

Ex-Post Evaluation of Japanese ODA Loan

“Power Sector Loan”

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0. Summary

The project aimed at (1) establishing an Environment Management System (EMS) in Vietnam Electricity (ENV), (2) installation of environment equipment and (3) facilitation of rural electrification; these measures were intended to contribute to mitigating the environmental impact of the power sector and supporting stable power supply in Vietnam. The relevance of this project is quite high as it is closely related to Vietnam’s policies and needs both at the time of the appraisal and ex-post evaluation. However, a lowering of efficiency has resulted from a delay and cancellation of consulting services. Also with regard to effectiveness and impact, it has not fully achieved the intended environmentally positive effects and impacts due to the cancellation of consulting services for establishing EMS at EVN and the Ninh Binh thermal power plant. In light of the original scope of the project, therefore, the effectiveness is considered to be fair. Sustainability, however, is considered to be high. Judging from the current situation of the power sector reform being implemented by the Vietnamese Government, we have confirmed that the direction of restructuring of the EVN group on the whole is in favor of strengthening organizational competitiveness by duly introducing the market mechanism. Also there is a high degree of usage of facilities for distribution of electricity and regular check-ups for operation and maintenance is systematically carried out.

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

1. Project Description



(Project Locations)



(A substation in Bac Ninh)

*In the map on the left, the red circles show the three regions where the subprojects for rural electrification were implemented (5 provinces in the North, 4 provinces in the Central, 11 provinces in the South region)

1.1 Background

Since the launch of Doi Moi reform program in 1986, the Vietnamese economy has thrived and this has been accompanied by a sharp increase of electricity demand. During the period from 1996 to 2002, before the project, the annual average rate of electricity consumption increase was 14.6%. ENV estimated that electricity consumption would increase at the annual average rate of about 13% by 2010. In order to satisfy this sharp demand increase, ENV addressed the need for massive electrical power development on the scale of up to 37,600MW in its long-term plan that extended to 2020, and expected that about one-fourth¹ of overall power will be provided by newly built coal-fired thermal power plants since Vietnam is endowed with relatively abundant coal resources. On the other hand, however, the use of coal inevitably brought up the issue of environmental pollution caused by NOx, SOx and particulate matter emitted from ordinary coal-fired thermal power plants. Therefore it was seen as an urgent task to make use of a standardized Environment Management System (EMS) throughout ENV in an organized manner in order to introduce proper guidelines and implement environment measures and programs. Also in order to minimize anticipated as well as ongoing environment burdens through parallel efforts on behalf of rural electrification, the installation of environment-protecting equipment was to be duly made.

1.2 Project Outline

The objective of this project is to establish Environment Management System and to expand distribution services by introducing an Environmental Management System in EVN, installing environmental equipment and facilitating rural electrification; thereby contributing to mitigate environmental impact on power sector and to support stable power supply in Vietnam.

Loan Approved Amount / Disbursed Amount	3,190 million yen / 2,810 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2004 / March, 2004
Terms and Conditions	Interest Rate:0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of the Socialist Republic of Vietnam / Vietnam Electricity Guarantor: Government of the Socialist Republic of Vietnam
Final Disbursement Date	August 13, 2009
Main Contractor (Over 1 billion yen)	--

¹ At the time of the 2003 evaluation study, it was anticipated that by 2020 of the total of about 37,600MW of installed capacity 9,500MW would be provided by coal-fired thermal generation. It was further anticipated that reform of the power sector would result in the new entry of generation companies primarily as independent power producers (IPP) operating thermal power plants and through private investment through the BOT method.

Main Consultant (Over 100 million yen)	ESBI Engineering and Facility Management (Ireland)
Feasibility Studies, etc.	<p>(1) "Project Concept Paper for Vietnam: Power Sector Loan" (Maenaam Advisory, August 2003) original version in Japanese</p> <p>(2) "Study on Assisting the Establishment of EMS in EVN, Socialist Republic of Vietnam" (J-Power, January 2004) original version in Japanese</p> <p>(3) "Study on Assisting the Establishment of EMS in EVN, Socialist Republic of Vietnam (Phase II) " (Chubu Electric Power Co., Inc, April 2004) original version in Japanese</p>
Related Projects	"The Study on National Energy Master Plan in Vietnam"

2. Outline of the Evaluation Study

2.1 External Evaluator

Takeshi Daimon, Waseda University

Miho Kawahatsu, Waseda Research Institute Corporation

2.2 Duration of Evaluation Study

Duration of the Study: December, 2011 – October, 2012

Duration of the Field Study: March 11, 2012 – March 25, 2012, June 30, 2012 – July 8, 2012

2.3 Constraints during the Evaluation Study

With regard to effectiveness and impact, due to data constraints, of all provinces served by two EVN subsidiaries, the Northern Power Corporation (NPC) and Central Power Corporation (CPC), Bac Ninh, Quang Ninh, Quang Nam were selected to be subject to comparison by use of predetermined operation and effect indicators. As Bac Ninh was selected as a pilot province for the project at the time of appraisal,² the results of a beneficiary survey conducted as part of the ex-post study was used in the evaluation. Other provinces in the NPC and CPC service areas as well as 12 provinces served by the Southern Power Corporation were not subject to the evaluation as the size of subprojects were deemed too small and limited to represent provincial-wide data; therefore relevant data for the indicators were not collected there.

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance with the Development Plan of Vietnam

With regard to electric power strategy during times relevant to the project, following on the Fifth Power Development Master Plan (2001-2010), in July 2011, the Seventh Power Development Master Plan (2011-2020) was promulgated and according to it within the section on development policy, with regard to reducing the burden on the environment created by the power sector, it referred to “the protection of resources and the environment at the same time that power is developed, and ensuring the sustained development of the nation.” At the same time, with regard to the stabilization of electric power supply in provincial areas, it assigned continued high importance to infrastructure improvement in connection with power distribution, stating “It is possible to electrify all villages by 2015, and then 98.6% of all farm households will be able to use electricity, and it is intended that all farm households will be able to use electricity by 2020.”

Reform of the electric power sector on the basis of market principles is contained in the Power

² A reason of the selection is that Bac Ninh Power Company under NPC implemented subprojects for low voltage power distribution focusing on seven out of the eight districts of the province. That means that they covered almost all of the provincial area and potential beneficiaries were up to 519,000 residents.

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ② Fair, ① Low

Sector Policy Statement issued by the Ministry of Industry in 1997, providing orientation for reform of the sector. Further, at the time of establishment of EVN in 1995, the Vietnamese Government in preparation for joining the WTO,⁵ had been examining the legal framework for reform of state enterprises on the basis of the Corporation Law of 2005, after which there was reorganization of state enterprises with the objective of improving their competitiveness, and conversion of some into joint stock companies. It was against this background that the Electric Power Law⁶ was passed in 2005, to realize organizational reform in order to promote the introduction of market principles.

The above processes of change denote that the project is highly consistent with both the action plan for implementing the national power strategy and the nature of reform of the power sector.

3.1.2 Relevance with the Development Needs of Vietnam

At the time of the project appraisal, there was perceived need for development of electric power generation capacity on a large scale, in keeping with the rapid increase in power demand that was a result of the country's economic development, and at the time of ex-post evaluation the power sector's priority had been assigned to thermal power development, using coal, petroleum and natural gas which continued to require appropriate environment measures (see Fig. 1).

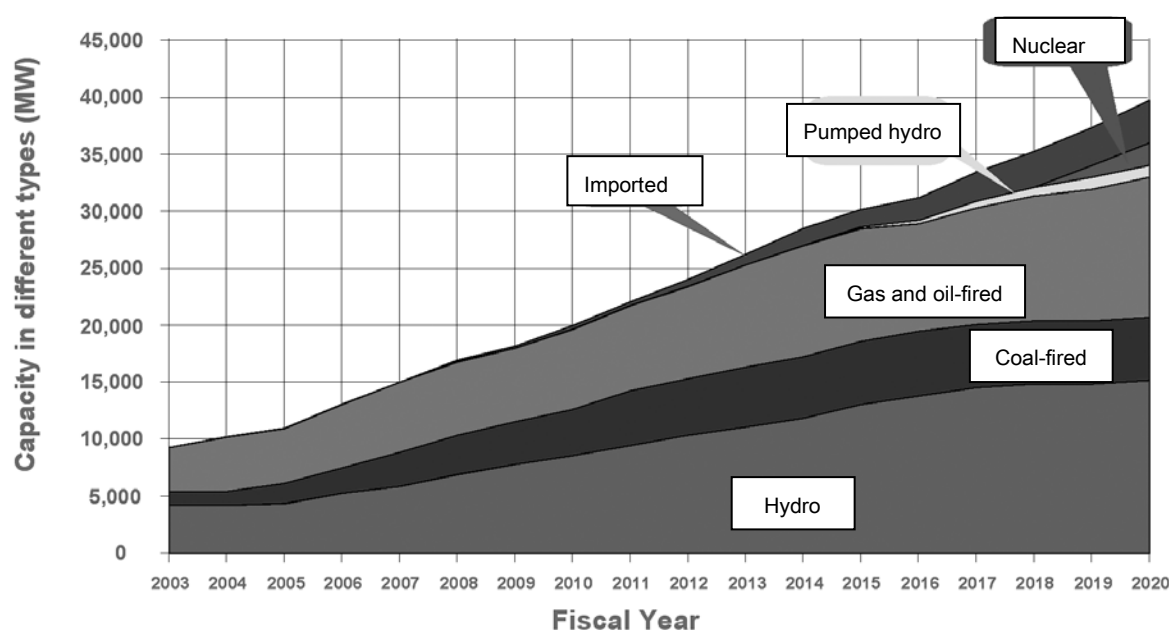


Fig. 1. Power Development Plan of Vietnam (2003-2020)

Source: EVN

At the time of the ex-post evaluation, there had been an increase in the overall national concern over climate change and environment issues⁷, making EVN's approach to environment issues all the

⁵ After applying for admission to the WTO in January 1995 Vietnam was formally admitted to the organization in January 2007.

⁶ The basic principles of the Electric Power Law are (1) formation of a power market operating on the basis of free competition, (2) promotion of investment from within and outside the nation, and (3) protection of the rights of consumers, investors, and employees.

⁷ World Bank. Global Facility for Disaster. April 2011. *Reduction and Recovery, Climate Risk and Adaptation Country Profile, Vietnam*.

more important. In 2002 EVN had established at Department of Science, Technology, Environment and Telecommunication⁸ and following that there was steady expansion of the organization's structure. Since 2006, the spinning off of companies and organizational change of EVN in keeping with its conversion to a joint stock company resulted in the company's becoming smaller and its operations becoming more narrowly focused. These changes have increased the importance of implementing measures on behalf of the environment. Further, regarding power distribution operations at the regional level, the independent activities and responsibilities of power distribution organizations formed at the level of villages (communes) have been dominant (Fig. 2), as of the time of a nation-wide survey by the Chamber of Commerce and Industry in 2007, less than 40% of all communes were purchasing power from a subsidiary of EVN. Renewal and improvement of power distribution at the commune level thus is lagging – a condition that is hampering the improvement of stable power supply to the rural sector. It is thus evident that operations by distribution subsidiaries of EVN on behalf of effective use of electric power and of ensuring the stable supply of electricity in rural areas continues to be of high importance⁹.

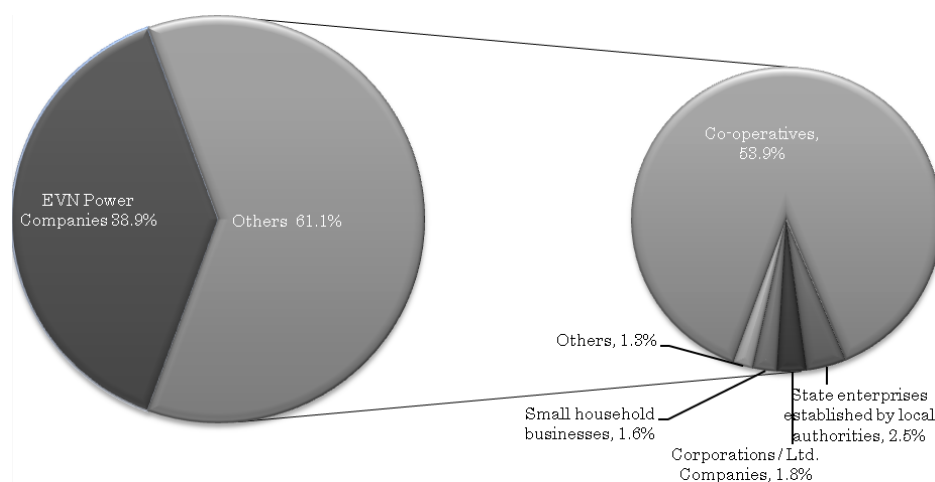


Fig. 2. Shares of Power Distribution by Type of Organization

Source: Vietnam Chamber of Commerce and Industry, 2007.

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal, improvement of electric power infrastructure was one of the high-priority areas in the country assistance program for Vietnam. It intended to be offering of assistance for operations where development cooperation could be highly effective in improving the use of existing facilities (for power generation, and for energy conservation, etc.), for the stable supply of electric power, and power distribution systems that would contribute to rural electrification, while

⁸ It was previously called Center of Environment and Computer.

⁹ Eligibility of subprojects was examined by EVN based upon a list submitted by regional power corporations. They had to fulfill the following main conditions: (1) listed in power corporation's investment program in the fiscal years 2003~2006, (2) have never been and not to be financed by the other external resources (e.g., World Bank, Asian Development Bank), (3) Not exceeding 500 million yen per each contract for construction/procurement.

giving attention to improvement of the environment. Another background factor was the policy of assisting ongoing sector reform through implementation of sector loans, particularly through providing advisory support by means of the soft component of the yen loan, to facilitate institutional reform in order to minimize the burden on the environment.

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

3.2 Effectiveness¹⁰ (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

At the time of appraisal "improvement of the regional power distribution network" were identified as operation and effect indicators and the pilot province for this was Bac Ninh (where the implementing agency was NPC, a subsidiary of the forerunner of the present EVN), and Quang Nam (there, the CPC). Regarding the year to be the target for comparison of actual results to targets this was set at 2008 at the time of appraisal, because implementation had not been delayed.

The results of analysis of indicators for the three provinces are as in the following table.

Table 1. Operation and Effect Indicators in Bac Ninh, Quang Ninh, and Quang Nam

Province	Indicator	Base value (2003)	Target value (2008)	Actual value (2008)
Bac Ninh	Electricity consumption per household (MWh/household)	0.62	1.24	1.04
	Annual power outage hours per user household (minutes/year per household)	7200	5400	5133
Quang Ninh	Electricity consumption per household (MWh/household)	0.25	0.35	2.40
	Annual power outage hours per user household (minutes/year per household)	800	600	575
Quang Nam	Electricity consumption per household (MWh/household)	0.74	1.37	n/a ¹¹
	Annual power outage hours per user household (minutes/year per household)	n/a	n/a	n/a
	Distribution loss (%)	8.5	6.65	7.05
	Distribution loss reduction rate (%)	n/a	22	23

Source: JICA appraisal documents and questionnaire responses from NPC, CPC

From the actual data for Bac Ninh obtained at the time of the ex-post evaluation study, it is seen that the fulfillment rate for electricity consumption per household reached 84% so that it can be said

¹⁰ Sub-rating for Effectiveness is to be put with consideration of Impact

¹¹ Regarding data (actual value of 0.007MWh/ household in 2008) obtained from the Quang Nam Province through CPC, we could not confirm detailed data sources and unit to calculate the values of the indicator. Therefore, it was judged that we could not ensure the accuracy comparable to that of data from other provinces.

that in terms of this measure the objective was essentially achieved. Concerning power outages per user household the length of the outages was below the target figure so that in terms of this measure the target was reached. Also, even in Quang Ninh 96% fulfillment was achieved for power outages per user household, indicating improvement of the stability of power supply. Moreover, the data from Qiang Nam shows improvement in the efficiency of power distribution, in the form of reduced distribution loss based on actual longitudinal data, even though the target figure itself was not reached. Data for the annual failure rates of low voltage transformers show that the annual number of failed transformers per 100 transformers were 0.024 in 2007 and 0.016 in 2008, a point of concern in this project, shows almost no failures so that the project accomplished a certain degree of effectiveness.

3.2.2 Qualitative Effects

The following four points were set forth for qualitative effect analysis at the time of appraisal.

- Reduction of the burden on the environment by establishing an EMS in EVN
- Reduction of greenhouse gas effects by acquisition of equipment for protection of the environment
- Stabilization of power supply by rehabilitation and construction of facilities
- Restraint of CO₂ production by reducing use of diesel generators

Regarding “reduction of the burden on the environment by establishing an EMS in EVN” and “reduction of greenhouse gas effects by acquisition of equipment for protection of the environment,” the building of an EMS was not completed and acquisition of equipment for protection of the environment was not done through use of the yen loan but by the funds of the Pha Lai thermal power plant itself and although installation of environment protection equipment – only for water treatment – was done, the qualitative effects sought for this project were not attained.

Regarding “stabilization of power supply by rehabilitation and construction of facilities,” in the beneficiary survey¹² in Bac Ninh an inquiry was made into attitudes of residents who can be thought of as being direct recipients of benefits, and analysis of the data obtained was used to supplement our judgment of qualitative effects. They were asked several questions regarding the quality of power supply that were deemed as problematic in Vietnam (multiple answers allowed). Among them, four issues that were particularly relevant to the project were: “power cut without prior notice,” “frequency of rolling blackouts,” “frequency of breakdowns,” and “voltage stability.” 82% of them responded “power cut without prior notice” had been much improved. 81% of them responded “frequency of rolling blackouts” had been much improved. 74% of them responded “frequency of breakdowns” had been much improved. 84% of them responded “voltage stability” had been much improved. Further,

¹² Before conducting the beneficiary survey, we studied basic data (area, population, number of communes, economic growth rate, food production per capita, type of occupation) of the seven targeted districts. Further, we needed to confirm that the 130 respondents should be residents of the districts who had lived before the project (2004). Notable characteristics of the sample are that the size of household is relatively small (3.5 persons) and head of household are mostly male except one. Also more than 90% of them knew that the project was assisted by JICA through an announcement from Bac Ninh people’s committee and the power company.

many of the transformers that were intended to be replaced in this province by means of the project had been purchased by the residents in about 1975 and by dint of being superannuated frequently broke down, causing more than 30% distribution loss prior to project implementation. However, in 2006, after project implementation which covered a wide area of Bac Ninh for upgrading of transformers with optimization and improvement of distribution lines, it was reported that great improvement was attained, so that the loss was currently reduced to 11%.

Regarding “Restraint of CO2 production by reducing use of diesel generators,” since the project targeted rural areas in Bac Ninh where there are relatively more poor households, it is not in the case that they did not own diesel generators at all in the first place. Also according to responses from three regional power corporations, there was no report that existing diesel generators were removed. However, if there was no implementation of the project for rural electrification, we can assume that diesel generators might be used so that CO2 might have been increased.

Table 2. Rural electrification in Vietnam

(%)

	2005	2006	2007	2008	2009	2010
Communes	95.9	96.4	97.0	97.8	97.9	98.6
Households	90.4	91.5	96.7	94.5	95.0	97.3

Source : EVN Corporate profile 2009-2010,2010-2011

3.3 Impact

3.3.1 Intended Impacts

The project sought to achieve improvements by the following impacts:

- Reduction of the environmental burden caused by the power sector
- The use of power is to be spread more widely in rural areas

On the matter of the reduction of the environmental burden, as the project component of establishing an EMS has not been completed, the anticipated impact therefore was not realized.

With regard to the rural use of power, we have designed and conducted a survey of villagers in Bac Ninh, specifically to examine on their purchasing of electric appliances, as well as the change in the percentage of power bill payment in household expenses, after the project.

First, we have confirmed that the stable electricity supply realized by the project contributed to their purchases of new electric appliances and use of power. Notably, the bars of “bought after the Project” in Figure 3 indicate the wide range of new purchases of electric appliances. 5% of respondents bought electric pumps, and washing machines which had not been bought before the project. They are useful to improve sanitary and environmental conditions. Air-conditioners (40%), Microwave ovens (50%), water heaters (45%) were purchased to provide comfort and convenience in domestic life. Also, the increase in ownership of PCs and laptops (30%), radios and karaoke sets (30%), and TVs (10%) can serve to provide greater access to information and new ways to spend

leisure time. All in all, the villagers have increased purchases of electric appliances which can bring various changes in many aspects of their daily lives.

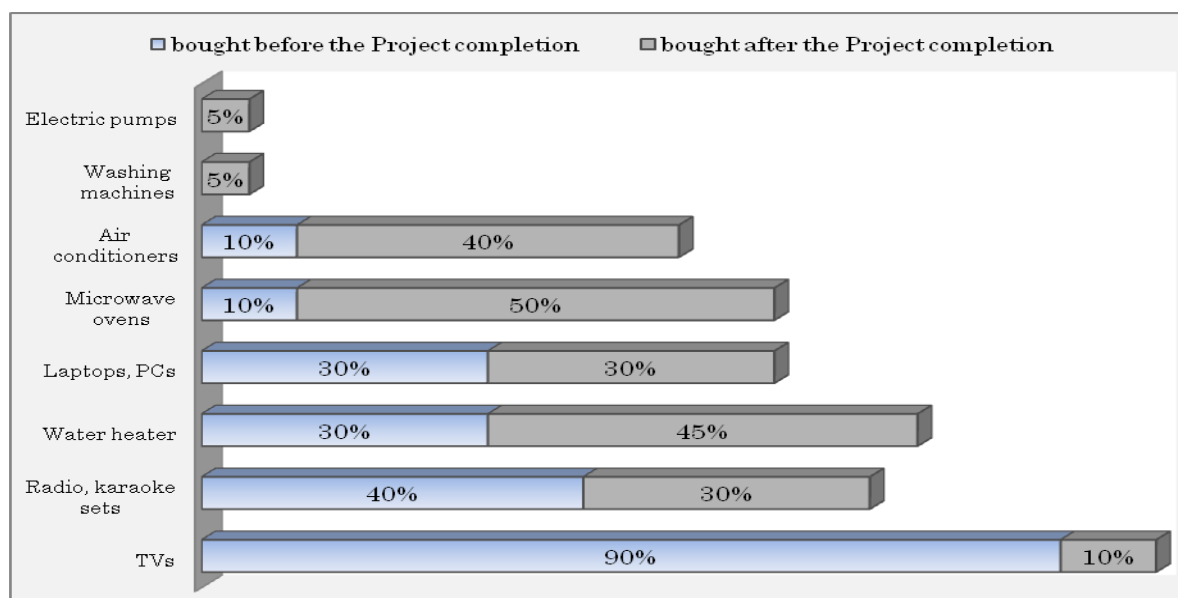


Fig. 3. Change in Possession of Electric Appliances among Residents in the Survey Area

Source: Data compiled from the beneficiary survey

Second, the percentage of the power bill payment in household expenses was increased by 88% after the project. Thus it can be said that they have come to use more electricity after realization of the project. In fact, the electricity tariff per unit had not increased much at the time of the study in May 2012, and was at the same level as the time of project completion in 2006.¹³ In addition, responses indicated that as a result of having shifted to becoming customers of Bac Ninh Power Company (an EVN subsidiary) as encouraged by the project, the electricity tariff per unit was rather cheaper than before.

¹³ However, the tariff has been uniformly increased by 5% starting from July 2012.

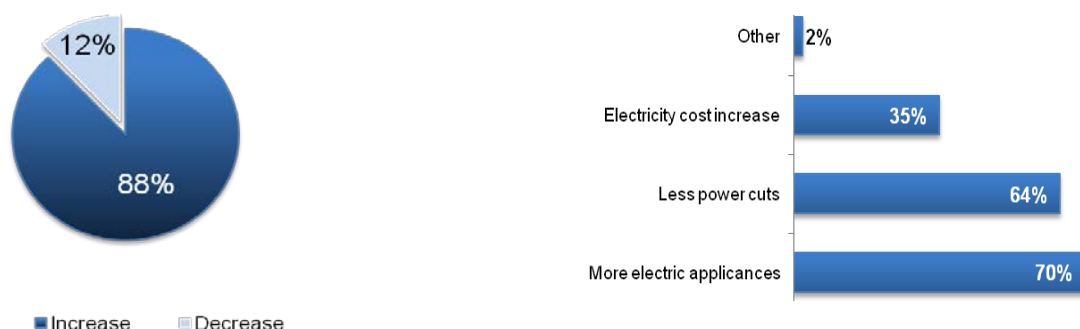
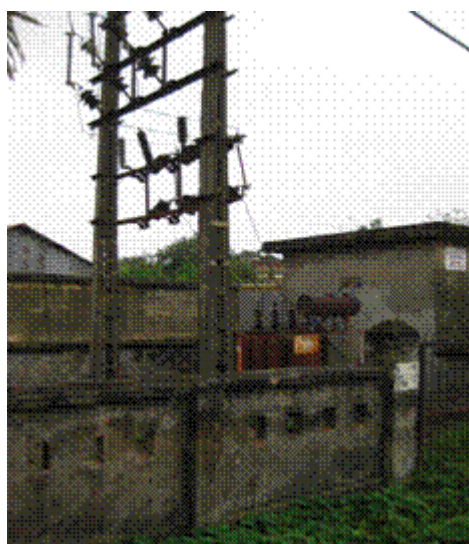


Fig. 4. Change in the Percentage of Power Bill Payment in Household Expenses

Source: Data compiled from the beneficiary survey

3.3.2 Other Impacts

According to Bac Ninh Power Company, as unintended positive impacts, a decrease of electrocution of children and domesticated animals caused by the replacement of the outdated substations scattered in rural villages has been observed. Also, with the additional new substations, they could replace existing outdated distribution equipment without interrupting the electricity supply.



(Outdated substation in a village dating to the 70's)



(Old electric transformer)

➤ Impact on the Natural Environment

The power company reported that in agricultural villages in Bac Ninh, because they started using electric pumps, farmers could easily drain and circulate water in paddy fields and could also efficiently provide oxygen for fish culture in ponds. Thus, the project has some positive impacts on

village-based agriculture and fishery in terms of water improvement and production in villages.

➤ Land Acquisition and Resettlement

It has been reported that there were some subprojects under the supervision of NPC that took more time for due procedures for land acquisition and resettlement, notably for legal compensation, than expected. As such, this is not currently deemed to be a social problem of serious magnitude.

BOX 1. Socio-Economic Impacts of the Project

The socio-economic impacts in Bac Ninh brought about by the project are illustrated in the table below.

Table 3. Changes after the Project in Bac Ninh

Listed changes in lives	No Comment	Strongly Agree	Agree	Disagree	Strongly Disagree
My family now has more opportunities to access information, knowledge from TV, Radio, and Internet	1%	45%	52%	0%	2%
Quality of life was improved, made safer and more comfortable	2%	42%	54%	0%	2%
Our children spend more time for studying, and they can now use a computer to get more access to information for study	1%	49%	47%	1%	2%
We can spend more time for entertainment and culturally enriched	2%	48%	48%	1%	1%
Healthier and nutritiously improved	1%	39%	58%	1%	1%
It gives support to housewives for housework and child-care	3%	45%	49%	2%	1%
Better quality in public care services and social infrastructure	2%	43%	52%	1%	2%
Local security is increased	2%	41%	54%	1%	2%

Source: Data compiled from the beneficiary survey

Based on the survey result, improving the reliability of electricity supply actually has many positive impacts on their daily lives. Among others, the two notable facts are that children spend more time studying at night and housewives are free from the burden of prolonged domestic work, an improvement that can have direct synergy effects on improvement on education and income generation. Through interviews, we have confirmed that by the new purchases of household appliances women have become able to spend more time on income generation activities as a result of the project. Thus, they can significantly help support their family budget by bringing in additional income from the activities.

Positive impacts of the project are being observed on the whole and no other pending issues for immediate attention have been reported concerning the environment, relocation of inhabitants, or land acquisition.

In light of the above, quantitative effects are being observed. On the other hand, regarding qualitative effects and intended impacts particularly on reduction on the burden of the environment,

these were not achieved mainly because of cancellation of consulting services for establishment of EMS. Regarding other impacts, they are mostly positive. Thus, its effectiveness is fair.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

At the time of the project appraisal, three outputs were assumed as below.

- ① Establishment of Environmental Management System (EMS) in EVN headquarter and at the Ninh Binh thermal power plant
- ② Procurement of environmental equipment for the Pha Lai thermal power plant
 - System line for manufacturing of mechanical parts of electrostatic precipitators and air heaters for boilers
 - Sewage waste water plant
- ③ Rural electrification
 - Substations, distribution lines, cable lines, antennas in 47 provinces

First, with regard to establishment of EMS in EVN, the scope of the target of consulting service includes not only EVN headquarter and the existing Ninh Binh Thermal power plant (Ninh Binh 1) but also a new Ninh Binh thermal power plant (Ninh Binh 2) being planned during the project period for a site adjacent to Ninh Binh 1. This eventually caused the delay and cancellation of the consulting services since the government of Vietnam decided to stop all the projects related to Ninh Binh 2 because of a serious siting problem. Therefore, consulting services started in April 2007 and an inception report was submitted. However, the decision of government of Vietnam mentioned above was issued in July 2007, the consulting service was stopped and postponed, and in September 2008, EVN finally decided to cancel the services. This was duly reported to JICA and explained by EVN through a formal process and JICA agreed with the decision¹⁴.

Regarding the procurement of environmental equipments at Pha Lai thermal power plant, the power plant became a joint stock company in March 2005 (EVN's ratio of stock holding was 67%). The board meeting decided that this should be dealt with by its own funding. Therefore it was decided to make procurement be outside the scope of the project and not implemented by use of the yen loan.

Regarding rural electrification, all subprojects that 3 regional power corporations implemented were completed and placed in operation.

Thus, on the whole, although the soft component was partially cancelled, and the procurement of equipment was outside the scope of the project, the unused budget that occurred due to the change of the scope was allocated to fund additional subprojects¹⁵ for the rural electrification component and

¹⁴ According to the comments by a former official of MPI, as EVN was undergoing cost-cutting and rationalization as state-owned enterprise reforms during the project period, if there was a possible way of introducing EMS by the project, it might have been in the grant form of technical assistance or expert dispatch.

¹⁵ Since the three regional power corporations which are subsidiaries of EVN are in charge of entire management of the subprojects, EVN headquarters did not have a direct responsibility to report JICA in detail. Thus EVN headquarters did not have detailed records for each subproject.

completed during the project period.

Table 4. List of Subprojects for Rural Electrification at the Time of Appraisal

Name of power corporation	Name of province	Distribution lines (km)	Number of Substations	Total capacity (kVA)
NPC	Bac Ninh	96	282	37,015
	Quang Ninh	51	51	7,740
CPC	Quang Nam	166	107	18,380
	Soc Trang	5	40	1,025
	Tra Vinh	3	11	275
	Tien Giang	24	7	503
	Ben Tre	8	33	1,225
	Kien Giang	1	3	300
	Binh Thuan	46	0	--
	Binh Phuoc	4	0	--
SPC	An Giang	7	0	--
	Can Tho	8	0	--
	Ca Mau	1	0	--
	Long An	8	0	--
	Ninh Thuan	16	0	--
	Tay Ninh	23	0	--

Source: JICA appraisal documents

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned cost at the appraisal was 3,753 million yen in total. Of the planned total, 3,190 million yen was the requested sum for a yen loan. In comparison, the total disbursement was 2,812 million yen, mainly for rural electrification. The environment equipment was procured partially by own funds (The water treatment system investment amount was 260 million VND. It was completed and started to operate in 2006~2007, and the oil-water separator system investment amount was 200 million VND; it was completed and started to operate in 2005.)

The actual cost was a total of 3,176 million yen, consisting of payment of 451,884 million VND in domestic currency for all the completed subprojects for rural electrification and 20 million yen for consulting services paid for in foreign currency. This amount was 85% of the planned cost of 3,753million yen. Even allowing for exclusion of the original cost of consulting services (210 million yen) from the total planned cost due to the cancellation, it is lower than planned (90%).

Table 5. Comparison between Planned and Actual Cost

	Unit (million yen)		
	Planned Cost	Agreed amount of the yen loan	Actual cost
Consulting services	210	90	20
Procurement of environment equipment	530	Out of scope	Self-financed
Rural electrification	2,344	2,994	3,050
Others (IDC, Contingency)	699	106	106
Total	3,753	3,190	3,176

Source: JICA documents

3.4.2.2 Project Period

The project period was extended once, by 24 months, in August 2007. After the extension, the project was duly implemented within the period planned. However, restructuring-related internal procedures accompanying EVN's becoming a joint stock company in June 2006 caused a substantial delay in approving and implementing consulting services. At the beginning, the contract negotiation prior to approval was delayed for about 32 months. Once started, it stopped right away and then was postponed. It was finally cancelled after the government decision on the new Ninh Binh thermal power plant.

Regarding rural electrification, for certain subprojects in Northern Vietnam, the implementing agency needed to revise the bidding plan and this took a longer time for processing. Also, as a small group of villagers needed to be relocated in order to build a substation, this required some time to deal with the legal compensation and land acquisition matters. In Central Vietnam, one case in point is that a subproject required specific equipment for which no local bidder met the technical requirements (for an underground cable of waterproof type) so that they had to change the procurement method to international competitive bidding which took a longer processing time than planned. On the whole, the actual project period duration was 159% of the initial planned project period of 41 months.

In addition, the terms of reference for consulting services originally included monitoring for installation of rural electrification. However it was not contracted for by EVN during the implementation period. Therefore, it was not systematically monitored and reported by the third party that may have caused lowering of the efficiency of management of the subprojects implemented throughout the three regions.

Thus, the time required was longer than planned even considering the decrease of the output

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

Although the project cost was within the plan, the project period exceeded the period planned, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

As stated in the section of “Relevance to the Development Plan of Vietnam,” power sector restructuring is under way as a matter of major national policy. Even before the project implementation and after becoming a holding company since 2006, EVN continued to undergo extensive organizational restructuring. From the perspective of the EVN group as a whole as well, it is in a very fluid situation that is more or less unpredictable. However, regarding operation and maintenance of the facilities constructed for rural electrification in the project, provincial power companies grouped under the three regional power corporations are in charge in the field. These power companies and power corporations continue to be subsidiaries of EVN and comprise the essential components of the EVN group. Thus, it is hard to foresee that major organizational problems at the power companies arose from the current restructuring. In addition, according to the Prime Minister’s Decision on the “Roadmap for Power Sector Reform” adopted in January 2006, plans call for further change in the structure of the power sector and its time schedule so that power corporations under EVN will be spun off and be financially independent from 2015. Thereupon they will be able to purchase electricity from not only EVN but also power sources other than EVN, in the wholesale electricity market. Inevitably competition will increase and will make power companies irreversibly adjust to achieve greater economic efficiency and to strengthen organizational management. In addition, even though the organizational restructuring based on electricity as a business was ongoing, the Department of Science, Technology and Environment which is the core organization for dealing with all environment issues of EVN including the establishment of EMS¹⁶, was steadily expanded from just a few persons to a staff of 10 with relevant expertise. This reflects the increase in recognition of its importance since 2002.

Regarding the renovation of the communication network, it has been reported that EVN Telecom has been liquidated¹⁷ and Viettel which is another state-owned company specialized in telecommunication has taken over its assets since last November. Therefore these facilities are no longer under the control of EVN. We also confirmed that they settled that all liabilities of EVN Telecom including those related to the project will be borne by Viettel in February 2012.

¹⁶ According to the master plan made in 2011, the main tasks of the Environment Department are (1) promotion of energy-saving measures, (2) environmental impact evaluation, (3) development of alternative energies that reduce the environmental burden, (4) promotion of investment in environment protection, and (5) promotion of use of LED for public facilities.

¹⁷ EVN Telecom, an affiliate of EVN, was in charge of operation and maintenance of the facilities. However, it was revealed to be business failures, due to lax management and insufficient screening of credit applications. The chairman of EVN was fired by the Prime Minister in November 2011, to take responsibility for the business failure. Through this, the government demonstrated that EVN should focus only on electricity business. In fact, it was reported that EVN Telecom was recently in a battle for market share with other companies and failed to bring in new customers. As such Viettel which is under the defense ministry has been in charge of operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

Regarding local electricity distribution, no major problems have been reported since provincial power companies under EVN have been put exclusively in charge, even before the project, as cooperatives had been operating in many communes in rural areas. Introduction of new facilities and their operation and maintenance did not require unfamiliar foreign technology and technical knowledge. In fact, the conventional low voltage transformers are manufactured domestically. In any event, a point that should be kept in mind is that it is necessary to provide regular training regarding new distribution lines that connect to the old ones require grid network optimization technique. We have confirmed that there is a training course at EVN for technicians of power companies according to the rule of EVN on a regular basis.



Pole mounted transformer made in Vietnam

Further, as awareness of environment issues has increased in EVN¹⁸, it continues to assign importance to the establishment of EMS and other measures on behalf of reduction of the burden placed on the environment.

As recognition of this has become well established within EVN, once EMS is established, it is quite likely that the effect will be achieved and sustained in the future.

3.5.3 Financial Aspects of Operation and Maintenance

According to the response from power corporations, the profit from the project is slightly lower than the cost of operation and maintenance. In NPC's projection, the profit level will exceed the cost after 2013. In principle, it is very important to set price levels that can cover actual costs of electricity, however, it is known that Vietnam's price level is far lower than those of its neighboring countries. As such, the World Bank and the ADB have asked the Government of Vietnam to ensure an adequate tariff increase as a performance indicator of the sector reform.¹⁹ Therefore a future tariff increase is inevitable for both resource development and the electricity business and to attract a considerable amount of investment from inside and outside the nation. With this background of the pressure for higher prices and for increased competition, it is getting even more essential for all power companies to upgrade the level of their distribution services to justify price increases and to ensure transparency of cost of operation and maintenance for customers.

Regional power corporations which supervise and manage all the provincial power companies

¹⁸ As one example of their effort with regard to EMS, Thac Ba hydro power plant which is the oldest hydro power plant of EVN and has already become a joint holding company, achieved ISO14001 certification in 2004 as a result of its installation of an EMS.

¹⁹ ADB (Asian Development Bank, Operations Evaluation Department).2004. *Technical Assistance Performance Audit Report on Advisory Technical Assistance for Power Sector Institutional Strengthening in Viet Nam.*

and facilities need to prepare for upgrading hands-on management to become financially independent. Among others, to introduce systems to ensure uniform collection of operation and maintenance costs is indispensable as a basis of management. However, all in all, as shown in Table 6, judging from the financial issues and direction of the EVN group on the whole as well as the three-way progress of state-owned-enterprises, the power sector and price reform all of which have accelerated from this year, no major problems have been observed in this aspect.

Table 6. Solvency of the EVN Group

Indicators	2008	2009	2010	Remarks
Liquidity ratio	165	143	117	Being over 100%, not too much of a problem regarding cash-flow
Long term debt-equity ratio	87	91	74	Being less than 100%, its long-term fund management is not too much done by short-term funding
Equity ratio	32	28	23	There has been somewhat of a downturn

Source : Calculated from the balance sheets in the Corporate Profile of EVN

Note: Assets and liabilities of the three regional power corporations (NPC, CPC, SPC) are currently included in the balance sheet in the profile in consolidated accounting.

3.5.4 Current Status of Operation and Maintenance

Through the field survey, we have observed that the facilities constructed by the project have been fully utilized based on regular check-ups following the EVN manual of operation and maintenance. Also it was informed to us from the power company that having new transformers obtained by the project, they were able to replace the outdated transformers without interruption of supply, so that the overall condition of distributing electricity has been improved.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project is judged to be high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project aimed at establishing an Environment Management System in EVN, and installation of environment equipment and facilitation of rural electrification; these measures to contribute to mitigating the environmental impact on the power sector and supporting stable power supply in Vietnam. The relevance of this project is quite high as it is relevant to the policies and needs both at the time of the appraisal and ex-post evaluation. However, a lowering of efficiency has resulted from a delay and cancellation of consulting services. Also with regard to effectiveness and impact, it has not fully achieved intended environmentally positive effects and impacts due to the cancellation of consulting services for establishing EMS at EVN and the Ninh Binh thermal power plant. In light of the original scope of the project, therefore, the effectiveness is considered to be fair. Regarding sustainability, it is considered to be high. Judging from the current situation of the power sector reform being implemented by the Vietnamese Government, we have confirmed that the direction of restructuring of the EVN group on the whole is in favor of strengthening organizational

competitiveness by duly introducing the market mechanism. Also there is a high degree of usage of facilities for distribution of electricity and regular check-up for operation and maintenance is systematically carried out.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

In light of power sector reform by which the market mechanism has to come into play, EVN and EVN affiliated group companies inevitably have to face the issue of making fair and reasonable increases in prices hand-in-hand with improvement of services. Especially, as the government decision to transfer rural electricity management from local authorities to EVN and EVN now has to deal with end-users on a daily basis, business management of EVN power companies at the provincial level becomes substantially more important. Also, the fixed and variable costs of distribution and fair profit must be reflected in the price of electricity and that will ultimately lead to stable management and competitiveness. The first specific measure necessary to realize the above is that all power companies should introduce uniform software to swiftly collect, compute and integrate O&M cost related data which are the basis of business management.

4.2.2 Recommendations to JICA

None in particular.

4.3 Lessons Learned

To assist the sector on the whole may generally involve many organizations and legal entities, so that sufficient attention should be paid to relationships among them as well as each function that shapes the nature and quality of the sector. Also it is important take note of the status of progress within the roadmap for sector reform.

Also, as in the case in point wherein reform is to be driven by introducing the market mechanism through means such as privatization, it is necessary to keep in mind the anticipation of other potential competitors in the private sector. That means that it is important to be flexible regarding the scope of changes as they must be properly responsive to market signals ranging from what types of service improvement are sought or what the specific needs of consumers/buyers are, as well as awareness-raising to enable fair pricing and costs from a hands-on managerial perspective.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	<p>(1) Consulting services</p> <ul style="list-style-type: none"> • Establishment of Environmental Management System (EMS) in EVN (32M/M) • Monitoring for installation of environment equipment and rural electrification subprojects (17M/M) <p>(2) Procurement of environmental equipment</p> <ul style="list-style-type: none"> • System line for manufacturing of mechanical parts of electrostatic precipitators and air heaters for boilers • Sewage waste water plant <p>(3) Rural electrification</p> <ul style="list-style-type: none"> • Substations, distribution lines, cable lines, antennas 	<p>(1) Consulting services</p> <p>Cancellation</p> <p>(2) Procurement of environmental equipment</p> <p>Out of the scope of the Yen loan</p> <p>(3) Rural electrification</p> <p>Completed as planned and some additional subprojects during the project period. There were some revisions of scope of subprojects.</p>
2. Project Period	March 2004 – August 2007 (41 months)	March 2004 – August 2009 (65 months)
3. Project Cost		
Amount paid in Foreign currency	240 million yen	126 million yen
Amount paid in Local currency	3,513 million yen (457,389 million VND)	3,050 million yen (451,884 million VND)
Total	3,753 million yen	3,176 million yen
Japanese ODA loan portion	3,190 million yen	2,812 million yen
Exchange rate	VND1 = 0.00768 yen (As of October 2003)	VND1 = 0.00713 yen (Average between October, 2003 and March, 2009)