

## Ex-Ante Evaluation (for Japanese ODA Loan)

### 1. Name of the Project

Country: The Republic of Uzbekistan

Project: Turakurgan Thermal Power Station Construction Project

Loan Agreement: November 10, 2014

Loan Amount: 71,839 million yen

Borrower: The Government of the Republic of Uzbekistan

### 2. Background and Necessity of the Project

#### (1) Current State and Issues of the Electric Power Sector in Uzbekistan

Uzbekistan's peak power demand reached 8,400 MW in 2014. The nation has a total rated power generation capacity of 13,324 MW at the end of 2013, but power generation facilities throughout the country are aging, and the currently available peak generation capacity of facilities within Uzbekistan is only around 7,800 MW. Thermal power plants (out of which 90% uses natural gas as fuel) generate approximately 90% of all power, and their low average thermal efficiency (around 30%) causes a major environmental impact.

Against such a background, government of the Republic of Uzbekistan has formulated a plan to renew/newly install about 20 power generation units by 2030, mainly introducing the combined cycle gas turbine. And the government has repeatedly expressed strong desire to establish a long-term relationship for financial and technical cooperation.

In order to deal with the challenges in the electric power sector in a comprehensive and efficient manner as well as responding to this expectation, the government of Japan has decided to conclude a comprehensive Exchange of Notes as “the Electric Power Sector Project Loan (SPL) composed of several projects, and then extend ODA loans to each infrastructure development project, at the same time combining formulation of a master plan or technical cooperation for human resource development.

The implementation of this project has been defined by the Presidential Decree (PP-1943), and it is implemented as the first project in the SPL, taking into account the high priority in Uzbekistan. The Fergana region in the east part of the country, where about 30% of the population lives, has shortage of electricity, and further increase of electricity demand by about 8% year on year is expected in the region. In order to mitigate the shortage in electricity and CO2 emission, the construction of highly efficient generation facility is an urgent issue with high priority.

#### (2) Japan and JICA's Policy and Operations in the Electricity Sector

Japan's Country Assistance Policy for Uzbekistan (April 2012), defines the

renovation and development of economic infrastructure (for transportation and energy) as one of priority areas, and JICA country analysis paper (July 2012) also highlights development of economic infrastructure especially for transportation and power sector as a priority area, which is consistent with the objective of the Project. As for the past Japanese ODA loan projects in the electricity sector, there were three projects; Tashkent Thermal Power Plant Modernization Project (24,955 million yen), Talimarjan Thermal Power Station Extension Project (27,423 million yen) and Navoi Thermal Power Station Modernization Project (34,877 million yen).

(3) Other Donors' Activity

The World Bank and the Asian Development Bank are assisting in such areas as the introduction of the smart meters, development transmission lines and extension of generation facilities.

(4) Necessity of the Project

As the Project is in response to Uzbekistan's development issues and is in line with its development policies as well as Japan's assistance policy, there is a high level of necessity and validity to JICA's support for the Project.

<b>3. Project Description</b>
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(1) Project Objectives

The objective of the Project is to achieve a stable supply of electricity by/through constructing or renovating the highly efficient Combined Cycle Power Plant (CCPP), transmission lines and substations in the Namangan Province, thereby contributing to sustainable economic development of Uzbekistan.

(2) Project Site/Target Area: the Namangan Province

(3) Project Components

- 1) Construction of CCPP (2 units of 450MW) and related equipment
- 2) Renovation of Transmission Lines and Substations
- 3) Construction of Related Facilities
- 4) Consulting Services (design, bidding assistance, construction supervision, etc.)

(4) Estimated Project Cost (Loan Amount)

108,655 million yen (Loan amount: 71,839 million yen)

(5) Schedule

From August 2014 to November 2019 (total: 64 months). The Project completion is defined as the commencement of the service of the facilities (November 2019).

(6) Project Implementation Structure

- 1) Borrower: The Government of the Republic of Uzbekistan
- 2) Executing Agency: The State Joint-Stock Company "Uzbekenergo"

- 3) Operation and Maintenance System: Although the State Joint-Stock Company “Uzbekenergo” has only one CCPP operation and maintenance experience of the Navoi Thermal Power Station, which started operation in October 2012, the company is building capacity of technical staff through trainings in Japan and so on. The company has a lot of experience regarding the transmission lines and substations.
- (7) Environmental and Social Considerations/Poverty Reduction/Social Development
  - 1) Environmental and Social Considerations
    - (i) Category A
    - (ii) Reason for Categorization: The Project falls under the thermal power generation sector under the “JICA guidelines for environmental and social considerations” (issued in April 2010).
    - (iii) Environmental Permit: The Project's Environmental Impact Assessment report for the power plant part was approved in July 2013, and for the transmission lines and the substation part in March 2014, by the State Nature Protection Committee of the Republic of Uzbekistan (Goskompriroda).
    - (iv) Anti-Pollution Measures: During the Project's construction phase, measures such as limitation of the working hours for construction, regular maintenance of construction machines, and tentative storage and following appropriate treatment of polluted water will be taken against the air pollution, water discharge and noise. After the handover the facilities, the domestic emission/discharge standard is expected to be met through the introduction of low-NOx burner and high stack, discharge of water into the public sewerage system after the primary treatment plant (excluding discharge from the cooling tower), and installment of low-noise and low-vibration device. the increase of water temperature in the canal due to discharge from the cooling tower remains 0.6 °C, and water quality will meet the domestic standard in spite of condensation of chemical substances during the cooling. Wastes will be separated and disposed by disposal companies in accordance with the domestic standard.
    - (v) Natural Environment: The area in which the Project will be carried out is not in sufficient proximity to national parks or similar land to have adverse effects on such resources. Any negative impact on the natural environment is expected to be minimal. The Executing Agency monitors if the adverse effect on the ecosystem from the Project occur, and implement mitigation measures in case any adverse effect occurs.
    - (vi) Social Environment: The project does not require involuntary resettlement. On the other hand, the project requires the land acquisition of approximately 43 ha, including agriculture land and house under construction, from 82

household, and the land will be acquired in accordance with the domestic procedure and the Land Acquisition and Resettlement Action Plan.

During the stakeholder meetings, affected residents asked questions on the compensation policy, the place and infrastructure of relocation site, but they have not voiced any notable opposition to the Project.

(vii) Other / Monitoring: During the Project's construction phase, EPC contractors will monitor air quality, river water quality, noise, waste products and so on. After the commencement of the service of the facilities, work will be conducted at the Executing Agency will monitor gas emissions, air quality, wastewater and river water quality, noise, waste products and so on. The Executing Agency will also monitor the progress of land acquisition and and their lives after the acquisition.

2) Promotion of Poverty Reduction: none

3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases including HIV/AIDS, Participatory Development, Considerations for Persons with Disabilities, etc.): none

(8) Collaboration with Other Donors: none

(9) Other Important Issues: Products of Japanese companies are expected to be installed in the Talimarjan Thermal Power Station Extension Project for the primary parts such as the gas turbine (contract already concluded), and it is expected that Japanese companies will also participate in the tender of this project. Climate change will be mitigated via the deployment of high-efficiency co-generation CCPP (expected CO<sub>2</sub> emission reduction: 1,062,867 t per year).

#### 4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicator)

Indicators		Baseline (2014)	Target (2021) (Expected value 2 years after project completion)
<b>Operation indicators</b>			
Maximum power output (MW)		-	450MW × 2 units (temperature 8 °C、humidity 66%)
Plant load factor (%)		-	85.0
Auxiliary power ratio (%)		-	3.0
Availability factor (%)		-	95.0
Gross power efficiency (%)		-	60.1
Outage hours per cause (hours/year)	Human errors	-	0
	Machine	-	240

	errors		
	Planned outage	-	174
<b>Effect indicators</b>			
Annual net power output (GWh)		-	Decided at the time of the construction contract

2) Internal Rate of Return: based on the conditions indicated below, the economic internal rate of return (EIRR) of the project is 17.7% and the financial internal rate of return (FIRR) 6.6%.

[EIRR]

Cost: project costs (excluding taxes), operation, maintenance and management costs (fuel and other)

Benefits: increased power supply, reduced natural gas consumption, reduced CO<sub>2</sub> emissions

Project life: 30 years

[FIRR]

Cost: Project costs, operation, maintenance and management costs

Benefits: power sales revenue,

Project life: 30 years

(2) Qualitative Effects: promotion of national and regional economic development

#### 5. External Factors and Risk Control

Destabilization of natural gas supply to the Turakurgan Thermal Power Station, natural disasters

#### 6. Lessons Learned from Past Projects

The ex-post evaluations of Bangladesh's Sylhet combined Cycle Power Plant Construction Project points out that making the medium- and long term strategy for the continuous technical cooperation is important for the strengthening of the operation and maintenance capacity, as the effect of the project-based approach proved limited.

As the operation and maintenance experience of CCPP of the Executing Agency is limited in this project, technical cooperation combined with SPL as well as the capacity development through the consulting service is scheduled with a long-term view.

#### 7. Plan for Future Evaluation

(1) Indicators to be Used in Future Evaluations

- 1) Maximum Power output (MW)
- 2) Plant load factor (%)
- 3) Auxiliary power ratio (%)
- 4) Availability factor (%)
- 5) Gross power efficiency (%)

- 6) Outage time per cause (human errors, machine errors, planned outage)  
(hours)
  - 7) Annual net power output (GWh)
  - 8) Economic internal rate of return (%)
  - 9) Financial internal rate of return (%)
  - 10) Greenhouse gas (CO<sub>2</sub>) emission reduction (t)
- (2) Timing of Next Evaluation  
Two years after project completion