

Abstract

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PUMPING SCHEDULING OPTIMIZATION TO MINIMIZE POWER CONSUMPTION DURING ELECTRICITY PEAK HOURS

The need for reducing power consumption during electricity peak hours is increasing considerably due to the electricity generating challenges in Egypt. This research proposes a methodology of pump schedule optimization which is a cost free efficient method to reduce the waste of energy from inefficient pumping during these hours. The methodology is based on integration of (1) Optimal Pump Scheduling (OPS) model (2) Genetic Algorithms optimization Engine (GAeng) (3) Hydraulic Evaluation Model (HEM). The optimization process aims at minimizing energy consumption used by Water Distribution Networks' (WDN) pumps during electricity peak hours. Optimal schedules were generated by using Evolver v.5.5 GA solver and hydraulic simulator EPANET2. The model allows users to include, in the optimization, up to three electricity peak periods. The proposed methodology is tested on large-scale WDN of the 1st gathering of New Cairo City, Egypt. Solving of several scenarios considering different optimization periods and pump switches demonstrated the ability of the approach to reach up to 10.36% saving in energy compared to the pump schedule used by WDN operator.