# Sustainable Desalination

*The World's 1st Solar Powered Zero Carbon Footprint Water Plant*

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**Sep 2017**

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1. Changing the Game





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# Changing the Game

## Al Khafji Project

### ….the *game-changer* of the water industry

| | |
|---|---|
| **1. Savings and Protection** | Saves on oil fuel resources and protects the environment by $CO_2$ emission reduction |
| **2. Synergy** | Surplus power during daylight hours is send to the grid. In the evening hours, an equal amount of energy is pulled from the grid |
| **3. Initiative** | The world's 1st full-scale, zero carbon footprint, solar powered water treatment installation, designed to produce 60,000 $m^3$/ day of drinking water |
| **4. Projects** | Under the King Abdullah initiative for Renewable Energy Desalination, Al Khafji is intended to be the first of a series of such projects in the Kingdom to transform the water sector |

## 2. Sustainability Features





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# Sustainability Features

1. RO/PV Pilot plants for Process Enhancement
2. Compact plant design that reduces environmental impact
3. Optimized power consumption that minimizes power demand
4. High-Pressure Pumps (HHP) equipped with Variable Frequency Drives (VFD)
5. Variable frequency drives installed for main pumps avoiding peak current and voltage drops



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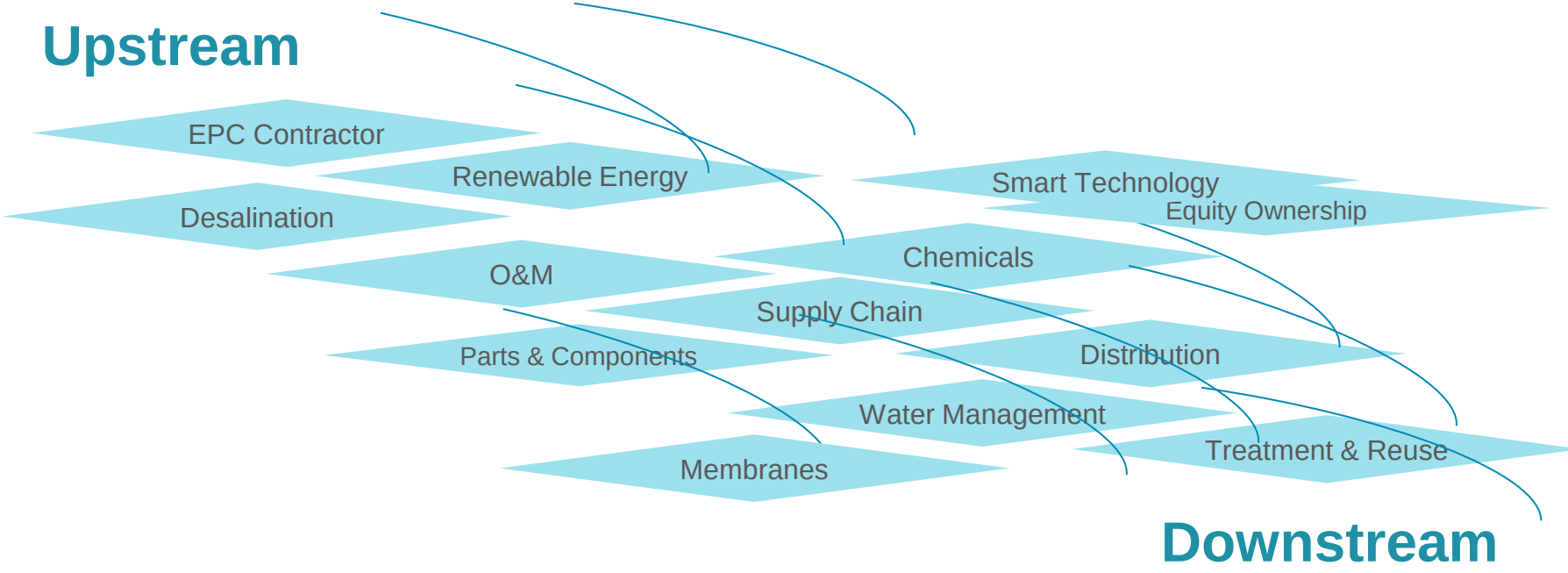
# Company Profile

AWT has a broad mandate to explore bankable opportunities along the water value chain



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## Line of business

- Design and Construction of  Water Projects

  (desalination, treatment & reuse)

- Developer of Projects
- O&M of Water Plants
- Other Lines of Business
  - E.g. technology & equipment provider

# Company Profile

At the heart of AWT lies the key to success. The ingredients include:

- World-class management team
- Strong engineering & project management capabilities
- Global industry-leading partners
- Stakeholder support and the ability to work with other stakeholders
- Core drivers of innovation and sustainability
- Financial backing

## AWT's Unique Features:

1. Innovation along the entire water value chain
2. Sustainability in solutions and practices
3. Superior Performance in engineering and project execution

## 3. Project Milestones

1 Changing the Game

2 Sustainability Features

3 **Al Khafji Project**

4 Process Overview

5 Video



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# Khafji Project (Key Technical Items)

## Plant General Information

- Assured Electrical Efficiency of the plant: < 4.2 Kwh/$m^3$
- Plant intake - 3 offshore towers and intake pipes which extend 2.1 km into the sea
- Seawater outfall - 2 pipes with diffusers at 3 km offshore

- Minimum Chemical Consumption
- High Quality Materials
- 40 % to 44 % Recovery

## Plant Technical Data

**Pre-Treatment**

- Three inlet towers and pipelines with total intake capacity of 90,000 $m^3$/day
- 3 intake pumps
- 12 +1 Dual Media Filters followed by 3 Self Cleaning Filters.
- 12-train Ultrafiltration System

**RO Treatment**

- Consists of first and second pass systems
- 6 RO trains installed initially
- Additional 3 RO tranis for 90 MLD for expansion
- Each train with 144 pressure vessels in the 1st pass and 48 vessels in 2nd pass

**Post Treatment**

- Product water collected in 2,600 $m^3$ concrete wet well
- 3 Pumps convey product water to SWCC storage tank
- Chemical feed systems installed for capacity of 60,000 $m^3$/day

- Minimum Capex expected for capacity ramp-up of up to 90,000 $m^3$/day
- Possibility of capacity ramp-up in phases depending on Off-take demand from SWCC



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# Khafji Project (Key Technical Items)

Pumps Manufacturing

FLOWSERVE


Control System Cabinets

SIEMENS

UF Units assembly

PENTAIR


SWI

SAS


RO

SAS

Intake Pipes Installation

mediterráneo Servicios Marinos

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# Project Milestones


**Milestone 1** — **May 16 – Jan 17** (Arrival of long lead items: Main pumps, Screening System)

**Milestone 2** — **Jun 16 – Dec 16** (Completion of main civil works)

**Milestone 3** — **May 16 – April 17** (Completion of marine works)

**Milestone 4** — November , 2017 (Start of Commissioning)



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# 4. Process Overview





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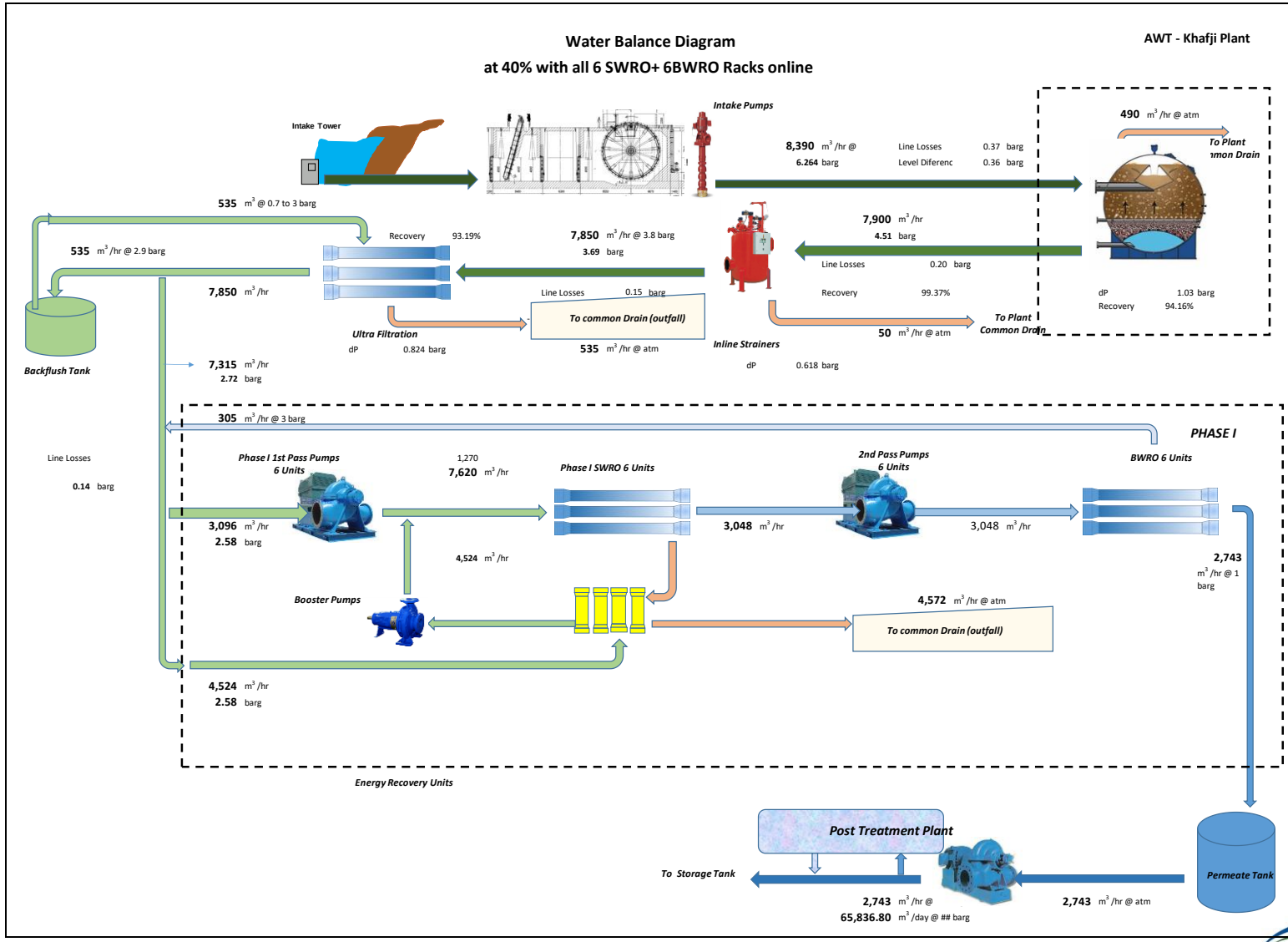
# Process Overview



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# Process Overview

Plant Operating scheme when all trains are in operations

- Total number of SWRO Trains @ 40% SWRO Recovery : 6
- Total number of BWRO Trains @ 40% SWRO Recovery : 6
- RO total gross water capacity @ 40% SWRO Recovery : 65,836 $m^3$/day

Plant Operating scheme during CIP or Maintenance of 1 train

- Total number of SWRO Trains @ 44% SWRO Recovery : 5
- Total number of BWRO Trains @ 44% SWRO Recovery : 5
- RO total gross water capacity @ 44% SWRO Recovery : 60,350 $m^3$/day

# Process Overview

Electrical System and Control System Scheme

- Two 30 MVA (34.5/4.16 KV) transformers are connected to 4.16KV switchgear
- 4.16KV switchgear (4.16KV, 2500A, 25KA / 3Sec) is feeding the MV drives of the Plant
- Siemens PCS 7 will be the control system for the project

## 5. Video





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# Al Khafji SWRO



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**For more Information**

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