

Public

Environmental and Social Data Sheet

Overview

Project Name: **GAZA CENTRAL DESALINATION PLANT - GCDP**

Project Number: 2018-0171

Country: Palestine – Gaza Strip

Project Description: Fully grant funded project concerning the construction in Gaza of a sea water reverse osmosis desalination plant with annual capacity of 55 mcm in Gaza, the relating renewable energy component, as well as a five-year subsidy of operating costs and TA for project management and works supervision. The project is designed to address a drinking water problem that is affecting 2 million people living in Gaza.

EIA required: yes

Project included in Carbon Footprint Exercise¹: yes

Environmental and Social Assessment

Description of the project

Availability of fresh water in the Gaza Strip is amongst the lowest in the world. Currently two million Palestinians in Gaza rely almost exclusively on the coastal aquifer as a source of freshwater, but this is already inadequate to meet demand both from a quantitative and qualitative perspective. Only 3% of the water pumped from the aquifer complies with World Health Organization drinking water quality standards. To compound matters, domestic water demand is projected to increase from 103 million cubic meters (mcm) in 2015 to more than 140 mcm in 2035 based on an expected growth rate of 3.2% of the Gazan population. To deal with this crisis, the Palestinian Water Authority (PWA) developed a rolling program of interventions to find alternative sources of potable water.

In this context, the construction of a large-scale seawater reverse osmosis desalination plant (SWRO) together with the appropriate supply and distribution infrastructure is the preferred option for Gaza to secure its water supply whilst relieving and hence stabilizing the aquifer. The approach received full international support from all major stakeholders, including also the European Commission, the European Investment Bank, the Islamic Development Bank and the World Bank. The construction of the SWRO plant is embedded in a larger

¹ Only projects that meet the scope of the Carbon Footprint Exercise, as defined in the EIB Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: 20,000 tonnes CO₂e/year absolute (gross) or 20,000 tonnes CO₂e/year relative (net) – both increases and savings.

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programme to also construct or rehabilitate all components required to distribute the desalinated water.

This document addresses the environmental impact of programme components that will be implemented under the EIB managed Trust Fund:

The Project Site for the desalination plant is located close to Deir Al-Balah in the centre of the Gaza Strip on a 7 ha area approximately 100m on-shore. A planning permission for the land that is owned by the Palestinian Authority has been granted. Project components are:

SWRO:

- Capacity of SWRO plant: 161,000 m³/d
- Sea water intake system including offshore intake structure, piping, screening system and pumping station
- Pre-treatment with either dual media filtration or ultra-filtration
- Reverse osmosis with first and second pass including energy recovery device
- Post treatment with acidification and alkalization
- Brine discharge with outfall diffuser
- Waste water treatment plant including chemical, oil, backwash water and sewage treatment system
- Potable water tank including transfer pumps
- Chemical storage
- Auxiliary systems
- Related electrical installations with MV switchgear
- Related I&C system with central control room
- Related civil works

Reciprocating Engines:

- Capacity of reciprocating engine: about 26-30 MW covering 3-4 units each with 7-9 MWe
- Dual-fuel reciprocating engines for diesel and natural gas firing, oxy catalyst and stack
- Auxiliary systems like compressed air system
- Fuel oil supply and storage tank
- Related electrical installations with LV switchgear and station transformer
- Related I&C system
- Related civil works

PV Modules:

- PV modules on roofs of desalination buildings with a total installed capacity of approx. 2.5 MW
- Related electrical system with inverters, transformers and cable connections
- Related I&C system with main controller for optimized power supply with reciprocating engines
- Related civil works

The off-site renewable energy component will be built on a site approx. 7 km South of the desalination plant and consists of a PV plant of 13 MW. Two wind turbines of 3 MW will be built close to the desalination plant site. All power generated will be used in the desalination plant.

At the moment diesel fuel is the only readily available energy source in Gaza apart from grid connections to Israel. Altogether, the power deficit in Gaza is already dramatically high. A

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comprehensive Power Supply Study has been prepared and concluded that a mix of renewable and conventional power sources leads to lower costs and a reduced carbon footprint of the desalination plant. It should be noted that there is no precedent so far that desalination plants of this size will be powered by a captive PV plant.

The Project will support a high priority water supply infrastructure in one of the world's most water-stressed countries and will allow Palestine to meet the growing demand. It will also mitigate the impact of climate change-induced decrease in the availability of fresh water resources. The Project also complies with the Bank's sector lending orientation in particular regarding climate change adaptation and development of new water resources.

The promoter is the Palestine Water Authority.

Environmental Assessment

Environmental Impact Assessment

If it were located inside the EU, a desalination plant of this capacity, even though not specified therein, would fall under Annex 1 of the EIA Directive (2014/52/EU amending 2011/92/EU) making a full EIA mandatory.

Palestinian Environmental Law (PEL):

The Palestinian Authority legislates and regulates all activities and projects in water and coastal zones through the Palestinian Environmental Law (PEL). The Ministry of Environment Affairs was replaced by the Environment Quality Authority (EQA) by Presidential Decree No(6) of 2002. The decree also moved all the responsibilities and the Ministry of Environmental Affairs to the EQA. It is now the body responsible for protecting and developing environmental projects in Palestine according to the "Law Concerning the Environment, No7, of 1999".

Palestinian Environmental Assessment Policy (PEAP)

PEAP is set to support sustainable development and ensure adequate standards of life and avoiding irreversible environmental damage, and mitigating reversible environmental damage from development activities. According to the policy, the proponent of any proposed activity should have Approval of the EQA through a particular process where stakeholder consultation is a crucial component of the policy.

The most important considerations about the ESIA Process in Palestine are defined by the PEL:

Article 45 of the PEL; "The ministry (EQA), in coordination with the competent agencies, shall set standards to determine which projects and fields shall be subject to the environmental impact assessment studies. It shall also prepare lists of these projects and set the rules and procedures of the environmental impact assessment".

Article 47 of the PEL states that; "The ministry (EQA), in coordination with the competent agencies, shall determine the activities and projects that have to obtain an environmental approval before being licensed. This includes the projects that are allowed to be established in the restricted areas".

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According to the PEL and the PEAP, the project proponent must first obtain an initial approval from the appropriate ministry or local planning committee. The proponent then submits an application for environmental approval to the EQA. The EQA notifies the appropriate permitting authorities that an application for environmental approval has been received. The application should also list what environmental and other permits must be obtained and complied with, indicate how the expected conditions of these permits will be fulfilled, and include a signed statement by the proponent that these conditions will be fulfilled.

Based on the application submitted to the EQA, screening criteria are used to determine whether an initial environmental evaluation (IEE) would be sufficient for the project of concern or whether a comprehensive EIA is required. An Inter-Ministerial Committee is formed to approve the EIA, following which an environmental clearance is given to the project. The EQA is expected to liaise with the institutions of concern with respect to the project. An Environmental Approval may specify the following:

- Required measures to mitigate adverse environmental impacts or capture potential environmental benefits, including a compliance schedule. This may include land compensation measures issued by the Higher Planning Council after reviewing the project. The procedures involve the Ministry of Finance, the MoLG and municipalities of concern.
- Measures that the proponent must implement in order to comply with relevant standards and requirements.

From 2015 to 2016 the European Commission financed the preparation of the ESIA. The EQA has granted permission to proceed based on that ESIA. It is also acceptable to the EIB as it complies with Best International Practices as well as the EIB Environmental and Social handbook

Environmental Monitoring in Palestine

The project proponent shall express its commitment to adhere to the standards and requirements for the protection of the environment and to apply all the required mitigation measures addressed in the EIA including a monitoring programme.

The purpose of the monitoring program is to:

- assess the possible impacts of seawater desalination and brine discharge on the marine environment, spatially and temporally;
- verify the results of the brine dispersion models, which were prepared as part of the EIA and the detailed design for the plants;
- compare the monitoring results to national and international environmental standards and guidelines.

Based on the already existing ESIA the BOT contractor will develop the final design for the plant and an Environmental Management Plan.

Key environmental issues

The following main environmental impacts were identified in the EIA:

Seawater intake

The extraction of large quantities of seawater may cause the impingement of marine biota on the intake structures and the entrainment of smaller, passively drifting organisms into the plant. The effects will be minimized by an offshore, submerged intake with screens and slow

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flow velocities. Best Available Technology (BAT) to diffuse the effect of the intake on water circulation, impingement and entrainment will be applied.

Use of chemicals

Chemicals will be used in pre-treatment and cleaning, some of which will be discharged into the sea. Potential negative effects will be minimized by reducing chemical use (e.g. by using shock chlorination twice a year and mechanical cleaning of intake pipes instead of continuous chlorination, by using low antiscalant doses based on experience with other desalination plants in the region), by using less hazardous chemicals (e.g. using acid and base cleaning solutions without organic cleaning additives), and by treatment of intermittent wastes before discharge (i.e., filter backwash waters, cleaning solutions).

The project concept assumes pre-treatment through dual media filters or ultra filtration.

Cleaning solutions of any kind containing organic substances will not be disposed to the sea. Cleaning solution containing inorganic substances will be neutralized and treated before being disposed to sea in the brine pipe. Disposal of the treated filtered backwash water through the brine pipes to the sea is subject to submission of a detailed design and approval.

Concentrate (or brine) disposal

The high salinity concentrate is discharged into the sea where it causes an increase in ambient salinity in the mixing zone, which may be harmful to marine biota. Potential negative effects are minimized by discharging the concentrate through a diffuser in a suitable site further offshore.

Other important environmental considerations include the use of fossil energy to provide electricity for the desalination process and resulting emissions of air pollutants and greenhouse gases; land use and potential landscape impacts; the consumption of natural resources for chemicals; membranes and construction materials; construction-related impacts; possible soil and sediment impacts; impacts on the terrestrial flora and fauna; and pollution from accidental spills or leakages. The impacts have been identified and will be mitigated to the extent possible.

Climate Risk Assessment

The climate risk assessment of the project identified a number of climate sensitivities and additional geological hazard risks, such as extreme rainfall events (flooding), sea level rise, storm surge and storm tide as well as sea current and waves. The plant's design specifications will cater for the identified risks.

EIB Carbon Footprint

For the project, the purchased electricity represents one of the largest sources of GHG emissions and the most significant opportunity to reduce these emissions. The key source of GHG emissions of the project during operations relates to the net power demand of the project, and to what extent fossil energy sources generate the power. The carbon footprint calculation considered the following scenario:

Emissions caused by the operation of the desalination plant (energy only)

Using best available technology (BAT), such as highest efficiencies in pumps and motors, variable frequency drives, energy efficient RO membranes and isobaric energy recovery systems will already reduce energy consumption.

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Still, desalination is an energy intensive process. The specific energy demand is usually within a range for 3.4-4.0 kWh/m³, depending on seasonal variations of seawater temperatures. Therefore, the annual power consumption of the plant will be in the range of 220 GWh. The generation of this power will result in greenhouse gas emissions.

“With project” scenario (Absolute emissions)

Assuming the plant will fully run on diesel as the currently only available fossil fuel the operation of the plant will lead to the generation of 137,000 t CO₂e per year; or 68.5 kg CO₂e per person and year (187 g of CO₂e per day or less than 2 km driving in a standard diesel car).

Through the renewable energy plant, the greenhouse gas emissions will be reduced by approx. 20,550 t CO₂e per year to about 116,450 t CO₂e per year.

“Without project” scenario (Baseline)

Emissions of a “without project” scenario is normally determined in order to calculate relative emissions induced or saved by the project. In this specific case a w/o project scenario is an unrealistic option, yet determining a default alternative would be highly speculative. A relative emission has hence not been determined.

Furthermore the EIB will not consider the project for the purposes of determining the annual absolute or relative carbon footprint of Bank financed projects, as the EIB is not financing the project but only acting as a Trust Fund manager.

Social Assessment

The project will have short and long-term positive social impacts in terms of enhancing water security and provision of reliable, safe, and drought-resilient supply of fresh water. The availability of desalinated water will help restoring the overused underground aquifers and to address the climate change-induced reduction of the replenishment of freshwater resources.

An Abbreviated Resettlement Action Plan (ARAP) has been prepared in 2014. It identified one (1) household to be directly affected by the construction of the desalination plant. Since then all members of the household have been resettled and compensated. The site was fenced and vacant.

Various studies on the financial and economic viability of the project have been carried out over the last years. As a consequence, the international donor community developed a subsidy mechanism to ensure the operation of the plant but also to allow for a transition time until the cost of the desalinated water can be passed on to consumers. However, it should be noted that people in Gaza currently pay up to NIS 20 (EUR 5.20) per cbm for (privately) desalinated water or an even higher amount for bottled water of dubious quality. On average every person will receive 75 litres per day of high quality potable water at a cost of under 0.15 EUR (based on a price of EUR 2.00 per cbm).

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Labour Standards:

With the signature of the Oslo Declaration of Principles in 1993, the ILO launched a comprehensive technical cooperation programme in the West Bank and Gaza, which was further consolidated with the signature of a Memorandum of Understanding between the Palestinian Liberation Organization and the ILO in 1994. The MOU endorsed a programme of action focused on capacity building for social development; and in 1995 the ILO established a Representation Office in Jerusalem with support from the Regional Office for Arab States in Beirut, Lebanon. In 2013, the ILO and tripartite constituents in the OPT developed an overarching Palestinian Decent Work Programme (DWP) which aims to promote labour rights, enhance employment and extend social protection to all persons in the OPT. The compliance with both labour and occupational health standards during construction and operation are requirements in the tender documentation, and thus will be part of the contractual obligations of the concessionaire and on a back-to-back basis of all first tier suppliers and contractors.

Inspection and enforcement will be carried out by the PWA's supervision team, as well as the Labour Inspectorate of the Ministry of Labour, Social Affairs and Social Services.

Public Consultation and Stakeholder Engagement

Two public consultations were carried out in the course of the preparation of the ESIA in 2016.

The first consultation workshop held on 16 May 2016 at Adam Hotel in Gaza City gathered institutional stakeholders with responsibilities in the water sector or potentially affected by the presence, construction and operation of the GCDP project, such as Palestinian Authorities and Ministries. International Institutions and NGOs, were invited to these meetings in order to act as a bridge between the institutions and popular representatives. The targeted stakeholders for this workshop were ministries and governmental bodies in addition to affected individuals and different related communities.

The second workshop held on 17 May 2016 at Deir El Balah City hall gathered local stakeholders potentially affected and interested in the effects of the GCDP project, such as a community residents group, representatives of commercial activities (fisheries, agricultural, tourism, etc.) or social and environmental NGOs. A representative of the EU office in Gaza attended this workshop, as well as a representative group of residents from within 2 to 3 Km distance from the project site.

A detailed account of attendance is available in the ESIA document.

Other Environmental and Social Aspects

Cultural heritage

Palestine is a country with a rich centuries old cultural heritage. However, the historical and cultural monuments in Gaza Strip have suffered from neglect and lack of care during the occupation time. After the Oslo Agreement, the Palestinian Ministry of Tourism tries to protect historical and cultural monuments in Gaza Strip and West Bank.

The information from the Ministry of tourism indicates that no known antiquities or archaeological artefacts are on the project site of Deir El Balah. As there is no certainty of

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there being no such objects of cultural value at the PV plant site, construction works on the site should be coordinated with Ministry of Tourism to first evaluate the existence of any possible unknown archaeological objects. The Archaeological Clearance Letter for the Deir El Balah site has been received and appropriate provisions to obtain the approval letter for the PV site included in the BOT contract.

Conclusions and Recommendations

A full ESIA and an ARAP have been carried out. Their recommendations have been considered in the design documents for the plant. The ARAP has already been implemented.

With the following conditions in place, the Project is acceptable for financing in environmental and social terms.

Disbursement conditions other than 1st disbursement

- Confirmation by the works supervision engineer (or other qualified body) that the Environmental Management Plan complies with the ESIA and that appropriate provisions have been made to monitor its implementation.
- Confirmation by the works supervision engineer (or other qualified body) that all recommendations of the ESIA have been considered in the design of the desalination plant, its auxiliary works and the off-site renewable energy plant.

Undertakings

- The Promoter shall ensure that the Project (including all works performed by the contractors) is carried out in accordance with the provisions contained in the ESIA documents, associated management and action plans;
- The Promoter shall notify the Bank, within 2 days after its occurrence, of any significant environmental, occupational health and safety relevant event; and within 30 days provide the Bank with a summary report that includes a description of such significant event, and the measures that the promoter is taking or plans to take to address the event and prevent any future similar events;
- The promoter shall comply with the applicable laws, ILO labour standards and international best practices and shall ensure that relevant contracts financed under the Project include specific clauses on these undertakings.