



# Abu Dhabi Polytechnic

## Students' Graduation Project Abstract

<b>Department:</b>	EMET	<b>Semester:</b>	Spring-2022
<b>Project Title:</b>	Parabolic Through Concentrator (PTC) Application in the Mineral Mining of the Brine Concentrate		
<b>Supervisor:</b>	Dr. Amar Sahed		

### Abstract:

The purpose of this graduation project is to design a standalone (modular) solar water desalination system for use in desert areas where drinkable water is scarce. The system shall produce a few liters of drinkable water per hour to sustain the need of a small rural family.

The system design will be based on a parabolic trough concentrator technology in which sunlight energy is focused on a tube concentric to a glass tube along the focal line of the parabola. The fluid in the tube is heated to high temperatures by the energy of the sunlight which will cause the evaporation (thus phase-change) of pure water to have a high temperature vapor. This super-heated steam will be taken into a coiled heat exchanger in order to evaporate brackish water (thus desalination) of water as well as its decontamination. Then, vapor will pass through a condenser and a tank leaving the dirt and salt in the cleanable heat exchanger.

In our design we will consider the use of cost effective materials as well as a small PV system to sustain the needed pumping power.

In parabolic trough collector, mirrors focus the rays of the sun into an absorber pipe called heat collection element (HCE). The pipe is seated above the mirror in the center along the focal line and has a heat-absorbent medium (mineral oil, synthetic oil, molten salt etc.) running in it. The cold heat transfer fluid comes in, picks up the heat collected by the trough and exits at a high temperature. The heat energy is carried out to the water in a boiler heat exchanger producing steam that drives a turbine.

Other supporting structures include pylons, drive, and controllers. Pylons are the foundations that hoist the mirrors; drive enables the collector to track the sun. The local controller for each solar collector assemblies, connected to a central computer, keeps track of the drive and also watches out for any abnormal conditions.