A commercial facility pointed out that prior to the project, power supply from the existing substation was unstable (there were also incidence of power outages for about 20 to 25 minutes, including planned blackouts), however, distribution network was reinforced and power supply is stable with supply from the new substation as a result of this project. Local residents mentioned that before the project there were power outages once a week (there were various time periods of blackouts, including planned blackouts, half a day, three to four hours, one hour etc.), however, power supply is stable and there is no problem after the project.

Based on the above, it can be considered that this project is contributing to securing stable power supply and improving reliability, based on comprehensive judgment from the analysis of quantitative effects as well as the results of interviews with end users around the subprojects.



Chau Son Substation (Ha Nam Province)



Quang Minh Substation (Hanoi City)



Dong Anh-Chem Transmission Line (Hanoi City)



Phuc Dien Substation (Hai Duong Province)



Ben Rung-Bac Song Cam Transmission Line
(Hai Phong City)



Hoa Khanh 2 Substation (Da Nang City)



Binh Tri Dong Substation (Ho Chi Minh City)



An Phuoc Substation (Dong Nai Province)

3.3.2 Impacts

3.3.2.1 Intended Impacts

As impacts of this project, promotion of investment in project target areas and

improvement of living standard were assumed. Since such macro changes are affected by factors other than this project, it is difficult to verify direct causal relationship, however, in order to confirm the assumed impacts at the time of appraisal, analysis was made on the trend of power sales and industrial production data in the target area.

Among the executing agencies of this project, the trend of power sales by Hanoi Power Corporation covering Hanoi Capital Region and by Ho Chi Minh City Power Corporation covering Ho Chi Minh City, which is the largest city in the south, are shown in Tables 9 and 10, respectively.

In the five years from 2013 to 2017, the growth rates of power sales (total) in Hanoi City and Ho Chi Minh City are about 45% and about 30% respectively. During the same period, power sale in Hanoi City has increased by about 44% and in Ho Chi Minh City by about 26%, respectively for industrial sector, and power sale in Hanoi City has increased by about 62% and in Ho Chi Minh City by about 40%, respectively for commercial sector – all showing substantial increase. Also for residential sector during the same period, power sale in Hanoi City has increased by about 41% and in Ho Chi Minh City by about 29%, respectively, which is significant increase and it can be considered that consumption per household has increased⁹.

Table 9: Trend of Power Sales under the Jurisdiction of Hanoi Power Corporation

(Unit: billion kWh)

	2013	2014	2015	2016 年	2017 (Estimation)	Growth Rate between 2013-2017
Agriculture	0.08	0.07	0.09	0.11	0.16	94.3%
Industrial	3.53	3.84	4.28	4.73	5.10	44.4%
Commercial	0.79	0.89	1.07	1.22	1.28	62.4%
Residential	6.22	7.03	7.83	8.43	8.80	41.4%
Others	0.65	0.72	0.86	0.94	1.00	53.3%
Total	11.28	12.56	14.14	15.45	16.35	44.9%
Growth Rate of Total	6.6%	11.3%	12.5%	9.3%	5.8%	-

Source: Results from questionnaire survey of executing agency (Hanoi Power Corporation)

Note 1) Inconsistency of figures exists due to rounding error.

Note 2) Since growth rate in each sector from 2013 to 2017 is calculated based on detailed numerical values

⁹ (Reference) While the growth rate of population in Hanoi City is about 5.0% and that in Ho Chi Minh City is about 6.1% between 2013 to 2016 (source: General Statistics Office (GSO) Statistical Yearbook of Vietnam 2016), growth rates of power sales to residential sector during the same period are about 36% in Hanoi City and about 24% in Ho Chi Minh City, which are significantly higher than population growth rates.

(before rounding off), it does not coincide with the growth rate calculated from the rounded off power sales in this table.

Table 10: Trend of Power Sales under the Jurisdiction of Ho Chi Minh City Power Corporation

(Unit: billion kWh)

	2013	2014	2015	2016	2017 (Estimation)	Growth Rate between 2013-2017
Agriculture, Forestry and Fishing	0.05	0.06	0.07	0.07	0.08	60.0%
Industry, Construction	7.19	7.56	8.09	8.70	9.03	25.6%
Commercial, Service	2.25	2.38	2.62	2.94	3.17	40.9%
Residential	7.07	7.45	8.13	8.80	9.14	29.3%
Others	1.09	1.16	1.27	1.37	1.47	34.9%
Total	17.65	18.61	20.18	21.89	22.89	29.7%
Growth Rate of Total	5.5%	5.4%	8.5%	8.5%	4.6%	-

Source: Results from questionnaire survey of executing agency (Ho Chi Minh City Power Corporation)

Note 1) Inconsistency of figures exists due to rounding error.

Table 11 shows the trend of industrial production of project target areas (cities and provinces). All the cities and provinces have been on the rise from the previous year.

Table 11: Trend of Industrial Production in Project Areas (Each City and Province)

(Unit: %)

Province, City	2012	2013	2014	2015	2016
Hanoi City	105.0	104.5	104.2	108.3	107.3
Nghe An Province	109.7	106.0	110.0	109.0	109.4
Hung Yen Province	108.9	107.2	107.5	108.7	108.5
Ha Nam Province	130.7	110.9	111.9	124.8	111.1
Hai Duong Province	99.0	108.1	114.6	110.6	108.8
Hai Phong City	103.9	106.5	112.9	116.6	116.9
Da Nang City	106.0	110.5	111.0	113.1	113.2
Ho Chi Minh City	105.0	106.3	106.8	107.2	107.3
Dong Nai Province	107.4	107.6	107.6	107.7	107.5

Source: General Statistics Office (GSO) Statistical Yearbook of Vietnam 2016

Note 1) Base year is 2010. The figures in each year are the percentage when regarding the previous year as 100%.

From the above, it can be considered that this project has been contributing to the activation of economic activities, improvement of investment environment and promotion of investment, as well as improvement of living standards in the northern metropolitan area, central and southern economic cities.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

In this project, there was no large-scale deforestation in any of the subprojects, nor subproject whose project site was located in national parks or in protected areas designated by the country. Therefore, Category A subprojects were not implemented. In other words, this project does not fall under large-scale sectors, characteristics, and regions that are likely to affect environment, and thus undesirable effects on environment are not serious.

According to the executing agencies, they could not identify any negative impacts on natural environment during and after the project, and there were no complaints from surrounding industrial zones and residents. In addition, answers to the interview survey from end users around the subprojects also indicate that there was no particular incident regarding air pollution, odor, vibration, noise, etc. during and after the project. Therefore, it can be regarded that there is no negative impact on natural environment.

2) Resettlement and Land Acquisition

Table 12 summarizes the comparison of planned and actual state of resettlement and land acquisition for each executing agency.

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

Executing Agencies	Plan		Actual	
	Land	Resettlement	Land	Resettlement
Northern Power Corporation	5.2ha	0	5.2ha	0
Hanoi Power Corporation	12.0ha	0	12.0ha	0
Hai Duong Power Corporation	3.6ha	0	3.3ha	0
Hai Phong Power Corporation	1.3ha	0	1.3ha	0
Da Nang Power Corporation	0	0	0	0
Ho Chi Minh City Power Corporation	7.8ha	0	8.6ha	0
Dong Nai Power Corporation	0.7ha	0	0.7ha	0

Source: Results from questionnaire survey of each executing agency

Resettlement did not take place in any of the subprojects. Area of land acquisition increased somewhat from the initial estimation for Ho Chi Minh City Power Corporation, but other than this were as planned or slightly decreased. The reason for increase/decrease is due to the establishment of specific transmission line route after the start of the project.

According to the executing agencies, compensation procedures for landowners who provided a part of the land for this project were carried out based on government regulations on compensation¹⁰. There were cases in which it took time for consensus process on compensation amount to the targeted residents. According to the executing agencies, these residents finally agreed after carefully and patiently explaining the purpose and significance of the project. However, an agreement on the amount of compensation with the target resident could not be reached for one subproject under Ho Chi Minh City Power Corporation and the subproject was canceled after all. In addition, other than reaching agreement on the compensation amount, there were cases where it took time to coordinate and secure the site necessary for construction of transmission lines and substations (complicated

¹⁰ Articles 21 and 22 of Decree No. 69/2009/ND-CP.

negotiation and procedures) with local governments.

Land acquisition process including consultation with residents, was properly implemented based on Vietnamese regulations, without any problem.

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

3.4 Sustainability (Rating: ③)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

Operation and maintenance work of the subprojects after completion is carried out by the operation and maintenance organizations established under each power corporation, and there is no particular institutional change from the plan at the time of appraisal. (Table 13, Figure 1)

Table 13: Operation and Maintenance System of Subprojects Developed in This Project

Executing Agency	Structure of Operation and Maintenance
Northern Power Corporation	Northern High Voltage Grid Company under Northern Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. Under this Company, Northern Grid Branches are established at each provincial level (Hung Yen, Nghe An, and Ha Nam), and are carrying out operation and maintenance work on site.
Hanoi Power Corporation	Hanoi Power High Voltage Grid Company under Hanoi Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.
Hai Duong Power Corporation	High Voltage Power Network Enterprise under Hai Duong Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. District Power under Hai Duong Power Corporation is responsible for operation and maintenance of distribution network of 35 kV or less.
Hai Phong Power Corporation	High Voltage Management Enterprise under Hai Phong Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. District Power under Hai Phong Power Corporation is responsible for operation and maintenance of distribution network of 35 kV or less.
Da Nang Power Corporation	110 kV Grid Management Division in Da Nang Power Corporation is in charge of operation and maintenance of 110

	kV substations and transmission lines. District Power under Da Nang Power Corporation is responsible for operation and maintenance of distribution network of 22 kV.
Ho Chi Minh City Power Corporation	Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.
Dong Nai Power Corporation	High Voltage Grid Enterprise under Dong Nai Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.

Source: Results from questionnaire survey of each executing agency

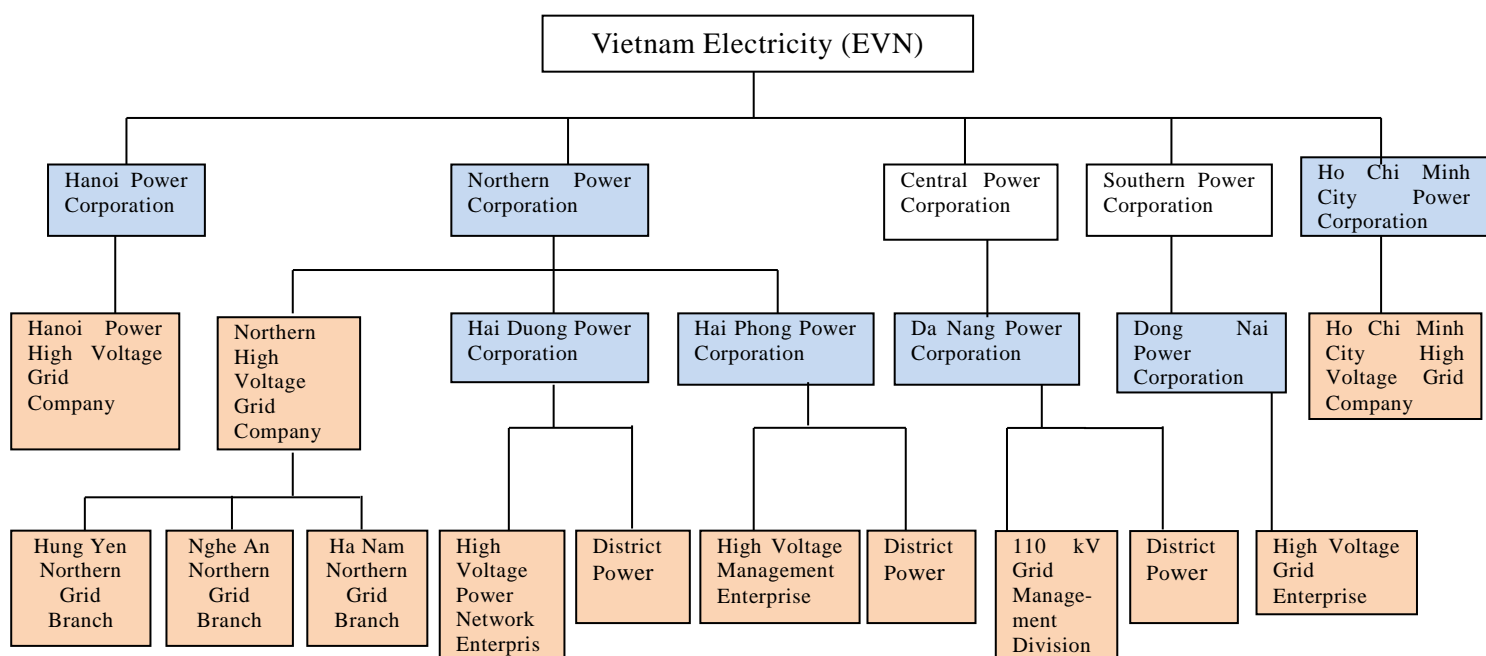


Figure 1: Operation and Maintenance System of Subprojects Developed in This Project

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

Note 1) Boxes shaded in light blue are the executing agencies. Boxes shaded in orange are the operation and maintenance organizations.

Role, division of work, coordination and decision making processes of each power corporation and operation and maintenance organizations under each power corporation are clear, and operation management of each subproject is standardized based on the “Organization of Activities Regulation” within the EVN group. According to each organization, it is difficult to clearly divide the number of staffs in charge of operation

and maintenance work for this project, since they are concurrently involved in operation and maintenance work of subprojects other than this project. However, it is said that the number of necessary staffs has been secured. Table 14 shows the number of staffs of the entire organization in charge of operation and maintenance of substations and transmission lines of 110 kV and above as well as the number of staffs responsible for operation and maintenance of subprojects for this project.

Table 14: Number of Staffs Engaged in Operation and Maintenance Work

Total Number of Staffs of Organizations in Charge of Operation and Maintenance of Substations and Transmission Lines Equal and Above 110kV	Of which, the Number of Operation and Maintenance Staffs of Subprojects for This Project
Northern High Voltage Grid Company under Northern Power Corporation: 2,437	36
Hanoi Power High Voltage Grid Company under Hanoi Power Corporation: 345	154
High Voltage Power Network Enterprise under Hai Duong Power Corporation: 426	N.A.
High Voltage Management Enterprise under Hai Phong Power Corporation: 303	218
110kV Grid Management Division in Da Nang Power Corporation: 47	8 (3 substations are already unmanned)
Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation: 511	N.A.
High Voltage Grid Enterprise under Dong Nai Power Corporation: 326	55

Source: Results from questionnaire survey of each executing agency

Remote monitoring technology for power network operation status using control and monitoring system of substations – Supervisory Control and Data Acquisition (hereinafter referred to as “SCADA”) has been introduced, and based on the EVN policy, unmanned operation of each substation is proceeding. (Target year is 2020¹¹.) In the future, the number of staffs engaged in operation and maintenance of substations is expected to decrease. However, each operation and maintenance organization is gradually reducing the number of staffs and is reviewing the structure flexibly according to the situation. Therefore, no particular problem has been identified.

¹¹ Da Nang Power Corporation and Ho Chi Minh City Power Corporation have set goals ahead of schedule – substations to be unmanned by the end of 2018.

3.4.2 Technical Aspect of Operation and Maintenance

All the staffs in charge of operation and maintenance are graduates of master's degrees, bachelor's degrees or vocational schools etc. of engineering (electricity, machinery, physics etc.), and technical staffs who have accumulated sufficient technology and experiences concerning operation and maintenance work of subprojects developed in this project are deployed. According to each executing agency, the average number of years of technical staffs engaged in operation and maintenance work is 10 to 15 years, and four years at least. Also, in accordance with the duties assigned, staffs have acquired licenses of electrical management engineers certified by the Electricity Regulatory Authority of Vietnam under the Ministry of Industry and Trade or qualifications¹² accredited by Load Dispatch Center of each region.

In addition, based on the personnel training policy for the entire EVN group, on the job training (OJT) as well as training by the executing agencies and the operation and maintenance organizations under the executing agencies are carried out multiple times every year to all technical staffs in charge of operation and maintenance work. At each substation, contemporary technologies such as Gas Insulated Switchgear (GIS) and SCADA etc. are introduced, and the on-site technical staffs have acquired their operation methods etc. through OJT and training.

Operation and maintenance manuals are standardized within the EVN group, and they are revised from time to time as necessary, and are utilized for daily operation and maintenance work. In addition, manuals of machinery and equipment are prepared by the manufacturers at each substation, and are also reviewed, revised and utilized at each substation, according to situations and needs.

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

3.4.3 Financial Aspect of Operation and Maintenance

The necessary operation and maintenance costs are estimated at each substation, and after compilation by the operation and maintenance organizations, budget request is made to the power corporation in charge and then the power corporation approves the budget. Budget is allocated as a part of operation and maintenance cost of the entire grid coverage, not for each individual subproject. According to interviews with each substation/maintenance organization and each executing agency, operation and maintenance costs are sufficiently secured at the level of each power corporation, and

¹² Certificate for Main Operator of 110 kV Substation and Certificate of Dispatcher.

the budget almost as requested has been allocated. Table 15 shows the budget, actual allocation and actual expenditure of operation and maintenance costs of each operation and maintenance organization.

Table 15: Operation and Maintenance Costs of Each Operation and Maintenance Organization

(Unit: million VND)

	2014	2015	2016	2017
Four Subprojects under Northern Power Corporation				
Budget (Requested Amount)	N.A.	1,138	N.A.	196
Actual Allocation	N.A.	1,141	N.A.	196
Actual Expenditure	N.A.	1,141	N.A.	196
Hanoi Power High Voltage Grid Company under Hanoi Power Corporation				
Planned Amount	13,049	13,049	13,049	13,049
Actual Allocation	12,909	13,849	15,059	15,327
Actual Expenditure	12,909	13,849	15,059	15,327
Nine Subprojects under Hai Duong Power Corporation				
Budget (Requested Amount)	N.A.	9,000	16,500	16,000
Actual Allocation	N.A.	9,000	16,500	16,000
Actual Expenditure	N.A.	8,900	16,500	16,000
High Voltage Power Network Enterprise under Hai Phong Power Corporation				
Budget (Requested Amount)	1,300	1,700	5,000	5,000
Actual Allocation	N.A.	N.A.	N.A.	N.A.
Actual Expenditure	1,240	1,660	4,864	4,900
110kV Grid Management Division in Da Nang Power Corporation				
Budget (Requested Amount)	36,731	41,414	46,361	48,582
Actual Allocation	36,731	41,414	46,361	48,582
Actual Expenditure	33,993	35,317	19,713	20,522
Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation				
Budget (Requested Amount)	51,887	108,375	79,910	98,916
Actual Allocation	50,730	106,676	72,163	93,366
Actual Expenditure	50,730	106,676	72,163	93,366
High Voltage Grid Enterprise under Dong Nai Power Corporation				
Budget (Requested Amount)	8,360	13,176	15,027	13,762
Actual Allocation	7,849	12,995	12,375	12,798
Actual Expenditure	7,849	12,995	12,375	12,798

Source: Results from questionnaire survey of each executing agency

Note 1) As regards four subprojects under Northern Power Corporation and nine subprojects under Hai Duong Power Corporation, since data on the total amount of respective subprojects was available, they were reflected in the table. Other than that, it was difficult to extract operation and maintenance costs of individual subprojects, therefore, operation and maintenance costs for each operation and maintenance organization as a whole were reflected in the table.

Note 2) According to Northern Power Corporation, relatively large scale repair was carried out in 2015 and a small scale repair was undertaken in 2017. Costs other than these repairs are not included in the table.

Note 3) As regards Hanoi Power High Voltage Grid Company, available data of planned amounts were included in the table. According to Hanoi Power Corporation, planned amount is 3% of the investment cost of the entire grid covered by the Corporation. Actual allocation is conducted according to the actual situation.

Note 4) According to Da Nang Power Corporation, the reason why actual expenditures in 2016 and 2017 are significantly lower than the actual allocation is that costs on related equipment which have been originally anticipated were classified as investment budget due to the progress of unmanned substations.

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

3.4.4 Status of Operation and Maintenance

Transmission, substation and distribution facilities developed by this project have been well maintained and managed, and are operating smoothly. No particular problem has been identified with subprojects that conducted site survey. According to interviews with each operation and maintenance organization, operation and maintenance activities are carried out based on each maintenance plan. For example, main operation and maintenance activities of subprojects under Hanoi Power Corporation are as follows.

- Daily maintenance: Operation and maintenance staffs of each substation undertake this maintenance in 3 shifts per day.
- Periodic maintenance (monthly, quarterly, and semi-annually): In addition to staffs engaged in operation and maintenance of each substation, engineers are dispatched from organizations/institutions responsible for operation and maintenance of the jurisdiction to undertake this maintenance.
- Periodic inspection (every half year, every year, every 3 years etc., inspection cycle differs depending on the equipment): A team of 10 to 15 staffs from Electricity Testing Company affiliated to Hanoi Power Corporation are dispatched and inspection is conducted over several days.

Records of daily operation and maintenance activities are prepared at each substation,

and regular reporting (monthly, quarterly, annually) are conducted to each power corporation, together with periodic maintenance records.

As regards spare parts, management systems within the EVN group called Maintenance Management Information Systems (MMIS) have been developed. Spare parts necessary for maintenance are stored in warehouses and the current situations have been constantly grasped. A system has been established to accommodate spare parts to be interchanged as necessary. In addition, some transformers and circuit breakers etc. need to be imported, so planned procurement is taking place.

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, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project newly constructed and strengthened power transmission and substation facilities as well as improved distribution lines in industrial zones and the surrounding areas of Vietnam's principal urban areas with the aim of ensuring stable power supply to meet the rapidly growing power demand and reducing loss in power transmission and distribution. The objective of the project aiming at providing efficient and stable power supply to build a foundation for achieving Vietnam's industrialization is well consistent with the development policy and development needs of the country, as well as with Japan's ODA policy which put up active support for economic infrastructure development. Therefore, the relevance of the project is high. Regarding project implementation, both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair. Regarding project effectiveness, availability factor indicating the operation status against the rated value of facilities in the pilot area (Yen My District, Hung Yen Province) temporarily achieved the target, but the rate of load has been increasing given the background of rapidly increasing power demand in the area. However, actual figures of availability factor, annual forced outage hours per user and power transmission and distribution loss rates of other project target areas have all improved and users' satisfaction level is also generally high. Thus, it is judged that project effects have sufficiently generated. In addition, impacts of the project contributing to investment promotion and improved standard of living in project surrounding areas have also seen. Thus, its effectiveness and impact are high. No negative impact on natural environment has been

reported, and land acquisition process has taken place appropriately based on the relevant regulations in Vietnam; thus, no problem has been seen. No major problem has been observed in the institutional, technical and financial aspects of operation and maintenance as well as in the current status. In addition, maintenance situation of transmission and substation facilities as well as distribution facilities is also good and the facilities are operating smoothly. Therefore, sustainability of the project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Necessity of continuous facility enhancement

Although development and expansion of transmission and substation facilities and distribution lines were undertaken by this project, it is necessary to continue strengthening transmission, substation and distribution facilities in order to ensure stable power supply in the face of growing power demand. For example, although the availability factor of transmission and substation facilities expansion project (subproject) in the pilot area of the project in Yen My District, Hung Yen Province decreased temporarily as a result of this project, ratio of maximum load to maximum output of facilities has increased since development of substation facilities could not keep up with the rapidly increasing power demand. When looking at the trend of power sales of this Province, the annual average growth rate between 2011 and 2017 is high as 17.3%, and the annual average growth rate in the same period in Nghe An Province and Ha Nam Province under the jurisdiction of Northern Power Corporation are also significantly rising – the average annual growth rates are 14.1% and 22.1%, respectively. Investment promotion is essential for Vietnamese government to achieve its policy goal to become an industrialized country by 2020, and infrastructure development in power sector (ensuring reliable, efficient and stable power supply), which is one of necessary factors for enabling business environment is important in the future.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Implementation of the project which has successfully taken advantage of the features of sector loan

This project consists of a number of subprojects and it can be regarded that the project has taken advantage of the features of sector loan – a loan project characterized by its

flexibility in terms of modification and changes of project scope in the process of implementation. Specifically, with the incidence of external factor such as fluctuations in the exchange rate during project period (depreciation of Vietnam Dong against Japanese yen), the executing agencies added subprojects by utilizing unused ODA loan balance. As a result, the number of subprojects has increased substantially by 2.52 times the original plan. Utilization of unused balance is not limited to sector loan projects, but it can be considered that by utilizing such external factor, the number of subprojects has flexibly increased. The additional subprojects all met the project purpose – to secure stable power supply responding to rapidly increasing power demand and to reduce transmission and distribution loss, thereby contributing to regional economic development and improvement of living standard. Also, the additional subprojects were all highly important and urgent as well as satisfied selection criteria required by JICA, thus they are deemed appropriate, commensurate with inputs. The project period was longer than planned since subprojects were added and implemented after the planned construction completion period assumed at the time of appraisal, however, loan period was not extended because loan disbursement period was set with a margin of more than four years after the assumed period of construction completion. In the future, when implementing similar sector loan projects, it is desirable that loan disbursement period to be set with margin like this project. It is important to pay attention during project supervision so that project scope can be changed flexibly in accordance with the circumstances while taking into consideration the project purpose.

End

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<ul style="list-style-type: none"> ▪ Construction and reinforcement of 110 kV power transmission lines ▪ Construction and expansion of 110 kV substations ▪ Expansion and rehabilitation of distribution line network * Number of planned subprojects: 25	<ul style="list-style-type: none"> • Corresponding to the initial project scope • Corresponding to the initial project scope • Corresponding to the initial project scope * Number of actual subprojects: 63
2. Project Period	March, 2008 – March, 2011 (37 months)	March, 2008 – December, 2015 (94 months)
3. Project Cost		
Amount Paid in Foreign Currency	2,762 million yen	Unknown
Amount Paid in Local Currency	9,923 million yen (1,307,378 million VND)	Unknown (Unknown)
Total	12,685 million yen	13,576 million yen
ODA Loan Portion	10,906 million yen	10,648 million yen
Exchange Rate	1 VND=0.00759 yen (As of October, 2007)	1 VND=0.004894 yen (Average between 2008 and 2015)
4. Final Disbursement	July, 2015	

End