

Ex-ante Evaluation Paper (for Japanese ODA Loan)

South Asia Division 1, South Asia Department, JICA

1. Name of the Project

Country: India

Project: Project for Construction of Chennai Seawater Desalination Plant (I)

Loan Agreement: March 29, 2018

2. Background and Necessity of the Project

(1) Current State and Issues of the Water Supply Sector in India

India's National Water Policy (2012) has set a policy objective of establishing access to drinking water for the entire population of India. However, less than 90% of households have access to adequate drinking water even in urban areas (Source: 69th round of National Sample Survey by the Ministry of Statistics and Programme Implementation, 2012), demonstrating that water source development and supply improvement have been unable to keep up with the increased water demand from population growth and economic development. Even where the distribution network has been established, water supply interruptions and restrictions have limited the daily supply time in major cities to just between 1–6 hours on average. In addition to a chronic shortage of human resources, the entities responsible for water supply services also face difficulties in operation and maintenance from both a technical and financial standpoint due to a high rate of non-revenue water and low water fee.

The target area of the 'Project for Construction of Chennai Seawater Desalination Plant' (hereinafter, "the Project") is Chennai Metropolitan Area (hereinafter, "CMA"), the state capital of Tamil Nadu in southern India, which has a population of approximately 8.9 million people (as of 2011). Although the population is expected to exceed 15 million by 2035, water supply upgrades are not able to keep up with population increase and economic development. Despite a water demand of 910 MLD (million liters per day) in 2016, supply remains at just 810 MLD. As several foreign companies are located in and around CMA, including the Japanese companies (378 offices as of November 2017 according to the Embassy of Japan in India website), these serious water shortages are also having a major impact on the investment environment. On the other hand, developing large scale surface water sources would require long periods of time and drawing up subsurface water would be difficult to satisfy the massive demand of water, and the surface water would be highly susceptible to conditions during dry season. For these reasons, expansion of seawater desalination was planned to increase supply capacity past the capacity of existing seawater desalination plants (totaling 200 MLD). The Project is positioned as one of the efforts to

secure a safe and stable water resource in accordance with the Master Plan for Water Supply and Sewerage Sectors in Chennai Corporation and rest of CMA formulated by the city to solve these problems in CMA.

(2) Japan and JICA's Water Supply Sector Cooperation Policy and the Positioning of this Project

The Country Assistance Policy for India (March 2016) set "support for sustainable and inclusive growth" as a priority area with particular priority given to infrastructure development, including water supply and sewerage in the Chennai-Bengaluru Industrial Corridor (CBIC) as well as major cities. Furthermore, JICA's Country Analysis Paper for India (March 2018) also recognized "addressing rapid urbanization" as a key development issue, and has analyzed the need to improve infrastructure including water supply and sewerage in urban areas that are experiencing ever-growing populations, as well as the need to provide public services. Therefore, the Project is consistent with the policy and analysis results. As of February 2018, there are 32 ODA loans to India totaling 637.6 billion yen that have been approved for India water supply and sewerage sector.

(3) Other Donors' Activity

World Bank has set one of its priority areas as combating changes in mid-sized cities from population growth and industrialization, and has been providing support for waterworks upgrades as a means to contribute to improving the situation.

Meanwhile, Asian Development Bank is supporting the water supply sector in urban areas in Karnataka state etc. not only for upgrading facilities, but also strengthening the operation and maintenance system and organizational structure. It is also focusing on promoting Public Private Partnerships. German government-owned development bank Kreditanstalt für Wiederaufbau (KfW) is also providing support through an extension of the existing seawater desalination plant at a project site adjoining the Project, which was planned in tandem with the Project to implement seawater desalination in Master Plan for Water Supply and Sewerage Sectors in Chennai Corporation and rest of CMA.

3. Project Description

(1) Project Objective

The Project aims to achieve a safe and stable water supply service in CMA, located in the south Indian state of Tamil Nadu, by constructing a seawater desalination plant and constructing and improving water transportation and distribution facilities, thereby contributing to improvement in local resident living conditions and the investment environment.

(2) Project Site/Target Area

Chennai Metropolitan Area, Tamil Nadu State

(3) Project Components

- 1) Construction of a seawater desalination plant (400 MLD)
- 2) Construction of water pumping stations and a distribution reservoir
- 3) Laying of transmission mains
- 4) Improvement of the existing water distribution facilities and network in Chennai Corporation; installation and upgrading of equipment (including meters) etc. (implemented by the Executing Agency)
- 5) Installation of external power transmission lines
- 6) Consulting Services: conceptual design, detailed design, bidding assistance, construction supervision, facilitation of implementation of Environmental Management Plan and Environmental Monitoring Plan, formulating and implementing plans for capacity development and organizational improvement of executing agency, and promoting public awareness activities

(4) Estimated Project Cost

104.548 billion yen (of which, the total ODA Loan amount is 73.404 billion yen with 30.000 billion yen as the tranche 1 loan amount)

(5) Schedule

Scheduled from March 2018 to June 2026 (100 months in total). The Project completion is defined as the in-service date of distribution facilities (March 2025).

(6) Project Implementation Structure

- 1) Borrower: President of India
- 2) Guarantor: None
- 3) Executing Agency: Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB)
- 4) Operation and Maintenance Agency: CMWSSB (approx. 3,100 staff members) is responsible for the operation and maintenance of the Project. For the seawater desalination plant, the plan is for the plant contractor to carry out operation and maintenance for 20 years after completion under a Design-Build-Operate (DBO) contract.

(7) Collaboration with Other Schemes and Donors

- 1) Related aid activities by Japan: None in particular
- 2) Aid activities of other aid organizations: None in particular

(8) Environmental and Social Considerations/Poverty Reduction and Social Development

1) Environmental and Social Considerations

① Category: B

② Categorization Rationale: The Project is not applicable to sectors/characteristics susceptible to the impacts listed in 'JICA Guidelines for Environmental and Social Considerations' (promulgated in April 2010), thus the negative impact on the

environment from the Project is judged negligible.

- ③ Environmental Permit: An Environmental Impact Assessment (EIA) report on the Project is to be approved by the Ministry of Environment, Forest and Climate Change.
 - ④ Anti-Pollution Measures: Measures against dust, noise, and water turbidity during construction shall include water sprinkling to control dust, soundproofing equipment, and the introduction of silt screens to filter suspended matter. After going into service, wastewater from the seawater desalination plant is expected to be treated at the facility before being discharged to comply with India law.
 - ⑤ Natural Environment: The negative impact on the environment from the Project is expected to be negligible as the target area is not situated in or around any vulnerable areas such as national parks. Further, no nesting or egg-laying habitats of sea turtles that inhabit Tamil Nadu have been found, and migratory areas are in more coastal or deeper waters than the location of the intake and discharge outlets. As far as impact from wastewater containing concentrated salt water, no rare species etc. habitats have been found near the discharge outlet, and also, the higher salt concentration will be mitigated through diffusion when released. Therefore, negative impact on ecosystems is assumed to be limited in nature.
 - ⑥ Social Environment: Due to a 30-year (renewable) lease agreement from a state subordinate body, the Project will not involve land acquisition or resident resettlement. With regard to impact on area fishermen, measures against water turbidity will be implemented during construction, and once in service, wastewater will be treated in the facility before being discharged. Since the higher salt concentration will be mitigated through diffusion when released, the negative impact is expected to be limited in nature.
 - ⑦ Other/Monitoring: During construction, the contractor and CMWSSB will be chiefly responsible for monitoring air quality, water quality, noise, waste treatment, ecosystems, etc. Once in service, CMWSSB will be responsible for monitoring water quality of the surrounding waters and ecosystem (including impact on fisheries) as associated with seawater concentrated wastewater.
- 2) Cross-cutting Items: Climate Change Related Matters: The Project aims to ensure a stable supply of water, by securing water sources that are not affected by fluctuations in rainfall amount/patterns expected from climate change, as well as by saving water through improvements of the water distribution network. For that reason, the Project will contribute to climate change (adaptation) measures. Poverty Measures and Considerations: Given that the planned implementation will improve the water distribution network in a project area that includes slum areas, the Project falls under the category of 'poverty consideration project' for the support it provides to the impoverished segment of the population.

3) Gender Classification: GI (S) Gender Informed (Significant) Project

<Activities/Classification Rationale> Through promotional and awareness activities such as house connection, activities have been planned based from a gender-centric viewpoint, by for instance arranging places and times in a manner that encourages participation by female residents.

(9) Other Important Issues: None in particular

4. Target Outcomes

(1) Quantitative Effects

Outcomes (Operational and Effect Indicators)

Indicator	Baseline (Actual value in 2016)	Target (2027) [2 Years after Completion]
Indicators for Chennai Metropolitan Area (reference values) ¹		
Population served (in 1000 persons)	7,800	12,800
Average amount of water supply (in MLD)	900	1,750
Indicators concerning seawater desalination plant		
Plant utilization rate (%) ²	—	68
Indicators for Chennai Corporation concerning the distribution network to be developed in the Project		
Population served (in 1000 persons)	7,100	8,200
Pipe-served water supply rate (%) ³	61	88
Meter installation rate (%) ⁴	4	100
Average amount of water supply (MLD) (reference value) ⁵	810	1,300

1) Since construction of a water distribution network outside of Chennai Corporation is not part of the Project, the indicators for CMA are for reference only.

2) Plant utilization rate is calculated based on 'seawater desalination plant average daily supplied volume ÷ supply capacity'

3) Pipe-delivered water supply rate is calculated based on 'population served with pipe ÷ population served'

4) Meter installation rate is calculated based on 'number of meters installed ÷ number of households connected'

5) Is only a reference value as it includes water supply from other plants.

(2) Qualitative Effects

The qualitative effects of the Project include an improvement in living conditions (i.e. improved health of residents, etc.) as well as social and economic development (i.e. economic growth of the region, investment promotion, etc.) by improving satisfaction in water quality and pressure (customer survey/sample survey) and by achieving safe and stable water services in the CMA.

(3) Internal Rate of Return

Based on the following assumptions, the Economic Internal Rate of Return (EIRR) of the Project is 19.5%. The Financial Internal Rate of Return (FIRR) is negative due to the current low water fees. A fee hike is planned for future consideration and will be monitored during the Project's implementation.

[EIRR]

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

Benefits: Willingness to pay water fees; reduction of well drilling and operating costs; reduction of medical expenses; reduction of domestic water transporting costs

Project life: 30 years

[FIRR]

Cost: Project cost (including tax), operation and maintenance cost

Benefits: Additional fee income (assuming a 100% meter installation rate and gradual fee increase)

Project life: 30 years

5. External Factors and Risk Control

- (1) Preconditions: Upgrading of the water distribution network by the executing agency is carried out without delay.
- (2) External Factors: None in particular

6. Lessons Learned from Past Projects and Application to the Project

The lesson learned from ex-post evaluation of the 'Urban Water Supply and Sanitation Improvement Program' in India, was that it is vital to consider a realistic plan for promoting the widespread use of water meters and prepare a fee structure that maximizes the amount beneficiaries pay by accurately projecting the demand for services and the amount residents are willing to pay for these services in a water supply project.

In the Project, it is confirmed that water fees will be progressively revised and that the water meter installation rate in Chennai Corporation will be set to 100% by the year 2026. Through consulting services, support is also planned for ascertaining the willingness and ability of residents to pay fees, carrying out PR activities to promote the widespread use of water meters, and preparing a financing plan for the executing agency.

7. Evaluation Results

The Project aims to achieve a safe and stable water supply service in CMA, located in the south Indian state of Tamil Nadu, by constructing a seawater desalination plant and constructing and improving water transportation and distribution facilities, thereby contributing to improvement in local resident living conditions and the investment

environment. As such, it is consistent with the Government of India's policies on development and solving issues as well as Japan and JICA's policy on assistance.

Moreover, given that the Project is judged to contribute to SGD Goal 6: to "ensure availability and sustainable management of water and sanitation for all," the need for JICA to support the implementation of the Project is high.

8. Plan for Future Evaluation

(1) Indicators to be Used

As indicated in sections (1)-(3) under Target Outcomes

(2) Timing of the Next Evaluation

Ex-post evaluation: Two years after project completion