€TRAINING

# Water Desalination Plant Technology, Processes & Management

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## Introduction:

The course introduces key issues related to promoting sustainable desalination operations in today's desalination industry. The course analyzes developments in the desalination industry using the three elements of sustainability: cost, society, and the environment. This course aims to help the students approach the desalination industry with sustainability in mind. As the desalination industry booms and new desalination-related systems, designs, processes, and products are introduced every year, these new developments could best be judged by their sustainability. In this context, the course covers topics such as environmental impacts of desalination processes, understanding water production via desalination within the water-energy-cost nexus, designing safe and sustainable intake and outfall systems for desalination plants, assessing the economic feasibility of new desalination processes, evaluation of renewable?energy?powered desalination processes, evaluation and applications of novel desalination systems, such as membrane distillation and forward osmosis, recent technological improvements for enhanced desalination processes, and fouling issues in RO membranes. To better convey the course concepts, case studies will be presented.

## Course Objectives:

At the end of this course, the participants will be able to:

- Apply and gain an in-depth knowledge on the operation, heat balance, performance, optimization, start-up and troubleshooting of MSF and RO water desalination plants
- Develop a good understanding of thermal and flash desalination, single and multiple effects of evaporation, fouling, scaling and the recent trends desalination
- Describe the RO membrane desalination processes and the basic principles of MF and UF, including the fouling and cleaning of these systems
- Develop a good understanding of the basic principles and design of reverse osmosis technology RO
- Discuss fouling, pre and post-treatment for RO and NF systems?Employ the method of disposal in brackish and SWRO and compare membrane and distillation

## Targeted Audience:

This course is aimed at engineers, scientists, and technologists involved in the planning, management, and operation of water desalination systems and also for manufacturers, consultants, designers, researchers, and water personnel. This course is also suitable for water laboratory staff including lab managers, chemists, scientists, analysts, technologists, and other labs technical staff.

## Course Outlines:

### Unit 1:

- The global water crisis
- The desalination market
- Desalination and sustainability

### Unit 2:

- Fouling in RO plants
- Safe and sustainable intake and outfall systems
- Environmental impacts of desalination processes

## Unit 3:

- Renewable-energy powered desalination
- Novel desalination technologies: membrane distillation

## Unit 4:

- Assessing the economic feasibility of new desalination processes
- Recent advances in desalination

## Unit 5:

- The Singapore experience: NEWater
- TBD: The Boron issue in desalination