

Ex-ante Evaluation

1. Name of the Project

Country: The People's Republic of China

Project: Henan Province Nanyang City Environmental Improvement Project

(Loan Agreement: December 21, 2007; Loan Amount: 11,500 million yen; Borrower: The Government of the People's Republic of China)

2. Necessity and Relevance of JBIC's Assistance

In China, the sewage treatment rate in urban areas has remained at 56% (2006), while in rural areas, where majority of the population (more than 1 billion) live, sewerage facilities have not spread very much. Consequently, water pollution of rivers and freshwater lakes has become a serious problem. Additionally, since China relies on coal for around 69% of its domestic energy consumption (2005), acid rain caused by sulfur oxide (SO_x), soot, dust and other particles are having a serious impact on the health of local residents and the ecosystem. Given this situation, in the 11th Five-Year Plan for Environmental Protection (2006–2010), the government of China has set the goal of reducing the emission of principal pollutants by 10% from the level recorded in the 10th Five-Year Plan. Toward this end, in addition to preventing water pollution in protected watershed areas through the development of sewage treatment facilities, as well as limiting the construction of coal-fired plants in cities, the government of China promotes the development of heat sources with smaller pollution burden such as co-generation facilities, gas supply facilities, etc.

Nanyang City (population in urban area: 800,000; land area: 75 km²), Henan Province, where this project is to be implemented, is located in the middle stream of the Yangtze River, one of the seven largest rivers in China. In Nanyang City, the construction of sewage treatment facilities is lagging (sewage treatment rate was 34% at the end of 2005) and untreated domestic sewage is directly discharged into the natural environment. This causes serious water pollution in, for example, the White River, which runs through the center of the city and its water quality index during the dry season is category –V.¹ Additionally, while the city relies on coal and refined artificial coal gas for 86% of its energy demand, most of the coal-burning facilities do not have dust collectors and desulfurizers, and they have become a main source of air pollution. In particular, apart from sulfur dioxide and dust produced in the coal gasification, there are concerns that carbon monoxide contained in the coal gas could lead to accidents triggered by its leakage from aging gas pipes.

Under these circumstances, the Henan Provincial People's Government formulated the 11th Five-Year Plan for Economic and Social Development in Henan Province (2006–2010), and set as its goal of a 10% reduction in the emission of principal pollutants by 2010. Toward this end, the Nanyang Municipal People's Government adopted the 11th Five-Year Plan for Economic and Social Development in Nanyang City and the 11th Five-Year Plan for Environmental Conservation in Naanyang City with the view to improving the city's water quality through development of sewage

¹ Category I: mainly water in headwaters, applicable to national nature reserves; category II: mainly headwater for centralized livelihood drinking water in first-class reserves, applicable to rare fish habitats, spawning grounds of fish and prawn; category III: mainly headwater for centralized livelihood drinking water in second-class reserves, applicable to general fish habitats and swimming areas; category IV: applicable mainly to industrial water use areas and amusement water use areas people are usually not exposed to; category V: applicable mainly to agricultural water use areas and water areas for general landscapes; category –V: water unsuitable for agricultural water, etc.

treatment facilities, expanding gas supply facilities, improving air quality through implementation of measures to strengthen monitoring of air quality, and reducing the total amount of emissions of principal pollutants.

This project addresses environmental conservation, one of the priority areas designated in the Economic Cooperation Program for China prepared by the government of Japan and JBIC's Medium-Term Strategy for Overseas Economic Cooperation Operations. Thus, JBIC's support for this project is highly necessary and relevant.

3. Project Objectives

The project aims to reduce polluted effluents discharged into the rivers in Nanyang City and mitigate air pollution by developing sewerage facilities and gas supply facilities that will reduce emissions of air pollutants, and thereby help improve the living conditions of the city.

4. Project Description

(1) Target Area

Nanyang City, Henan Province

(2) Project Outline

The project involves procurement of materials and equipment, civil works and training related to the development of sewerage facilities and gas supply facilities.

- (a) Sewerage facilities: Sewage treatment plants, sewage pipes and drains
- (b) Gas supply facilities: Gas production facilities (bio-gas), gas transmission facilities (gasification, network of pipes, pressure adjusting facilities)
- (c) Training: Training in Japan concerning sewerage and gas supply projects

(3) Total Project Cost / Loan Amount

27,388 million yen (Yen Loan Amount: 11,500 million yen)

(4) Schedule

September 2008–January 2013 (53 months). The definition of project completion is “final acceptance of the project by the Henan Provincial People's Government.”

(5) Implementation Structure

- (a) Borrower: The Government of the People's Republic of China
- (b) Executing Agency: Henan Provincial People's Government
- (c) Operation and Maintenance System:
 - Sewerage facilities: Nanyang Sewage Purification Center
 - Gas supply facilities: Nanyang ZhengRan Fuel Gas Co., Ltd.
Henan TianGuan Enterprise Group Co., Ltd.

(6) Environmental and Social Consideration

- (a) Environmental Effects / Land Acquisition and Resident Relocation
 - (i) Category: B

(ii) Reason for Categorization

This project is classified as Category B according to the “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (dated April 2002), as this project does not correspond to sectors or regions described in the said guidelines as being sensitive to negative impact, and as it is not deemed to have a significant harmful impact on the environment.

(iii) Environmental Permit

The Environmental Impact Assessment (EIA) report related to the project was approved by the Environmental Protection Bureau of Henan Province in November 2007.

(iv) Anti-Pollution Measures

Wastewater from sewage treatment plants and gas production facilities will be treated in a state and manner that meets the wastewater standards established in China. Thus, no significant adverse impact is foreseen. Additionally, the sludge generated in sewage treatment plants will be appropriately disposed of in existing disposal areas.

(v) Natural Environment

The project site is not located in or around sensitive areas, such as national parks, and so adverse impact on the natural environment is assumed to be minimal.

(vi) Social Environment

The project involves land acquisition of about 22 ha, and it will be carried out in accordance with the domestic procedures of China. The project does not involve resident relocation.

(vii) Other/Monitoring

In the project, the Environmental Protection Bureau of Nanyang City will monitor the water quality and so on.

(b) Promotion of Poverty Reduction

To help the poor, Nanyang City has introduced a lower fee for water supply and sewerage, and it will be applied to this project as well.

(c) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases including AIDS, Participatory Development, Consideration for the Handicapped, etc.)

None

(7) Other Important Issues

With the completion of the project, reduction in CO₂ emission equivalent to approximately 290,000 tons/year can be expected.

5. Outcome Targets

(1) Evaluation Indicators (Operation and Effect Indicator)

Subproject	Indicator	Baseline (2005 actual)	Target (2013, at project completion)
Sewerage facilities	Population treated (10,000 persons)	52.2	79
	Amount of wastewater treated (10,000 m ³ /day)	10	30
	Percentage of wastewater treated (%)	34	67
	Effluent quality (BOD concentration: mg/L)	280	30

	Effluent quality (COD concentration: mg/L)	500	100
Gas supply facilities	Population served (10,000 persons)	15	68
	Gas supply capacity (10,000 m ³ /day)	10	49.5
	Amount of gas supply (10,000 m ³ /day)	2.9	42
	Gas supply rate (%)	11.4	37.7
	TSP emission reduction volume (tons/year)	–	7,800
	SO ₂ emission reduction volume (tons/year)	–	25,200

(2) Number of beneficiaries

Approximately 790,000

(3) Internal Rate of Return (Financial Internal Rate of Return)

Based on the following conditions, the financial internal rate of return (FIRR) of the project is 3.8% for sewerage facilities and 8.1% for gas supply facilities.

- (a) Cost: Project cost, operation and maintenance expenses
- (b) Benefit: Income from fee
- (c) Project Life: 30 years

6. External Risk Factors

- Delays in construction due to site changes caused by changes in road maintenance areas, development areas, etc. in urban planning
- Impact on operation and maintenance due to limitation of domestic funds or shortages in collected fees due to changes in the policies relating to the fee sharing principle
- Risk of fluctuation in the price of crops from which biogas is made.

7. Lessons Learned from Findings of Similar Projects Undertaken in the Past

From the ex-post evaluation of the Beijing Sewage Treatment Plant Construction Project, it has been learnt that it is important to set an appropriate fee system that considers operation and maintenance costs, investment costs, payment ability of beneficiaries, and the outlook for budgetary supplements in order to ensure the sustainability of the project's effects. Based on this lesson, appropriate fee system and technical standards will be confirmed to be established through interim monitoring and supervision, etc.

8. Plans for Future Evaluation

(1) Indicators for Future Evaluation

- (a) Population treated (10,000 persons)
- (b) Amount of wastewater treated (10,000 m³/day)
- (c) Percentage of wastewater treated (%)
- (d) Effluent quality (BOD concentration: mg/L)
- (e) Effluent quality (COD concentration: mg/L)
- (f) Population served with gas (10,000)
- (g) Gas supply capacity (10,000 m³/day)
- (h) Amount of gas supply (10,000 m³/day)
- (i) Gas supply rate (%)

- (j) TSP emission reduction volume (t/year)
- (k) SO₂ emission reduction volume (t/year)
- (l) Financial internal rate of return (FIRR) (%)

(2) Timing of Future Evaluation

At project completion