**Japanese ODA**

# Ex-Ante Evaluation (for Japanese ODA Loan)

## 1. Name of the Project

Country: Republic of Tunisia
Project: Sfax Sea Water Desalination Plant Construction Project
Loan Agreement: July 14, 2017
Loan Amount: 36,676 million yen
Borrower: The Government of the Republic of Tunisia

## 2. Background and Necessity of the Project

(1) Current State and Issues of the Water Sector in the Republic of Tunisia

The southern half of the Republic of Tunisia (hereinafter referred to as "Tunisia") is situated in a semi-arid zone. In addition, both Tunis, its capital city in the north, and the Sfax metropolitan area in the central part of the country have little rain, with an annual average rainfall of about 500 mm (1991–2010) and about 230 mm, respectively (compared to the global average of 970 mm and Japan's average of 1,718 mm). The current reality is that the country has to use its available water supply, both surface water and groundwater, nearly to capacity. Out of Tunisia's total available water supply, about 80% of the surface water comes from the basin of the Medjerda River situated in the north, the only river in the country. The southern part of the country does not have any large rivers that can act as a water source. Furthermore, high-quality water that is low in salt is concentrated in the north. In Tunisia, in fact, the marked inter-regional disparity in the quality and quantity (80% in the north) of water poses a serious challenge for the country. This is why seawater desalination is vital as a new means to develop water resources to strengthen Tunisia's water supply capacity to supply safe water and preserve its groundwater.

The Sfax metropolitan area, which is the target area of the Sfax Sea Water Desalination Plant Construction Project (hereinafter referred to as the "Project"), depends on other regions (northern and central western Tunisia) for the majority (about 80%) of its water supply. However, the area began to suffer from water shortages in 2017 due to recent increases in population (an annual increase rate of 1.54%), increasingly tight supply and demand situations in other regions (as the area is situated at the end of the northern and central western water supply systems), and limitations imposed on the utilization of groundwater. The gap between supply and demand is projected to reach about 70,000 $m^3$/day by 2025 and about 150,000 $m^3$/day by 2030. Under these circumstances, the development of water resources through seawater desalination for stable supply of safe water in the area is a priority.

(2) Development Policies for the Water Sector in Tunisia and Priority of the Project

Given this situation, the Government of Tunisia has designated the construction of seawater desalination plant (which includes the Project), water preservation, etc. as priority issues in *The Green Economy, a pillar of sustainable development*, one of the pillars of its five-year development plan (2016–2020) published in November 2016. The purpose of the Project is to construct plant to achieve a total seawater desalination capacity of 100,000 $m^3$/day to meet the water demand until 2025. This is part of a plan to build plant to reach a total seawater desalination capacity of 200,000 $m^3$/ day by 2035. In addition, the National Water Distribution Utility (Société Nationale d'Exploitation et de Distribution des Eaux, hereinafter referred to as

"SONEDE") had written out a strategy in 2013 with the aim of sufficiently enhancing the water supply capacity of the country by 2030, and has been accordingly planning and implementing the construction of this Project and other seawater desalination plants etc. This Project is expected to enable a stable supply of water to areas that have already been supplying water to the Sfax metropolitan area (northern and central western Tunisia), thereby contributing indirectly to greater economic development and social stabilization in the area. Another expected outcome is that the Project will also contribute to greater adaptability to climate change by enabling a more stable supply of water that is unaffected by fluctuations in rainfall.

(3) Japan and JICA's Policy and Operations in the Water Sector

"Elimination of inter-region disparities between urban and rural areas" is one of the development themes set for the "promotion of stable domestic reforms towards fairer political and administrative processes," a priority area of Japan's Country Assistance Policy for the Republic of Tunisia. The Project is in line with this policy. The JICA Country Analysis Paper for the Republic of Tunisia (March 2017) also regards the Project as a "Water Resources/Disaster Management" program that "contributes to dealing with water shortages, a priority matter." As the Project is also about supporting the development of the economic infrastructure required to reduce disparities and enable sustainable economic development in northern Africa, it can be seen as facilitating the "promotion of structural economic transformation through economic diversification and industrialization," one of the priority areas for assistance discussed at the Sixth Tokyo International Conference on African Development (TICAD VI), as well as the "commitment to assist in stabilization of the Middle East," published at the G7 Summit in May 2016. Furthermore, Japan has provided a total of about 59 billion yen to the Water Sector of Tunisia through ten projects, including the Project for Desalination of Groundwater in Southern Region (grant aid) and the Water Supply and Sewage System Improvement Project in South-Tunisia (Japanese ODA loan).

(4) Other Donors' Activities

The main donors assisting the water sector of Tunisia include the World Bank, Arab Fund for Economic and Social Development, AFD (France) and KfW (Germany). For the desalination of seawater, KfW has been providing aid for two projects managed by SONEDE.

(5) Necessity of the Project

As the Project is about supporting the development of new water resources and preservation of groundwater sources (about 5,000 $m^3$/day) in Tunisia, which only has limited water resources, it is in line with Tunisia's policy to enable a more stable supply of safe water to the Sfax metropolitan area. In addition, the Project is also consistent with Japan's and JICA's assistance policies while contributing to Sustainable Development Goals 6 (water and sanitation) and 13 (climate change). Given the above, it can be concluded that there is great necessity for assisting the implementation of the Project.

## 3. Project Description

(1) Project Objective(s)

The objective of the Project is to enhance the quantity and quality of the water supply to the Sfax metropolitan area by constructing seawater desalination plant in Sfax City,

thereby contributing to better living conditions, as well as greater economic and social growth in the area.

(2) Project Site/Target Area
The Sfax metropolitan area, Sfax Governorate

(3) Project Components
1) Construction of seawater desalination plant (producing a total 100,000 $m^3$/day, including intake and outlet facilities)
2) Procurement and installation of water pipes
3) Construction of distribution reservoirs and pumping stations
4) Wiring for electricity
5) Consultation services (bidding support and evaluation, construction supervision)
Some of the facilities are designed according to the general plan, which aims to produce a total 200,000 $m^3$/day.

(4) Estimated Project Cost (Loan Amount)
43,621 million yen (including 36,676 million yen to be covered by the Japanese ODA loan)

(5) Schedule
July 2017–June 2024 (84 months total). Project completion is defined as the commencement of the facilities coming into service (June 2023).

(6) Project Implementation Structure
1) Borrower: The Government of the Republic of Tunisia
2) Executing Agency: Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)
3) Operation and maintenance system: SONEDE

(7) Environmental and Social Considerations/Poverty Reduction/Social Development
1) Environmental and Social Considerations
i) Category: B
ii) Reason for Categorization: The Project is classified Category B because it is not categorized as being in a sector or having characteristics that can have significant environmental/social consequences, or being in a particularly susceptible region, according to the "JICA Guidelines for Environmental and Social Considerations" (published in April 2010) and is considered not to cause serious adverse effects on the environment.
iii) Environmental Permit: An Environmental Impact Assessment (EIA) report for the Project was prepared by SONEDE and has already been approved by the National Agency for Environmental Protection in November 2016.
iv) Anti-Pollution Measures: While the installation of intake and outlet pipes can affect the water quality during installation, the contractor will take turbidity control measures. As for waste, although underwater drilling will produce waste soil, its adverse effects are planned to be minimized by using some of the soil for the embankments when constructing intake and outlet facilities. The rest will be appropriately disposed of at a waste treatment plant in Sfax City, in accordance with Tunisian law. After the commencement of the service, the desalination plant will begin to release concentrated water, but this is not projected to have any serious effects on water quality as the plant is designed with multiple nozzles and adopts an offshore discharge system to dilute the discharged water.

v) Natural Environment: The target area is not located in, or close to, a particularly susceptible area (e.g. national park). Although the construction work can affect benthic plants under the protection of the Barcelona Convention, artificial reefs will be set up to protect the vegetation.

vi) Social Environment: The Project will not involve any land acquisition as it will be implemented on state-owned land. However, if the installation of water service pipes, surge tanks or electrical wires involves any land acquisition, it will be carried out in accordance with the Tunisian law and JICA guidelines. No residents subject to influence from the installation of water service pipes etc. have raised any particular objections to the Project at meetings with the residents. As the Project can affect the local fishing community, due to water contamination, turbidity control measures will to be implemented after they have been described in full to the local fishers, in addition to compensating them on an as needed basis.

vii) Other/Monitoring: Water quality, growth of benthic plants, progress of land acquisitions, payment of compensations, etc. are to be monitored by the respective contractors during the construction and by SONEDE after the commencement of the service.

2) Promotion of Poverty Reduction: N/A

3) Promotion of Social Development: Gender considerations for the Project have been discussed with the managing agency after reviewing the gender-related policies of the Tunisian government to promote gender equality.

(8) Collaboration with Other Donors: N/A

(9) Other Important Issues

There is a possibility that Japanese technology will be chosen for the construction of seawater desalination plant where reverse osmosis membranes and high-pressure pumps are used.

## 4. Target Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

| Indicator | Baseline (2015) | Target (2025) [2 years after completion] |
|---|---|---|
| Average facility utilization rate[1] (July–August[2]) (%) | - | 70[3] |
| Water quality (Salt level) (mg/l) | 1,528 to 2,568[4] | Below 1,500[5] |
| Average amount of water supplied to the Sfax metropolitan area ($m^3$/day) | 114,732 | 129,000 |

(Notes)

1. Facility utilization rate (maximum) = (Maximum supply per day) / (facility capacity) × 100
2. Peak season of greatest water demand
3. Maximum supply capacity 100,000 $m^3$/day/peak factor (1.4) = 71,429 $m^3$/day
4. Inspection sites: PK10, PD11, PD14, Sidi Sarah and Bou-Merra distribution reservoirs
5. Inspector: SONEDE
   Inspection items: Salt level after the water produced by the desalination plant is mixed with water from other sources
   Inspection sites: PK10, PD11, PD14, Sidi Sarah and Bou-Merra distribution reservoirs
   Criterion: Below the standard level for drinking water set by the Tunisian government (2,000 mg/l to 2,500 mg/l)

(2) Qualitative Effects

The qualitative effects of the Project include a continuous, stable supply of water that ensures an excess in supply over demand throughout the year, preservation of groundwater, improvement of local residents' living conditions and acceleration of economic and social development.

(3) Internal Rate of Return

Based on the conditions indicated below, the economic internal rate of return (EIRR) of the Project will be 10.13%, while the financial internal rate of return (FIRR) cannot be calculated because negative cash flows are expected for each year of the project life.

[EIRR]

Costs: Project costs and operation and maintenance costs (excluding tax)

Benefits: Reduced cost of water intake from alternative sources, willingness to pay for additional benefits and improved hygiene associated with improved water quality

Project life: 30 years

## 5. External Factors and Risk Control

Deteriorating safety as well as political and economic conditions in Tunisia, particularly in and around the target area

## 6. Lessons Learned from Past Projects

(1) Evaluation of a Similar Past Project

The ex-post evaluation of the Water Supply and Sewage System Improvement Project in South-Tunisia revealed that the project was delayed by 56 months for the water supply portion. This was due mainly to bidding-related problems (difficulty in attracting bidders, a delay in bid evaluation, etc.). Besides this, the ex-post evaluation of the El Jem - Sfax Motorway Construction Project showed that it also had similarly long delays. The main lessons that can be learned from these past projects are that it is important to analyze the length of time required to complete bidding and other procurement processes, permit acquisition processes and so on. Based on past similar cases and other data, an appropriate schedule should be established for the project and that when there is a risk of delay, it is necessary to talk to and reach a consensus with the managing agency so specific risk management measures can be taken at the time the issue is examined.

(2) Lessons for the Project

In establishing a schedule for the Project, procurement procedures (procurement processes, period of examination by the Tunisian procurement agency, etc.) were closely reviewed with SONEDE by examining them against similar past cases. As this is the first time that SONEDE has ever selected a Japanese ODA loan consultant, a specialist in consultant selection assistance has already been sent to them (October 2016). As part of the efforts to prevent any delays in the procurement processes, an agreement has been reached with SONEDE in terms of consultant-assisted bidding, early establishment of a project implementation unit (hereinafter referred to as "PIU"), allocation of necessary personnel to the PIU, as well as implementation of periodical meetings between related organizations so that the progress during procurement can be closely monitored.

## 7. Plan for Future Evaluation

(1) Indicators to Be Used

1) Average facility utilization rate (July–August) (%)
2) Water quality (Salt level) (mg/l)
3) Average amount of water supplied to the Sfax metropolitan area ($m^3$/day)
4) Economic internal rate of return (EIRR) (%)

(2) Timing of the Future Evaluation

Two years after the completion of the Project

END