**Variable production regime at the Hadera Seawater Desalination Plant**

**Key words:** desalination, reverse osmosis, variable production, energy tariff, Hadera

**Corresponding target:** 2.3.2 Create an Energy Task Force, and develop a guide allowing to achieve a 20% energy reduction in desalination by 2015

**The Solution is an EXISTING solution**

**DESCRIPTION**

**Description of the solution**

Category (technical, institutional, legal, policy, financial, communication, others (please specify):*

Brief description of the solution

**word limit: 300 words**

The Hadera SWRO Desalination Plant successfully provides its full capacity of drinking water (127M m3/year) at the lowest production cost for this type of project. The project was developed as a BOT (Build, Operate and Transfer), under a 25 year BOOT contract with the Government of Israel. The plant was originally designed for a capacity of 100M m3/year, following a request from the Government of Israel, this was increased to the current 127M m3/year. The company was designed and constructed by H2ID, a joint venture between IDE Technologies and Shikun & Binui, both of Israel.

In an age of increasing environmental awareness, reducing energy consumption was a key consideration in the project design, which utilizes a proprietary 3-Center design first used in the Ashkelon plant, Cascade Boron Treatment and other technologies to decrease energy requirements and increase overall efficiency.

Furthermore, due to the high electricity cost during peak hours, the Hadera plant was designed based on variable production according to the Israel Electric Corporation’s official variable tariff. The plant was designed for 2 modes of operation: maximum water production at the low electricity tariff and minimum water production at the high electricity tariff. The main goal of variable production operation is to minimize energy cost per cubic meter of water (S/m$^3$) [Not the specific energy (kWh/m3)].

These combination of technologies and the variable production regime have enabled Hadera to achieve one of the lowest-ever costs for high-quality desalinated water.

**Location**

Where was/is the solution implemented?

**word limit: 50 words**

Located in the central Israel, the Hadera plant product water is pumped to the reservoirs of the national water network, from where is contributes to the country’s drinking water.
### Actors

**Who had initiated the project? What were the stakeholders’ drivers?**

**Which actors proved strategic in the implementation? At what stage were they brought in?**

**Who has ensured follow-up of the solution at the local level?**

**word limit: 150 words**

This plant is part of a desalination master plan launched by Israel in 2000 to help solve the country’s water resource problem. The water deficit is due to:

- Drought conditions;
- Limited availability of natural water resources due to climatic factors (low precipitation level and prolonged droughts);
- Increase in demand for water due to population growth and economic development — 60% more water required by 2020;
- Saline invasion into existing water resources

### State of progress

**What is the current development status of the solution (if relevant, please describe the steps already taken and ongoing/planned activities leading to the full development and preliminary testing of the solution)?**

**Note: Open text entry field — word limit: 100 words**

The Hadera seawater reverse osmosis was commissioned in 2009 and has been operating at its full production capacity since early 2010.

### STRATEGIC FIT & ADDED VALUE

**Problem to solve**

**Key question your solution aims to answer (i.e. if your Solution is the answer, then what is the question) and how does that fit with the target?**

**How does the solution contribute to the target’s effective implementation and attainment?**

**word limit: 100 words**

The 127M m3/year Hadera plant takes the success of its predecessor, the Ashkelon plant, one step further in demonstrating the maturity of seawater reverse osmosis technology and its ability to provide high quality desalinated water at one of the lowest ever costs. The combined use of advanced state-of-the-art technologies and a variable production regime allows the plant to consistently supply high quality potable water to the national water system.

**Added-value and cost effectiveness**

**What are the solution’s key outputs and what impacts did the solution have given the investment level (not only financial)?**

**Can the solution continue to deliver tangible impacts on the long term?**

**word limit: 100 words**

The specific energy consumption of the Hadera plant has remained consistently below the planned 3.7 KWh/m3, achieving outstanding performance with regard to energy efficiency.

The use of advanced reverse osmosis (RO) technology, variable operating regimes and contractual structure with proper risk allocation has achieved one of the lowest water prices for an operation of this scale.

**Monitoring**

**In the process of effectively implementing this solution, what are some of the key qualitative and quantitative indicators of success over time (i.e. what would you expect to see change, where and when)?**

**word limit: 100 words**

IDE Technologies is firmly committed to the environment and to maintaining a high quality level for both the drinking water produced and the wastewater discharged. The cutting-edge Scada supervisory control and data acquisition system optimizes the reliability and continuity of the information obtained in order to ensure the plant’s consistently high quality.
WIDER APPLICATION

Replication and up scaling potential
Given your experience, who would / should be most interested in this Solution and why? How will it help them?*
In what context do you think this solution could / would work best and why?*
Given your experience, what would be needed to upscale this solution, for example to a political or/and a regional level ?*
word limit: 300 words

The Hadera plant built on the success of the Ashkelon plant, adopting the three center design. Every element of the plant was customized to maximize performance and minimize costs in the local environment.
The project was financed by a prestigious consortium of international banks (EIB, Credit Agricole and BES) marking the first-ever large scale infrastructure project in Israel to receive such support. Awarded the Euromoney 2007 prize for major international finance.

Key lessons learnt
What tips and guidance (dos and don’ts) would you give to others interested in applying this solution in their own context?*
What is the minimum investment necessary (in terms of human resources, time, energy, infrastructure, financial resources, political will, etc.) in order to effectively implement this solution?*
What are the main factors of success that you wish to emphasize?*
word limit: 400 words

A comprehensive mathematical model has to be built to address the issue of operation of few pumps with several RO trains at different conditions of temperature, age, salinity and fouling. The model has to allow the prediction of the interaction of the high pressure pumps and booster pumps with different numbers of RO trains, as a few trains may be taken out for cleaning.
The main investment is in human resources, mathematicians, chemists and hydraulic professionals.

The main factor for success is a comprehensive understanding of the hydraulic, chemical and mechanical processes involved in the RO desalination processes
Future actions will focus on analyzing actual operation results, polishing mathematical characteristics and developing more accurate modeling instruments.

Existing commitments
Have some organisations/institutions/committees already committed to implement or replicate this solution?*
word limit: 100 words

CONTACT

Key contact institution
Where can people go for more information, help or advice on this solution?*
Details of the contact person* (e.g. name, address, e-mail or phone number)
word limit: 100 words

Ms. Debbie Werbeloff, Documentation and IP Manager
IDE Technologies Ltd.
P.O. Box 5016, Kadima 60920, Israel
Tel.: +972-9-8929774; Mobile: +972-52-6594447; email: debbiew@ide-tech.com
ADDITIONAL INFORMATION

Supporting material

*Website, Video, podcast, report, PowerPoint presentation, photo album, creative support, etc: please do not hesitate to send us as attachment to this template any supporting material to be circulated about your solution!*