ASHKELON 100 MCM/year BOT PROJECT

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Israel

Abstract

The Ashkelon Build, Operate and Transfer Project consists of the financing, design, construction, operation and transfer of a sea-water desalination plant with guaranteed production capacity of up to 100,000,000 m$^3$/year. This plant will be located at the Ashkelon site of the Eilat-Ashkelon Pipeline Corporation.

The design of the Plant is such that it enables an extension of the production capacity during the operating phase of the Project.

The Plant is designed, constructed and operated by a Consortium made up of three international Sponsors, who have created a special purpose company, V.I.D. Desalination Company Ltd. (the "SPC" or "VID") in order to carry out the Project. The companies and their respective initial participation in the SPC's share capital are the following:

- IDE Technologies Ltd. 50%
- Veolia Water S.A. 25%
- Elran Infrastructures Ltd 25%

The Project is governed by a Build, Operate and Transfer Agreement ("the Agreement") entered into between the Consortium and a government agency, the Water and Desalination Authority ("WDA") of Israel. The Agreement is awarded for a period of 24 years and 11 months from the Effective Date.

Construction is well on its way, in accordance to schedule, and the plant is expected to begin water production in early 2005.

Several factors contribute to the low water price offered by the Consortium (52.7 Usc/m$^3$):

- Contractual Structure with proper risks allocation
- Adaptation of SWRO technology for large-scale plants (pressure centers concept)
- Advance Energy Recovery System (low energy consumption)
- Self-Generating Energy Supply System (low electricity cost)
1. Executive Summary

1.1 Project Description

The Ashkelon Build, Operate and Transfer Project consists of the financing, design, construction, operation and transfer of a sea-water desalination plant with guaranteed production capacity of up to 100,000,000 m\(^3\)/year. This plant will be located at the Ashkelon site of the Eilat-Ashkelon Pipeline Corporation.

The design of the Plant is such that it enables an extension of the production capacity during the operating phase of the Project. In addition, the initial annual production capacity exceeds by - 10 million m\(^3\) the required guaranteed annual production capacity of 100 million m\(^3\) in order to allow for some flexibility in the production levels, should the WDA decide to purchase more desalinated water from VID or allow VID to produce Excess Quantities.

The Plant is designed, constructed and will be operated by a Consortium made up of three international Sponsors, who have created a special purpose company, V.I.D. Desalination Company Ltd. (the "SPC" or "VID") in order to carry out the Project. The companies and their respective initial participation in the SPC’s share capital are the following:

- IDE Technologies Ltd. 50%
- Veolia Water S.A. 25%
- Elran (D.D.) Infrastructures Ltd 25%

The Project is governed by a Build, Operate and Transfer Agreement ("the Agreement") entered into between the Consortium and a government agency, the Water and Desalination Authority ("WDA") of Israel. The Agreement has been awarded for a period of 24 years and 11 months from the Effective Date. The production of the Plant will be sold to the WDA, whose obligations (incl. payment obligations) under the Agreement are deemed to be obligations of the State of Israel.

1.2 Technology Used

The Project will use the Membrane Reverse Osmosis technology. This is a modern process technology used to purify water for a wide range of applications, including semiconductors, food processing, biotechnology, pharmaceuticals, power generation, seawater desalting, and municipal drinking water. The reverse osmosis industry today represents a combined world-wide production in excess of 7.7 million m\(^3\) per day.

Several innovative technological applications contribute to the low water price offered by the Consortium (52.7 Usc/m\(^3\)):

- Adaptation of SWRO technology for large-scale plants (pressure centers concept)
- Advance Energy Recovery System (low energy consumption)
- Self-Generating Energy Supply System (low electricity cost)
1.3 Overview of the Consortium

The Consortium is be made up of IDE Technologies Ltd. (“IDE”), Veolia Water S.A. (Veolia) and Elran Infrastructures Ltd (“Elran”).

IDE Technologies Ltd. is a 50/50 subsidiary of the Delek Group, a leading Israeli group of companies, and Israel Chemicals Ltd, a leading Israeli chemical company whose shares are traded on the Tel Aviv Stock Exchange. IDE is recognised as the world leader in low temperature distillation and has also considerable experience in reverse osmosis. IDE is specialised in the design, research, development and manufacture of sophisticated desalination plants and equipment, including saline water desalination processes, water treatment and purification of industrial streams, heat pumps and ice machines.

Veolia Water S.A. is wholly owned by the Veolia (formerly Vivendi) Group, the world leader in the environmental sector and the second largest communication company in the world. More specifically, Veolia Water is part of Veolia Environment, the world leader in environmental services operating in more than 100 countries. Veolia Water, created by the merger between Générale des Eaux and US Filter in September 1999, is the international brand name of Veolia’s water business.

Elran (formerly Dankner Ellern) Infrastructures Ltd. is a subsidiary of Dor Gas and the Dankner Group, one of Israel's leading privately-owned companies, with diversified interests in energy, chemical, petrochemical and plastic industries, residential and commercial development, cable TV and telecommunications. Dankner Group is traded on the Tel-Aviv Stock Exchange. Dankner is regularly searching for new investment opportunities.

1.4 Project timetable

- August 2002: Effective Date (beginning of a 25 year contractual term).
- April 2003: Notice to Proceed (approval for go ahead of works).
- March-July 2005: Completion of 1st Facility (50mcm/year).
- November-December 2005: Completion of 2nd Facility (100mcm/year)
- July 2027: End of agreement term (24 years & 11 .......... months from Effective Date).

1.5 Overview of the Contractual Structure

The main contracts are the BOT Agreement, the Engineering Procurement and Construction Contract (“EPC Contract”), the Operation and Maintenance Contract (“O&M Contract”), the Power Purchase Agreement (“PPA”) and the Financial Agreement(s). The general contractual structure of the Project is described below:
Construction of the first 50MCM/y is expected to last 24 months and for the second 50MCM/y, additional 6 months (total 30 months). The Construction is undertaken under an Engineering and Procurement Contract (“EPC Contract”) between the Consortium and the Construction Company made up jointly of OTV (Veolia Group) and IDE Technologies Ltd. The name of the EPC Consortium is OTID.

Operations will be governed by an Operation & Maintenance Agreement (“O&M Agreement”) entered into between the Consortium and the Operating and Maintenance Company made up jointly of Veolia Group, IDE Technologies Ltd, and Elran, the latter being a financial partner.

1.6 Financing Plan

Equity funds 23.5% of the total financing requirements.

Credit facility provided by lenders (syndication between Bank and Institutional Lenders) funds 76.5% of the total financing requirements.

Standby facilities will be provided by shareholders and by lenders to fund 7% of the total financing requirements.

2. Technology, Design Process and Information Related to the Site

2.1 Reverse Osmosis

As indicated above, the desalination process selected for this Project is the Seawater Reverse Osmosis (SWRO), which appeared as the best option from a technical and economical points of view, based on the Project’s needs and the Tender Committee's requirements.
The basic concept for the construction of 100 million m$^3$/year plant is to have two plants of 50 million m$^3$/year able to operate separately and independently from each other.

Most subsystems will be double (one for each 50 million m$^3$/year plant), with the exception of the Intake System, the Post-treatment and the Independent Power Plant. Those systems will be unified for the whole 100 million m$^3$/year plant, but are designed with the required redundancy to serve each plant separately.

### 2.2 Facility Overview, Battery Limits and Systems Design Approach

The System Design Approach has been established after a comprehensive analysis of the different parameters that may have a direct and/or an indirect influence on Plant’s feasibility, reliability and availability. In the following sub-sections, a brief description of the main segments of the Facility and their key features is presented, with particular attention being paid to the critical and relevant parameters that have been considered and finally reflected in the Design Approach.

**A Intake System**

Three alternatives have been initially considered:

- Open (submerged) Intake Sub-system
- Seawater Wells Sub-system
- IEC’s Seawater Supply Point (Power Station’s cooling water discharge)

Based on experience gained on other desalination projects with similar characteristics, the Open (submerged) Intake alternative has been selected as the most feasible one for this Project. This technical solution is well-known and allows to pump seawater with a better quality than the other alternatives that have been considered. Moreover it offers a better protection from hydrocarbon pollution.

Among design parameters selected, the following should be mentioned:

- safety margins in feed-water flow rate;
- three parallel pipelines, thus increasing both the availability and reliability (ensuring that at least 67% of the plant remains operable, in case of failure or shut-down of one of the pipelines);
- non-turbulent in-flow rates;
- high-density plastic pipelines, which demand low maintenance, have a lower tendency for bio-growth, are simpler to clean and have no hazardous materials for the membrane elements;
- hydrocarbon pollution pre-warning system.

**B Intake Pumping Station**

Vertical pumps are envisaged, for normal routine operation of the system (“base load”). The key features of this design are:

- Long-term successful experience of this approach widely used in Power Stations intake systems (large flow rates/small water head);
- Higher efficiencies are achieved;
Lower capital and operating expenditures, directly related to economies of scale - also reflected on the ancillary components (controls, electrical equipment, pipeline manifolds, etc.), improved efficiencies of pump and motors.

High flexibility in the operational mode, allowing for a quick and easy activation (or de-activation).

C Interconnection and Static Mixers

The design contemplates two parallel lines interconnecting between the Intake Pumping Station and the Pre-Treatment section of the Plant. This approach increases Plant availability and reliability (ensuring that at least 50% of the plant remains operable, in case of failure in one of the pipelines or static mixers).

D Chemicals dosing (at the Pre-Treatment segment of the Plant)

Full redundancy is provided for each dosing station. Each pump is supplied with a device adjusting pumps’ flow rate to Plant’s real-time needs. All the dosing pumps have a long track record in similar applications.

E Gravity Dual Media Filters

The Plant comprises gravity filters, containing gravel, quartz sand and anthracite media. The main features of this approach are:

- High filtration efficiency;
- Low weighted average filtration velocity, approx. 50% of the max. allowed;
- Distribution system which prevents clogging, short-circuits and channelling;
- Low energy consumption;
- Automatic back washing without interrupting Plant operation;
- Overall “spare filtration capacity” (stand by) of 33.3%.

It should be noted that the main principles of the design and operation modes of the Media Filters have been tested and piloted.

The ability of the system to handle higher (storm-induced) turbidities has been also checked.

F Micronic (cartridge) Filters

A battery of filters is planned, grouped in two parallel branches.

The main features of this approach are:

- High filtration efficiency;
- Low weighted average filtration rate;
- Distribution system which prevents clogging, short-circuits and channelling;
- Low energy consumption;
- “Spare filters” (stand by) of 40%.
**G High Pressure Pumps/Energy Recovery Devices (ERD)**

High-pressure pumps and couples of ERD of the type Double Work Exchanger Energy Recovery (DWEER) are envisaged. The high-pressure and energy recovery components can be operated independently, thus increasing the number of alternative operation modes of the system.

This new “pressure centers concept” is specially designed for large-scale SWRO plants and present the following advantages:

**THREE-CENTER DESIGN CONCEPT:**

The typical concept of equipment arrangement in desalination plants is based on several identical RO trains. Each RO train includes a high-pressure pump, an energy recovery device, and a bank of RO membranes. This concept began its transformation with the appearance of large desalination projects.

The designers of desalination systems tried to reduce water cost by increasing size of high pressure pumps, since larger pumps have higher efficiency at lower specific cost.

The necessity of flow proportionality for each component of RO train calls for the enlargement of membrane bank.

What is beneficial for pumps is detrimental for membranes bank. The relation between pump size and membrane bank size was the first contradiction.

Coupling the pump with the motor and turbine in one aggregate was beneficial up to a certain size. For large capacities, integration of pump and turbine in one machine limited variation in recovery range. Pump combination with two and more Pelton wheels leads to complications in maintenance.

The relation between pump size and number of turbine wheels on the same shaft creates the second contradiction. A further increase of RO train size is detrimental.

This vicious circle is broken in Ashkelon Plant. The high-pressure pump was disconnected from the energy recovery device. Pump capacity has not been equal to RO bank capacity, because the optimal size of the pump is not equal to the optimal size of the RO block. So individual high-pressure pump has to be disconnected from the individual RO bank.

Half of the Ashkelon desalination plant has a capacity of 163,000m$^3$/day. Different sizes of identical RO trains, (between five and forty) were checked during project preparation in all aspects. The concept of several identical RO trains was changed to a Three-Center Design.

The Three-Center Design is a form of installation of high pressure pumps, energy recovery devices and membrane banks. Figure 1, presents the scheme of the Three-Center Design.

Several large high-pressure pumps will form a Pumping Center, which will supply seawater via common feed lines to all RO banks. Forty DWEER units will form an Energy Recovery Center, which will collect pressurized brine from all RO banks, transfer the energy to seawater, and pump it into a common feed line to all RO banks.

The new approach of the Three-Center Design allows size optimization of each system element independently.
Over thirty five thousand RO membranes in all plant have to be arranged in banks, convenient for maintenance, flushing and cleaning.

These membranes can be arranged in small, medium or large RO banks. During the design several steps were attempted to find the techno-economical factors defining the optimal size of one RO bank.

By “RO bank” we mean a group of pressure vessels having a common distribution piping system that can be switched off separately, without affecting the operation of other RO banks.

For optimization purposes a quarter of the total membranes used in Ashkelon desalination plant were taken. Different options of RO banks sizes were considered, all including a total of 1120 pressure vessels. The options of RO bank size were from 30 to 210 pressure vessels per bank. See Table 1. Availability is an important aspect and was considered the main parameter for bank size optimization.

**RO Banks Availability**

All RO banks include 8960 membranes, 8960 inter-connectors and 17920 O-rings. All plastic and rubber elements are exposed to nearly 70 bar pressure, and from time to time they fail in performance. During normal operation these O-ring are moving and twisting every time when a pressure vessel is pressurized or depressurized. Some O-rings can have a small leak, others can twist badly and have to be set right at once.

RO bank availability is expressed as ratio, stoppage time (due to a fault of O-rings, interconnections and membranes) to total operation time.

Performance failure means that the seawater break through O-ring or interconnector or membrane has reached such extent that the RO bank has to be stopped immediately.
Based on our experience and evaluation, the average lifetime of an O-ring is 20 years in continuous operation if RO bank is stopped not more than once a week.

**Table 1: Availability and cost of RO banks**

<table>
<thead>
<tr>
<th>Number of RO banks per quarter of desalination plant</th>
<th>Number pressure vessels per RO bank</th>
<th>Availability of RO Banks</th>
<th>Additional cost of membrane &amp; P.V. Compensation for low availability in big RO banks</th>
<th>Additional cost, compensation for valves &amp; instruments for small RO banks</th>
<th>Total cost of all RO banks in plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>30</td>
<td>98.7%</td>
<td>90.2%</td>
<td>9.8%</td>
<td>100.0%</td>
</tr>
<tr>
<td>18</td>
<td>60</td>
<td>97.4%</td>
<td>91.4%</td>
<td>4.5%</td>
<td>95.9%</td>
</tr>
<tr>
<td>12</td>
<td>90</td>
<td>96.1%</td>
<td>92.6%</td>
<td>2.7%</td>
<td>95.3%</td>
</tr>
<tr>
<td>9</td>
<td>120</td>
<td>94.8%</td>
<td>93.9%</td>
<td>1.6%</td>
<td>95.5%</td>
</tr>
<tr>
<td>7</td>
<td>150</td>
<td>93.4%</td>
<td>95.2%</td>
<td>0.9%</td>
<td>96.2%</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
<td>92.1%</td>
<td>96.6%</td>
<td>0.4%</td>
<td>97.0%</td>
</tr>
<tr>
<td>5</td>
<td>210</td>
<td>90.8%</td>
<td>98.0%</td>
<td>0.0%</td>
<td>98.0%</td>
</tr>
</tbody>
</table>

Assuming that failures are distributed equally during 20 years ($t_r=20$), the number of O-ring that fail daily can be calculated as per formula (1):

$$P_{or} = 17920 \times \frac{\left(1 - e^{-\frac{1}{t_r}}\right)}{365} = 2.39 \text{ incidents per day}$$  \hspace{1cm} (1)

Assuming that average lifetime of inter-connectors is 50 years ($t_i=50$), the number of inter-connectors that fail daily, can be calculated as per formula (2):

$$P_{or} = 8960 \times \frac{\left(1 - e^{-\frac{1}{t_i}}\right)}{365} = 0.49 \text{ incidents per day}$$  \hspace{1cm} (2)

Roughly ninety nine percent of membranes will be replaced in an organized way and will not cause unexpected failures. One percent of membranes per year will cause unexpected failures, which must be taken into account:

$$8960 \times \frac{0.01}{365} = 0.24 \text{ incidents per day}$$  \hspace{1cm} (3)

A total number of 3.1 incidents of possible stoppages are expected every day. Three hours are necessary to replace an O-ring, an inter-connector or a membrane. If all membranes are arranged in one RO bank, this bank will be out of operation for 9.3 hours every day, which means 61% availability.

Smaller banks will increase plant availability. All membranes in the plant do not need to be stopped to replace one O-ring. We have to keep in mind that small RO banks are more expensive, since more valves, SMO pipes and instruments will be used. Membrane cleaning
is the additional issue that has to be taken in consideration from three aspects. The first is the size of the cleaning system, the second is membrane downtime during cleaning, and the third the cost of high pressure valves for connecting the RO bank to the cleaning system. The plant has to supply a certain amount of water, irrespective of the size of RO banks. Therefore more membranes must be installed in large RO banks to cover their low availability. Calculation of optimum size of an RO bank is based on reaching equal availability by using small and large RO banks. For this reason, availability was recalculated into the cost of additional membranes, pressure vessels and distribution piping.

The summary of total specific cost is shown in Table 1 and Figure 2.

**Figure 2**: Optimum Size of one RO Bank

The key features of this approach are:

- Plant availability and reliability
- Higher efficiencies are achieved;
- Lower capital and operating expenditures, directly related to economies of scale - also reflected on the ancillary components (controls, electrical equipment, pipeline manifolds, etc.), improved efficiencies of pumps and motors;
- High flexibility in the operational mode, allowing for a quick and easy activation (or de-activation)
H SWRO Desalination System and Boron Removal

The design of the Reverse Osmosis system adopted for this Project, comprises multiple RO stages, implementing a process for boron ions removal from the desalinated water each one operating at optimum design point.

The proposed multiple RO-stage desalination and Boron removal system has the following features:

- High removal efficiency and product yield for Boron removal. The system can reach a removal efficiency as required;
- Low specific power consumption;
- Low chemical consumption;
- Lower capital investment required for achieving low Boron and Total Dissolved Solids (TDS) contents in product;
- The boron removal system is flexible and easy adjustable to changes in feed water temperature;
- Lower tendency for membrane fouling;
- Reduced energy consumption is achieved;
- If required, the same configuration can produce larger quantities of permeate. This is achieved by increasing the flow through the membrane elements, still under the limits of manufacturer recommendations.

I Post-Treatment

While the final Boron levels are achieved by the multiple stage membrane process, the Post-Treatment envisages mainly the re-hardening of the permeate, bringing the water quality up to the levels required in the Tender Documents. The offered Post-Treatment incorporates limestone treatment (and, optionally, Caustic Soda dosing). This approach, based on several Pilot Tests and experience gained in similar projects, achieves the lowest capital and operational costs.

J Auxiliaries

The “auxiliaries” systems and equipment comprise the cleaning system and the flushing and suck-back system. In the event of power failure, a diesel driven pump for flushing is also provided.

K Energy Supply

The Electrical Power for the Project will be provided from two redundant sources:

- by a Self-Generating Energy Supply System that will be built as a part of the Project adjacent to the desalination plant .
- by a 161 KV overhead line from the Israel Electric Company Grid .

This approach contributes to the high reliability of the Project and increases its availability. From an operational point of view, the desalination system will work most of the time on a continuous “base load”, thus avoiding frequent (daily) changes in the operation mode.
The self-generating energy supply system will be fueled by natural gas. Minimal environmental constraints are expected and lower electricity costs will be achieved.

**L Others**

In addition to the above-described key features and benefits, the Plant comprises high quality materials of construction, stand-by and redundant equipment, standardization of equipment and facilities that contribute to higher Plant reliability and expected annual availability. The implementation of instrumentation, controls, alarms, testing procedures, etc., is also part of the Quality Assurance policy to be adopted in order to assure the highest standards of safety and reliability of the Plant.

**M Simplified Diagram of the Process**
2.3 Information related to the Site

A Site Description

The desalination plant is located at the Ashkelon Industrial zone, 700 meters north of an existing IEC (Israel Electrical Company) power station, within the EAP (Eilat-Ashkelon Pipeline Corp.) facility.

The feed water to the plant is pumped from the Mediterranean sea. The pumping station is located on the sea shore, 200 meters from the Site. The water quality is typical Mediterranean sea water.

The desalinated water delivery point is at the site battery limit. The brine (concentrated feed water) will be discharged back to the sea diluted with the coolant outfall of the adjacent IEC Power Plant.

The electrical power for the plant will be provided from two independent sources: overhead line from the national grid and self-generating energy supply system (IPP) installed at the site.

B Lease Agreements

The Accountant General leases the Site from EAP in accordance with the provisions of the Lease Agreement.

Under the Agreement, VID is granted the right to utilize the Site or any part thereof concurrently with the issuance of the Notice to Proceed for the term of the Agreement. VID has no other right than the right to use the Site for the Construction, Operation and Maintenance of the desalination plant.

3 - Contractual Structure

3.1 Description of the Contractual Structure

The Project's contractual structure has been designed with a view to allocating the different risks to those parties that are the most qualified to manage and control them.

CONTRACTUAL STRUCTURE
3.2 Engineering Procurement and Construction Contract ("EPC Contract")

The Heads of Terms of the EPC Contract include the following:

A Parties

The parties to the EPC Contract are (i) VID Desalination Company Limited (as the "Seller") and (ii) a consortium comprised of the following companies:

- IDE Technologies Ltd (IDE): 50%
- Omnium de Traitement et de Valorisation SA (OTV): 50%

together the “Contractor” or “EPC Contractor” (EPCC).

B Scope of Work

The EPC contract is of a turnkey nature. The EPC Contractor is responsible for the development, engineering, design, construction, manufacture, procurement, inspection, supply, transportation and testing of the water desalination plant so as to achieve minimum performance criteria for a fixed lump sum price and in accordance with a final date certain Construction Schedule.

The EPC Contractor shall achieve Construction Completion by the date set forth in the BOT Agreement, within 30 months after the issuance of the Notice to Proceed to allow the Seller to meet its obligations under the BOT Agreement. The minimum performance criteria of the EPC Contractor are in accordance with the BOT Agreement allowing the Seller to meet its obligations under this agreement.

C Governing Law

The Law of Israel shall apply to the EPC Contract.

3.3 Operation and Maintenance Agreement ("O&M Agreement")

The Heads of the Agreement of the O&M Agreement (OMA) include, but are not limited to, the following:

A Parties

The parties are: (i) VID Desalination Company Limited as the “Seller” and (ii) the O&M Company which shall be formed by:

- Veolia Water S.A. (represented by its affiliates GdE and OTV): 49.5%
- IDE Technologies Ltd: 40.5%
- Elran Infrastructures Ltd: 10%
together known as the “O&M Operator” (OMO) or “Operator”, or “A.D.O.M.”.

**B Scope of Work**

The O&M Company’s (A.D.O.M.’s) scope of works will include:

- Operation and maintenance of the water desalination plant except the supply of energy;
- Delivery of guaranteed quality water at the delivery point treated water in accordance with the provisions of the BOT Agreement;
- Pre-operation works including:
  - Review and approve the EPC design and process, the EPC equipment and contracts with equipment suppliers;
  - Participation in the Functional and Completion tests and Commissioning;
  - Provide personnel for training by the EPCC;
  - Write O&M Manual under EPC supervision.

**3.4 Independent Power Purchase Agreement (“IPP Agreement”)**

The Heads of Terms of the IPP Agreement include, but are not limited to, the following:

**A Parties**

The parties are: (i) VID Desalination Company Limited, the “Seller” and (ii) the IPP developer which shall be Mishor Rotem - Delek Energy Limited Partnership (“MRD”)

**B Scope of supply**

MRD undertakes to finance, design, supply, erect, commission, operation and maintain the power plant and to supply all the net output of the power plant, at its own cost. The power plant will be erected on the Site.

**4 – Water Price Structure**

**4.1 Description of the Water Tariff Structure**

The water tariff is composed of Fixed component (to cover capital expenditure, fixed O&M costs and part of the profit) and Variable component (to cover energy costs, variable O&M costs, membranes and chemicals costs and also part of the profit) the indexation of each component is as described below:

<table>
<thead>
<tr>
<th>Variable components</th>
<th>Indexed to:</th>
<th>To cover:</th>
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<tbody>
<tr>
<td></td>
<td>- Oil prices or electricity prices</td>
<td>- Energy costs</td>
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<td></td>
<td>- CPI (USD and NIS)</td>
<td>- Variable O&amp;M costs</td>
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<tr>
<td>Fixed components</td>
<td>Indexed to:</td>
<td>- Membranes &amp; chemicals costs</td>
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<tr>
<td></td>
<td>- NIS (min 33%)</td>
<td>- profit</td>
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<tr>
<td></td>
<td>- USD</td>
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<td>- Euro</td>
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<td>- Yen</td>
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<table>
<thead>
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<th>Fixed components</th>
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<th>To cover:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>- NIS (min 33%)</td>
<td>- Capital expenditure</td>
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<tr>
<td></td>
<td>- USD</td>
<td>- Fixed O&amp;M costs</td>
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<td>- Euro</td>
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<td></td>
<td>- Yen</td>
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</table>
4.2 Volumes requirements

Desalinated volumes requirements are within a minimum and maximum range defined for Daily, Bi-monthly and Annual quantities as described below:

- The bi-monthly quantities required in the summer months were higher
  - design of plant to facilitate this requirement

- Tolerance band of +/- 8%
  - LDs payable for delivery less than 92% of requirements
  - additional agreement with WDA required for quantities in excess of 108%

- Payment was weighted towards meeting short-term goals:
  - Daily: 50% of capacity payment
  - Bimonthly: 40% of capacity payment
  - Annual: 10% of capacity payment

5 – ARTISTIC VIEW OF THE FACILITY