



Gaza Central Desalination Plant And Associated Works Program

Donor Information Handbook

PWA and the Palestinian Water Sector are supported by the following
Partners



Executive Summary

Gaza Central Desalination Plant & Associated Works Program (GCDP)

I. Background

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. Specifically, by 2020, PWA plans to implement the following measures:

- improving the water distribution system,
- improving agricultural water management,
- developing wastewater treatment and reuse and
- Increase supply of bulk water resources (**constructing of a central desalination plant**).

In this context, the construction of a large-scale desalination plant together with the appropriate supply and distribution infrastructure has been confirmed by all major stakeholders including the European Commission, the European Investment Bank, the Islamic Development Bank and the World Bank as the preferred option for Gaza to stabilize the aquifer and secure its water supply.

Expected impact:

- Providing safe & clean water for more than 2 million people
- Contributing to the regeneration of the coastal aquifer
- Reducing the pollution in the Eastern Mediterranean
- Enabling economic development & boosting jobs creation

II. Gaza Central Desalination Plant & Associated Works Program Components

The PWA, in partnership with international institutions including the European Commission, the European Investment Bank (EIB), the Union for the Mediterranean (UfM), the Islamic Development Bank and World Bank, prepared a comprehensive and integrated investment program and defined its components as follows:

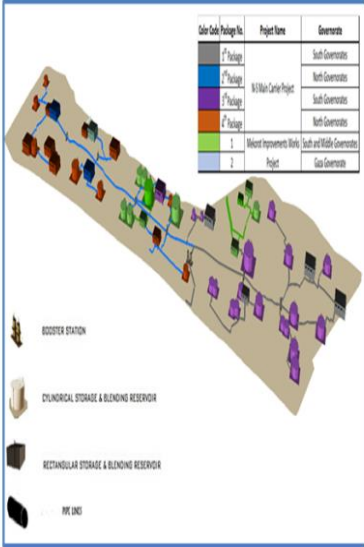
1. Gaza Central Desalination Plant:

- Construction and operation of a seawater reverse osmosis (SWRO) desalination plant of 55 MCM capacity;
- Installation of an On-site power plant fossil plant and a photovoltaic plant installed on the roofs of the SWRO buildings & Construction of an Off-site power plant consisting of a photovoltaic plant on ground structures and two wind turbines;

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Donor Information Handbook**

2. Associated works:

- Construction of a north-south water carrier including storage reservoirs for transport of desalinated water, and for blending the desalinated water with water from other, primarily groundwater sources;
- A non-revenue water reduction plan, to reduce NRW to about 20% (in the year 2030) and to increase revenue collection efficiency from the current 38% to 80% and beyond;

<ul style="list-style-type: none"> ▪ North South Carrier consisting of about 42.5 km of pipeline ▪ North loop consisting of about 16.2 km of pipeline ▪ Middle loop consisting of about 11 km of pipeline ▪ South loop consisting of about 25.2 km of pipeline ▪ 12 pumping stations; 5 main booster stations along the carrier; and water tanks for a total capacity of 200,000 m³. ▪ 37 km of water distribution system; and ▪ Replacement of about 21 km of old and undersized water pipes 	 <table border="1" style="margin: 0 auto; font-size: 8px;"> <thead> <tr> <th>Color Code</th> <th>Package No.</th> <th>Project Name</th> <th>Governorates</th> </tr> </thead> <tbody> <tr> <td>Grey</td> <td>1st Package</td> <td></td> <td>South Governorate</td> </tr> <tr> <td>Blue</td> <td>2nd Package</td> <td></td> <td>North Governorate</td> </tr> <tr> <td>Green</td> <td>3rd Package</td> <td>W. Water Carrier Project</td> <td>South Governorate</td> </tr> <tr> <td>Orange</td> <td>4th Package</td> <td></td> <td>North Governorate</td> </tr> <tr> <td>Light Green</td> <td>1</td> <td>Water Treatment Works</td> <td>South and Middle Governorates</td> </tr> <tr> <td>Light Blue</td> <td>2</td> <td>Water</td> <td>South Governorate</td> </tr> </tbody> </table>	Color Code	Package No.	Project Name	Governorates	Grey	1 st Package		South Governorate	Blue	2 nd Package		North Governorate	Green	3 rd Package	W. Water Carrier Project	South Governorate	Orange	4 th Package		North Governorate	Light Green	1	Water Treatment Works	South and Middle Governorates	Light Blue	2	Water	South Governorate	<p>Location : South West Gaza Area : 8 Hectares Capacity : 55MCM/year</p> <p>Components:</p> <ul style="list-style-type: none"> ▪ Sea Water Intake Structure ▪ Primary Treatment Facilities ▪ Reverse Osmoses Process Facilities ▪ Post-treatment Facilities ▪ Brine Discharge ▪ Power Supply Plants <ul style="list-style-type: none"> ▪ reciprocating dual fuel engines (24 MW) ▪ Onsite Solar PV Panels of 2 MW. ▪ Off site 12.5 MW PV solar plant ▪ Off Site 4 MW wind mills
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Overview – GCDP Associated Works

Overview – Gaza Central Desalination Plant (GCDP)

Program Implementation

The EIB, EC, & PWA, have developed a Program Management Architecture (PMA) to ensure the smooth and successful implementation of the Program, whilst emphasizing transparency, good governance and supporting capacity building for the water sector in Palestine.

Power Supply

Due to the overall power crisis in Gaza, the EIB and PWA commissioned a power supply feasibility study, which identified and analysed various power supply options and their associated costs for the GCDP. The total power demand of the SWRO plant is in the range of 25 MWe, resulting in a total energy demand of 204 GWh per year. The following power supply option was selected:

The construction of an on-site fossil plant with reciprocating engines will enable 100% coverage. In addition, renewable energy facilities will be build both on and off-site with the potential to cover up to 15% the GCDP energy demand as an average per year:

- an on-site photovoltaic plant on the roof of the SWRO buildings with the capacity to cover 2.2% of the energy demand;
- an off-site photovoltaic plant with the capacity to cover 10.3% of the energy demand.
- two wind turbines with the capacity to cover 2.6% of the total energy demand.

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Donor Information Handbook

Power supply scenario (conservative)

Within the first two years of operation, the power supply will be covered by reciprocating engines fired with diesel fuel. From the second year of operation, onwards it is assumed that the complete power supply will be realized via a new grid connection from Israel via a 161-kV line from which a dedicated power line from El Matahen substation (within Gaza) to the project site. The reciprocating engine plant will serve as a back-up plant and will operate as back-up in case of any grid interruptions, whereas the renewable energy plants will be in operation to save operational costs. After two years of operation, it is assumed that the (back-up) reciprocating engines will be switched from diesel fuel to natural gas firing. In case the grid connection would not be available the plant could be fully powered by natural gas¹.

III. Program Cost – CAPEX & OPEX

Overall, the total cost for the Program is approximately **EUR 562.3 million** including an operational subsidy of EUR 46 million for the first five years of operation, project management and supervision cost as well as contingencies. This figure does not include the corresponding Trust Funds management costs.

<u>Program Items</u>	<u>Cost (million EUR)</u>
1. Desalination Facility	302.5
1. Desalination Plant (SWRO)	215
1. Power Plant	87.5
1. Reciprocating Dual Engines	40
1. PV Roof	6
1. PV on Ground Structure	27.5
1. Wind Turbines	8
1. Grid Connection	6
1. Associated Works	160
1. North - South Conveyor	130
1. Non-Revenue Water Reduction	30
1. Operation Subsidy for Five Years	46
1. Consultant for Supervision (Project implementation consultants (PIC 1 & PIC2))	15
1. Program Management Support Consultant Envisaged to be funded by EIB for Three Years	6.5
1. Program Management Team Envisaged to be funded by IsDB for Three Years	5.5
1. Contingences (5%)	26.8
1. TF Management Cost (not agreed upon yet)	-
Total Investment	562.3

¹ This will depend on progress of the Gas for Gaza (G4G) for which planning procedures have already begun on Israeli territory.

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Donor Information Handbook

The total OPEX of the full GCDP Program including associated works are expected to vary between EUR 65 and 110 million and will largely depend on energy supply options. This is translating into average water tariffs to cover supply costs of EUR 0.7 and 1.2 per cubic meter, with the difference substantially depending on availability of grid connection and natural gas. The above-mentioned EUR 46 million of operational subsidy will be used to reduce water bills for low-income households. The exact subsidy system still needs to be agreed with the donors.

Trust Fund Architecture

- The EIB will manage a Trust Fund relating the construction of the Desalination plant and its power supply a.
- The WB will manage a Trust Fund relating the construction of the Associated Works. The IsDB will manage an upper Fund (for handling cash flow to the two operational funds above) holding the financial contributions from the Arab Gulf Donors.

In addition, the Palestinian Water Authority will manage donor financing related to the Non-Revenue Water component through similar to existing bilateral mechanism.

Achieved Milestones

Significant progress has been made on all aspects of the programme, such as land acquisition, tendering procedures, programme management architecture, including the launching of the Palestinian Authority Steering Committee, energy supply and the financial mechanism for donor contributions, as well as Israel's agreement in principle on the regime to apply for entry of materials and important developments with the Gas for Gaza pipeline.

Next Step
Donors pledging conference scheduled for March 2018
✓ **Current Pledges: EUR 362.5 million**
▪ **Remaining Funds to be raised: approx. EUR 200 million**

For further information on all technical matters, please contact:

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GAZA CENTRAL DESALINATION & ASSOCIATED WORKS PROGRAM
Donor Information Handbook

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