Japanese ODA Loan

Ex-Ante Evaluation (for a Japanese ODA Loan)

1. Name of the Project

Country:	The Republic of Serbia
Project:	Flue Gas Desulphurization Construction Project for Thermal Power Plant Nikola Tesla
Loan Agreement:	November 24, 2011
Loan Amount:	28,252 million yen
Borrower:	Electric Power Industry of Serbia (EPS)

2. Background and Necessity of the Project

(1) The Current State and Issues of the Power/Environmental Sector in the Republic of Serbia

In the Republic of Serbia (hereinafter referred to as Serbia), the Electric Power Industry of Serbia (EPS) is responsible for power generation. The percentage of power generated by coal-fired power plants accounts for 73% of the total power generated in Serbia (in 2009). Domestically produced lignite, which is used as fuel, is low quality and it has high sulfur and ash contents. In addition, equipments to prevent environmental pollution have not been installed. Therefore, air pollutants such as sulfur oxide and dust, are being released exceeding the emission standards of the country and there is a concern that they will have negative impacts on the environment. In particular, the Thermal Power Plant Nikola Tesla A, the largest power plant in Serbia, is essential for the stable supply of electricity in the country. It is made up of six units (with a total capacity of 1,649 MW) and it generated 25% of the electricity in 2009. However, the SO_2 concentration in the exhaust from the power plant is much higher than the national emission standards (400 mg/Nm^3). In addition, Serbia signed the Southeast Europe Energy Community Treaty in 2006 and it is required to reduce the SO_2, NOx, and dust emissions from thermal power plants down to the level of EU standards. The target date for achieving these standards in Serbia is the end of 2017. If the standards cannot be met despite the various efforts, the relevant power plants may have to be shut down. Therefore, taking measures to reduce air pollutants from thermal power plants is an urgent issue for Serbia.

(2) Development Policies for the Power/Environmental Sector in Serbia and the Priority of the Project

The Energy Sector Development Strategy of the Republic of Serbia by 2015 (2005) puts maintaining and updating the current energy production systems as the top priority. It considers that thermal power plants will continue to be the main power supply sources. Based on this policy, the National Strategy for Sustainable Development (2007) sets forth the installation of flue gas desulfurization equipment in its action plan for the implementation of the strategy. In addition, the National Environmental Programme (which was approved by the government in 2010) points out the problem of air pollution caused by the deterioration of facilities and a lack of flue gas desulfurization equipment. Its continuous goal is to reduce SO_2 and NOx emissions from large-scale combustion plants.

(3) Japan and JICA's Policy and Operations in the Power/Environmental Sector in Serbia

The project aims to reduce air pollutant emissions by installing flue gas desulfurization equipment at power plants. Therefore, it comes under "Environmental Protection" which is one of the priority areas of Japanese assistance for Serbia. JICA's policy regarding power sector in "Environmental Protection" is to support environmental improvement measures including a reduction in environmental impacts through the improvement of energy efficiency and climate change measures.

JICA has conducted the Study for the Introduction of Energy Management in Energy Consumption Sectors in Serbia (2009-2011) and the Capacity Development Project on Nationally Appropriate Mitigation Actions (NAMAs) (2010-2013).

(4) Other Donors' Activities

Other donors providing assistance for the power sector in Serbia include the European Bank for Reconstruction and Development (EBRD) and KfW.

(5) Necessity of the Project

The project aims to improve the environment in Serbia through the installation of flue gas desulfurization equipment. The project addresses an urgent issue which is prioritized in the Serbian development plans and it is also in line with Japan and JICA's priority areas of assistance. Therefore, it is highly necessary and appropriate to provide assistance for the project.

3. Project Description

(1) Project Objective

The objective of the Project is to reduce air pollutants by constructing flue gas desulphurization equipment at thermal power plant Nikola Tesla which is the largest power plant in Serbia, thereby contributing to improvement of environment and the environmentally sustainable development in Serbia.

(2) Project Site/Target Area

Thermal Power Plant Nikola Tesla

(3) Project Components

1) Construction of flue gas desulfurization equipment (FGD)

2) Installation of related equipment (limestone supply systems, gypsum dehydration systems, etc.)

3) Consulting services (assistance for the basic design, assistance for bidding, supervision of construction, etc.)

(4) Estimated Project Cost (Loan Amount)

33,584 million yen (Loan Amount: 28,252 million yen)

(5) Schedule

The planned implementation schedule is from November, 2011 to June, 2018 (about 80 months in total). The project will be deemed complete when the facilities start operations (June, 2017).

(6) Project Implementation Structure

1) Borrower: Electric Power Industry of Serbia

2) Guarantor: Republic of Serbia

3) Executing Agency: Electric Power Industry of Serbia

4) Operation and Maintenance System: Electric Power Industry of Serbia

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

1) Environmental and Social Consideration

(i) Category: B

(ii) Reason for Categorization: The project is classified as Category B because it has been determined that the sector, the characteristics and the target area of the project do not come under the categories of sensitive sectors, sensitive characteristics or sensitive areas and that it will not have significant adverse impacts on the environment in light of the Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations (established in April 2002).

(iii) Environmental Permit: An environmental impact assessment (EIA) report for the project is not required under the Serbian domestic law.

(iv) Anti-Pollution Measures: The project is considering selling gypsum generated in the flue gas desulfurization process to companies which manufacture gypsum products. If it cannot be sold, it will be disposed of at disposal sites equipped with seepage control structures and seeping leachate treatment systems. Effluent from flue gas desulfurization equipment will be treated so that it will meet the domestic standards before it is discharged into the Sava River.

(v) Natural Environment: There is a wetland registered under the Ramsar Convention northwest of the project area. However, the wetland is located more than 10 km upstream of the project area and the project will also reduce air pollutant emissions. Therefore, adverse impacts of the project on the wetland are not expected.

(vi) Social Environment: The project will not require land acquisition nor resettlement because it will be conducted within the existing power plant compound.

(vii) Other/Monitoring: In the project, the executing agency will monitor air quality, water quality, noise, vibrations, etc. during construction and operation.

2) Promotion of Poverty Reduction: None

3) Promotion of Social Development (gender perspective, measures for infectious diseases including HIV/AIDS, participatory development, consideration for persons with disabilities, etc.): None

(8) Collaboration with Other Schemes and Donors: None

(9) Other Important Issues: It is the first time that flue gas desulfurization equipment will be installed in Serbia. It is expected that the practice will be introduced at other power plants. EPS is currently working on measures to control NOx and dust.

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

Indicator	Baseline (The highest value in 2005-2009)				Target (2019) [2 years after project completion]
Unit	A3	A4	A5	A6	
SO_2 emissions (mg/Nm^3)	2,121	2,160	2,700	2,234	200 or less
Dust emission (mg/Nm^3)	223	53	50	432	30 or less
Desulfurization efficiency (%)	-	-	-	-	94.0 or more

2) Internal Rate of Return

Though the project aims to reduce the emissions of SO_2 and dust, it is difficult to calculate the EIRR (economic internal rate of return) using the reduction of medical expenses, etc. as a benefit, because no data is available which quantifies the adverse effects caused by air pollution in areas around the project.

(2) Qualitative Effects

- The living environments of neighboring inhabitants will improve. A long-term stable power supply will be enabled and the project will contribute to the country's economic development.

5. External Factors and Risk Control

It is necessary for EPS to complete the construction of the integrated waste water treatment facilities for the power plant (which EPS is independently constructing) before the installation of the fuel gas desulfurization equipment.

6. Lessons Learned from Past Projects

Past projects indicate the importance of improving the effectiveness of technology transfer through hosting training participants at the implementation stage. In Serbia, there are no past examples of constructing FGDs and EPS does not have any experience in operating FGDs. Therefore, EPS is planning to conduct training by dispatching its engineers to manufacturers and it will continue in-house training independently in order to improve the maintenance skills for FGDs. The project will monitor these efforts.

7. Plan for Future Evaluation

(1) Indicators to be Used

1) The amount of SO_2 emissions
2) The amount of dust emissions
3) Desulfurization efficiency

(2) Timing

Two years after project completion