

## Ex-ante Evaluation

### 1. Name of the Project

Country: The Socialist Republic of Viet Nam

Project: Thai Binh Thermal Power Plant and Transmission Lines Construction Project  
(I) (II) (III) (IV)

L/A signed: November 10, 2009 (I), January 26, 2015 (II), July 4, 2015 (III), May 28, 2016 (IV)

L/A Amount: (I) 20,737 million Yen, (II) 36,392 million Yen, (III) 9,873 million Yen,  
(IV) 54,982 million Yen

Borrower: The Government of the Socialist Republic of Viet Nam

### 2. Background and Necessity of the Project

#### (1) Current state and Issues of the Power Sector in Viet Nam

Vietnam achieved a high rate of gross domestic product growth, averaging 6.6 percent per year, between 2000 and 2013. With that economic growth, the demand for power has risen at an annual rate averaging 12.5 percent over the 6 years from 2007 to 2012, and it is expected to continue to grow going forward.

#### (2) Development Policy for the Power Sector in Viet Nam and the Priority of the Project

To address this rising demand for power, 50,000 MW (megawatts) of new power source is planned to be developed between 2011 and 2020 under National Power Master Plan VII (2011–2020). It also aims at developing more reliable power supply by newly installing and enhancing transmission and distribution systems. The largest share of energy sources at the end of 2012 was hydro power which accounted for 50.2% while coal-fired thermal power was 18.3%. The Plan will mainstream coal-fired thermal power as the major energy source with 51.6% of the share in 2030 by utilizing domestic coals.

Thai Binh Thermal Power Plant and Transmission Lines Construction Project (hereinafter referred to as the “Project”) is recognized in the aforementioned Master Plan as a project to cover growing power demands in northern Viet Nam.

#### (3) Japan’s and JICA’s Policy and Operations in the Power Sector

Japan’s Country Assistance Program (CAP) for Viet Nam (December 2012) identifies cooperation in the area of stable resource/energy supply as an important part of “Promotion of Economic Growth and Strengthening International Competitiveness,” one of the priority areas of Japan’s assistance to Viet Nam, and defines assistance relating to increasing power generation (and particularly key power generation facilities) as a priority issue. Concurrently with this policy, JICA’s Country Analysis Paper is also putting emphasis on stable energy supply. Therefore, the Project conforms to Japan’s assistance policy. Since Japan resumed its ODA to

Vietnam in 1992, the accumulated capacity of power plants constructed by the yen loan is more than 3,000 MW. In addition, JICA carried out the technical cooperation and human resource development for formulating power master plan and electric power technical standards promotion.

#### (4) Other Donor's Activity

The World Bank (WB) is concentrating on supporting power sector reforms and rural electrification. The Asian Development Bank (ADB) is focusing on further strengthening the profitability of the power generation and high-pressure systems sector by providing funds from its Ordinary Capital Resources (OCR), in addition to promoting sector reforms.

#### (5) Necessity of the Project

The Project aims to efficiently address the pressing demands for power and contribute to securing a stable power supply in northern Viet Nam by constructing a coal-fired thermal power plant that runs on domestic coal, in Thai Binh Province. It accords with Japan's and JICA's priority assistance areas, and therefore, JICA's support of the Project is highly necessary.

### **3. Project Description**

#### (1) Project Objective

The objective of the Project is to meet the increasing power demand in Viet Nam through construction of new coal-fired thermal power plant (600MW) and related transmission network in Thai Binh Province, thereby contributing to the socio-economic development of the country.

(2) Project Site / Target Area: Thai Binh Province, Hung Yen Province, Nam Dinh Province, Ninh Binh Province, in the Socialist Republic of Viet Nam

#### (3) Project Components

1) Construction of Thai Binh Thermal Power Plant (300MW x 2 units)

① Civil engineering works (cooling water intake/discharge channels, port facilities including coal unloading facilities, etc.)

② Material procurement and installation (turbine, boiler, power generator, flue gas desulfurization unit, etc.)

2) Construction of a 220kV transmission line (approx. 30km)

3)

#### (4) Estimated Project Cost (Loan Amount)

170,704 million Yen (Accumulated Loan Amount: 121,984 million Yen)

Original plan: estimated project cost was 82,199 million Yen

#### (5) Schedule

November 2009 - April 2020 (126 months in total; planned). To be completed with the commencement of operation (April 2018).

Original plan: schedule was November 2009 – May 2017 (91 months in total), to

be completed with the commencement of operation in May 2015.

(6) Project Implementation Structure

- 1) Borrower: The Government of the Socialist Republic of Viet Nam
- 2) Executing Agency: (Power plant) Vietnam Electricity, (Transmission line) National Power Transmission Corporation
- 3) Operation and Maintenance System  
(Power plant) Ninh Binh Thermal Power Joint Stock Company, (Transmission line) No.1 Power Transmission Corporation

(7) Environmental and Social Consideration / Poverty Reduction / Social Development

1) Environmental and Social Consideration:

① Category: A

② Reasons for Categorization:

The Project is classified as category A, because it comes under the road and bridge sector and also has features that are likely to have significant impact (large-scale involuntary resettlement) as defined by the Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations (issued in April 2002).

③ Environmental Permit:

(Power Plant) EIA report was approved by the Ministry of Natural Resources and Environment (MONRE) in March 2009. (Transmission line) EIA report was approved by MONRE in February 2009 to July 2014.

④ Anti-Pollution Measures:

(Power plant) Viet Nam's domestic standards and World Bank standards<sup>1</sup> for air quality will be satisfied by installing a desulfurization unit, and standards for warm-water discharge will be met by ambient discharge through a discharge channel. (Transmission line) The levels of air quality, noise, and vibration produced mainly during construction work will conform to Viet Nam's domestic standards.

⑤ Natural Environment:

The Project site is not located in or around an area that would be readily affected by the Project, such as a national park, and any adverse impacts on the natural environment are expected to be minimal.

⑥ Social Environment:

No resident relocation will be necessary. (Power plant) Around 257ha of land was acquired in line with the required domestic procedures in Viet Nam in 2009. Around 3.4ha of land for operator's office is under acquisition process.

No resident relocation will be necessary. (Transmission line) Around 21ha of land including the land for transmission line construction by Vietnamese side

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<sup>1</sup> Pollution Prevention Abatement Handbook 1998

will be acquired in line with the required domestic procedures in Viet Nam by August 2016.

⑦ Other/monitoring:

During construction, air quality, water quality, noise and vibration, and the state of livelihood recovery by the affected residents will be monitored by the Implementing Agency, and after commencement of operations, the power company that will be established to operate the power plant.

- 2) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for the Handicapped, etc.): Create jobs at construction sites for women who are affected residents for livelihood recovery. The HIV/AIDS Prevention Center, managed by the Thai Binh Province People's Committee in collaboration with local NGOs, implements measures to protect construction workers and local residents from HIV/AIDS.

(8) Collaboration with Other Donors: None

(9) Other Important Issues: Collaboration with a technical cooperation project is being considered within the framework of the stable energy supply program.

<b>4. Target Outcomes</b>
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(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

(power plant)

Indicator	Baseline (2009 Actual)	Target (2020) 【Two years after the completion of the project】
Maximum output (MW)	-	600
Net electric energy production (GWh)	-	3,276 or more
Plant load factor (%)	-	68.5 or more
Gross thermal efficiency (%)	-	39.9 or more
Availability factor (%)	-	92.0 or more
Auxiliary power ratio (%)	-	9.0 以下
Outage hours (human error) (hr)	-	0
Outage hours (mechanical error) (hr)	-	218 以下
Outage hours (regular inspection)	-	480

(transmission line and substation)

	Indicator	Baseline (2009 Actual)	Target (2020) 【Two years after the completion of the project】
Availability Factor (%)	1. Transmission line between Thai Binh Thermal Power Center and Thai Binh Substation	-	41
	2. Transmission line between Thai Binh Thermal Power Center and Truc Ninh Substation	-	44
	3. Transmission line between Truc Ninh Substation and Nam Dinh Substation No. 2 (Note)	-	26
	4. Transmission line between Nam Dinh Substation No. 2 and Nam Dinh Substation (Note)	-	18
	5. Transmission Line between Ninh Binh Substation No. 2 and Thai Binh Substation (Note)	-	17
	6. Transmission Line between Ninh Binh Substation and Ninh Binh Substation No. 2 (Note)	-	7
	7. Transmission Line between Ninh Binh and Nam Dinh	-	24
	8. Transmission Line between Thai Binh and Kim Dong	-	22
	9. Truc Ninh Substation	-	49
	10. Thai Thuy Substation	-	49
Maximum output (MW)	Truc Ninh Substation	-	158.4
	Thai Thuy Substation	-	207.3

## 2) Internal Rate of Return

Based on the conditions indicated below, Economic Internal Rate of Return (EIRR) of the project is 12.0%, and Financial Internal Rate of Return (FIRR) of the project is 4.2% for power plant and 22.9% for transmission line and substation.

(EIRR)

Cost: Construction cost (excludes tax), operation/ maintenance management

costs

Benefit: Reduction in the cost of purchasing power from Independent Power Producer

Project life: 25 years

(FIRR)

Cost: Construction cost, operation/ maintenance management costs

Benefit: Revenue from power sales

Project life: 25 years

- (2) Qualitative Effects: Promotion of economic growth in throughout the country and strengthening of international competitiveness

## **5. External Risk Factors and Control**

Thai Binh Power Plant Center consists of the power plant constructed by the Project and Thai Binh 2 Thermal Power Plant (600MW x 2, owned by Petro Vietnam, schedule to be completed in 2016) adjacent to the Project. While the common facilities, such as dredging, ash pond, and access road are maintained in Thai Binh 2 Power Plant Project, the common transmission lines are improved by the Project. Therefore, the unified schedule management is needed.

## **6. Lessons Learned from Past Projects**

(1) Evaluations of similar projects undertaken in the past:

1) Ex-post evaluation of “Anpara Power Transmission System Project” in India indicates that when a power generation project and a power transmission project are implemented together as a set, it is necessary to pay adequate attention to progress management so that the projects’ completion dates are coordinated and project effectiveness does not suffer.

2) The construction period in “Nghi Son Thermal Power Plant Construction Project” in Vietnam was delayed due to a serious accident occurred during the construction caused by an insufficient system for safety measures as well as times required for adjustment and improvement of boilers based on the characteristics of coals to be used.

(2) Lessons for this project:

1) Thai Binh Thermal Power Center connecting to transmission lines improved by this Project consists of Thai Binh Thermal Power Plant supported by the Project and Thai Bin 2 Thermal Power Plant (600MW x 2, scheduled to be completed at the end of 2016) implemented by Petro Vietnam. Given the aforementioned lessons learned, the Project will introduce information sharing and monitoring system for the project

progress which is initiated by the Ministry of Industry and Trade, the supervisory ministry of executing agency for both Plants and transmission lines.

2) The Project is to improve safety measures through the strengthening of implementation system. Since the Project is to use the same coals and boilers with the aforementioned project, delay in the construction period will be prevented by utilizing the results of incineration test and boiler adjustment.

## **7. Plans for Future Evaluation**

### (1) Indicators to be Used

(power plant)

- 1) Maximum output (MW)
- 2) Net electric energy production (GEh)
- 3) Plant load factor (%)
- 4) Gross thermal efficiency (%)
- 5) Availability factor (%)
- 6) Auxiliary factor (%)
- 7) Outage hours (human error) (hr)
- 8) Outage hours (mechanical error) (hr)
- 9) Outage hours (regular inspection) (hr)

(transmission line, substation)

- 10) Availability factor (%)
- 11) Maximum output (MW)

(in total)

- 12) Economic internal rate of return (EIRR) (%)
- 13) Financial internal rate of return (FIRR) (%)

### (2) Timing: Two years after the completion of the project