

Ex-Ante evaluation

1. Project

Country: Ukraine

Name of the Project: Bortnychi Sewage Treatment Plant Modernization Project

Loan Agreement: June 15, 2015

Loan Amount: 108.193 billion yen

Borrower: The Cabinet of Ministers of Ukraine

2. Background and Necessity of the Project

(1) Current situation and challenges in the sewerage sector in Kyiv city, and positioning of the Project

In Kyiv city, which is the target area of the Project and the capital of Ukraine, (population about 2.8 million as of 2013), the installation of public sewerage pipes and operation of the sewage treatment plant began in the 1960s during the Soviet era. The current coverage of the sewerage system in Kyiv city has reached nearly 100%. The Bortnychi Sewage Treatment Plant, with a wastewater treatment capacity of 1.57 million cubic meters per day, treats all sewage water from Kyiv city and the surrounding cities before discharging the treated water into Dnieper, an international river. The Bortnychi Sewage Treatment Plant, which was constructed in 1964, has deteriorated and thus suffers from degraded performance, resulting in odor problems. Sludge produced in the sewage treatment process is pumped to the sludge field in the outskirts of Kyiv city, but the field is nearly full. Therefore, sludge incinerators and other facilities are urgently needed to reduce the volume of sludge in addition to restoring the capacity and functionality of the sewage water treatment system.

With the aim of addressing its deteriorated infrastructure, the Government of Ukraine announced “the Nationwide Program for Reforming and Developing the Utilities Sector” in 2004, directing local governments to formulate detailed plans for overhauling and rehabilitating municipal utilities and infrastructure. Based on the Nationwide Program, the Kyiv City State Administration formulated its own “Program for Reforming and Developing the Utility Sector of Kyiv” which gave first priority to the Project. Moreover, the Kyiv City State Administration prioritizes the Project in its “Target Program: Drinking Water of Kyiv City 2011–2020”, elaborated in 2010 as a sector development plan.

Since around 2004, the Government of Ukraine has been seriously considering joining the European Union (EU). Although the current government lead by the President Poroshenko envisages applying for EU membership in 2020, any countries seeking EU membership will be requested to strictly comply with EU environmental standards, which accordingly require that effluent standards fulfill the EU directives. The total nitrogen and total phosphorus concentrations in effluent from the current sewage treatment plants, however, does not satisfy the criteria stipulated in the EU

directives, making it necessary to introduce advanced sewage water treatment facilities.

Given the above concerns, therefore, the Bortnychi Sewage Treatment Plant urgently needs to be rehabilitated from the standpoint of improving sanitation and living conditions.

(2) Japan and JICA's aid policies for the sewage sector, and the positioning of the Project

In the Country Assistance Policy for Ukraine issued in March 2013, "Industrial Promotion for Sustainable Economic Growth" is defined as a priority area and it is stated that Japan will assist in improving facilities to support infrastructure improvement, energy conservation and energy efficiency. Thus, the Project is relevant to Japan's assistance policy for Ukraine. In March 2014, the Government of Japan announced an assistance package for Ukraine totaling around 150 billion Japanese yen at maximum, of which the Project is the core component. In past assistance, JICA conducted a training program for the sewerage sector and provided assistance in formulating the overall plan of the Project under a technical assistance scheme related to ODA loans.

(3) Response from Other Donors

The World Bank assisted in rehabilitating drinking and sewerage infrastructure in ten major cities in Ukraine, including Kyiv City. For the Bortnychi Sewage Treatment Plant, the Norwegian government supplied dust extractors in 2006 and 2010, while in 2005 the Danish government supplied facilities related to the biological reaction tank that is still under construction. These assistances do not overlap with the Project.

(4) Necessity of the Project

Since the Bortnychi Sewage Treatment Plant was constructed between 1960 and 1990, its sewage water treatment performance has decreased due to deteriorated facilities. Facility improvement, including incinerators for sludge processing, is also becoming an urgent necessity. The Project is highly relevant to Ukraine's development policy as well as Japan's Country Assistance Policy for Ukraine; thus, supporting implementation of the Project is highly necessary and relevant.

3. Project Description

(1) Project Objectives

The Project contributes to improve sewage treatment in Kyiv city in Ukraine by developing and modernizing the Bortnychi Sewage Treatment Plant facilities, thereby contributing to improved sanitation and living conditions for the citizens of Kyiv city.

(2) Project Site/Target Area: Kyiv city, Ukraine

(3) Project Description

- 1) Construction and rehabilitation of sewage treatment facilities, construction of sludge treatment facilities, and construction of sludge incineration facilities
- 2) Consulting services (e.g. bidding assistance and construction supervision)

(4) Total Project Cost

139.198 billion yen (Yen Loan Amount: 108.193 billion yen)

(5) Project Implementation Schedule

From June 2015 to September 2023 (100 months in total). The Project will be completed when all facilities are put into operation (September 2022).

(6) Project Implementation Structure

- 1) Borrower: The Cabinet of Ministers of Ukraine
- 2) Executing Agency: Public Joint-Stock Company Kyivvodokanal (KVK)
- 3) Operation and Maintenance System: Same as 2). Until now the KVK has been in charge of operation and maintenance of the Bortnychi Sewage Treatment Plant, and thus the KVK has no major concerns in terms of operational and maintenance capacity. The Project will provide technical assistance on the methods and skills of operation and management for the newly installed facilities and equipment. With respect to financial management, the KVK plans to raise fees to a level that enables them to afford to pay for operation and maintenance costs, while some parts of fee structure have already been revised. The financial status is therefore expected to improve from now on.

(7) Environmental and Social Considerations, Poverty Reduction, and Social Development

1) Environmental and Social Considerations

i. Category: A

- ii. Reason for Categorization: The Project is classified in the "Waste management and disposal" sector as indicated in the "JICA Guidelines for Environmental and Social Considerations" issued in April 2010.
- iii. Approval for Environmental Consideration: The Environmental Impact Assessment (EIA) report on the Project was already approved by the Cabinet of Ministers of Ukraine in April 2014.
- iv. Anti-Pollution Measures: In order to ensure compliance with environmental standards and/or emission standards, contractors will be requested to take appropriate measures to address air and noise pollution as well as waste disposal during construction work, including spraying water, prohibiting construction machinery operation at night, and appropriately storing and disposing of industrial waste. With regard to air quality, waste management, and unpleasant odors after the Bortnychi Sewage Treatment Plant commences operation, the KVK plans to take several measures, such as installing exhaust emission gas treatment facilities, practicing appropriate waste storage and disposal, recycling sludge incineration ash, covering sludge processing facilities, and installing deodorizing equipment.
- v. Natural Environment: The Project site is not located in or around sensitive areas such as national parks, and thus adverse impacts on the natural

- environment are assumed to be minimal.
- vi. **Social Environment:** The Project is composed of construction and rehabilitation work within the existing sewage water plant premises, and therefore does not entail any land acquisition or resident relocation.
 - vii. **Other/Monitoring:** During the construction period of the Project, contractors will be in charge of monitoring air quality, noise pollution, waste management, and the like. After the Bortnychi Sewage Treatment Plant starts operation, the KVK will take responsibility for monitoring air and water quality, waste management, unpleasant odors, and so on.
- 2) **Promotion of Poverty Reduction:** N/A
 - 3) **Promotion of Social Development (e.g. Gender Perspective, Measures to Prevent Infectious Diseases Including AIDS, Participatory Development, Consideration for the Handicapped, etc.):** N/A
- (8) **Collaboration with Other Schemes and Donors:** Detailed Design of the Project will be implemented under Technical Cooperation related to ODA loans. There is no specific aid coordination with other donors for the Project.
- (9) **Other Important Remarks:** The project will adopt advanced Japanese environmental technologies, such as improved fluidized bed sludge incinerators, screw-press sludge dehydrators, belt-type sludge concentrators, and the like.

4. Targeted Outcomes

(1) Quantitative Effects

1) Evaluation Indicators (Operation and Effect Indicators)

Indicators	Baseline (2013 actual)	Target (2024) Two years after completion
Effluent quality of total nitrogen (Block 1)	24.6 mg/l	10 mg/l
Effluent quality of total phosphorus (Block 1)	6.2 mg/l	1 mg/l
Wastewater treatment capacity (Block 1)	200,000 m ³ /day	577,000 m ³ /day
Wastewater treatment capacity (Block 2)	450,000 m ³ /day	577,000 m ³ /day
Wastewater treatment capacity (Block 3)	350,000 m ³ /day	419,000 m ³ /day
Moisture content of sludge cake	N/A	76 %
Sludge volume reduction rate	N/A	99 %

2) Internal Rate of Return (IRR)

Economic Internal Rate of Return (EIRR) (%): Based on the conditions below, the Economic Internal Rate of Return (EIRR) for the Project is calculated as 7.86%.

Cost: Project cost (excluding tax), operation and maintenance expenses (excluding tax)

Benefits: Affordability to Pay

Project Life: 50 years

- 3) Qualitative Effects: Improvements in environmental and sanitary conditions and in resilience to climate change in Kyiv city, which will be brought by introducing sludge incinerators to reduce the risk of sludge spills during downpours or floods.

5. External Factors and Risk Control

(1) Prerequisites

Work implemented by the KVK, such as removal work and site preparation, should be completed prior to the commencement of Project construction work.

(2) External Conditions

Attention should be paid to the progress of reforms addressed by the government of Ukraine, particularly anti-corruption measures.

6. Evaluation Results and Lessons Learned from Past Projects

(1) Evaluation Results of Past Similar Projects

In past similar ex-post evaluations (e.g. the Water Supply Project for Four Cities in China), it was learned that appropriate water fees must be introduced in order to secure the financial sustainability of the project when the water supply agency is losing money.

(2) Lessons for the Project

Currently, the revenue from drinking water and sewerage users does not fully cover KVK's operation and management expenses, so the KVK is subsidized by the central government. Although drinking water and sewerage fees were revised by as much as 257% in July 2014, it did not cause major confusion or disorder. In order to achieve financial sustainability for the Project, the gradual revision of drinking and sewage water fees in line with increasing energy prices and price fluctuations is critical. The Project therefore plans to monitor the financial and implementation status of the project executing agency (KVK) through quarterly progress reports.

7. Plans for Future Evaluation

(1) Indicators for Future Evaluation:

- 1) Effluent quality of total nitrogen (Block 1) (mg/l)
- 2) Effluent quality of total phosphorus (Block 1) (mg/l)
- 3) Wastewater treatment capacity (Block 1) (m³/day)
- 4) Wastewater treatment capacity (Block 2) (m³/day)
- 5) Wastewater treatment capacity (Block 3) (m³/day)
- 6) Moisture content of sludge cake (%)
- 7) Sludge volume reduction rate (%)
- 8) Economic Internal Rate of Return (EIRR) (%)

(2) Timing of Next Evaluation:

Two years after completion