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Fuel allocation in water and power cogeneration desalination plant

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ABSTRACT

Most large thermal desalination plants are combined with power generation, using energy that would otherwise be rejected by the environment. Energy is usually one of the largest operating costs and can vary appreciably with fuel value, plant configuration, and operating mode. In independent or privatized power and desalination plants, the Power and Water Purchase Agreement (PWPA) contains a method for allocating energy and other operating and capital costs between power and water. The method used is a key factor in the project payment structure. In this study, three methods were applied to calculate the fuel allocation: power to distillate ratio (PDR), heat value for potable water and exergy method. The most appropriate method was selected based on several general criteria that closely matched the operating conditions of the cogeneration plants. The recommended method has been applied in one of the Saline Water Conversion Corporation (SWCC) water and power cogeneration desalination plants to better identify the fuel distribution between water and power production. The design operating conditions were used to identify the appropriate methodology for the power-to-distillate ratio (PDR), heat value for potable water, and exergy. The accuracy of each methodology was determined and compared by applying it to a standardized plant and then implementing the appropriate methodology in one of the water and power cogeneration desalination plants.

Keywords: Thermal desalination; MSF; Water and power cogeneration; Fuel allocation; Power to distillate ratio