



## Implementation of hydraulic modelling for site selection of pump as turbines for pressure reduction and power production in water distribution networks

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### ABSTRACT

Inefficient management of water distribution networks (WDNs) causes a serious problem of water losses in many countries. Excess water pressure is one of the main factors that increases leakage in WDNs. Pressure management is an efficient and economically feasible method to reduce physical water losses in WDNs, and is generally achieved by installing pressure reducing valves (PRVs). Recently, pump as turbine (PAT) has become a viable option to replace PRVs. In this study, water losses reduction, power production potential, CO<sub>2</sub> emissions reduction and payback period were investigated for Konyaalti WDN, which is composed of 18 district metered areas (DMAs), with implementation of PAT. Population, water demands and flow rates were forecasted for the years 2020, 2025 and 2035. A hydraulic modelling study was conducted to determine the optimum pressure levels to be maintained at the entrance of each DMA. Temporal and spatial variations of water pressure and excess water pressure levels were obtained for minimum and maximum water consumption periods. The investigation revealed that DMA-6 was the best site for implementation of PAT with a payback period of 0.85 year. Long-term analysis of hydraulic parameters (water demand, flow rate, excess water pressure) and evaluation of environmental benefits and payback period are necessary for optimal site selection of PAT.

*Keywords:* Pump as turbine; Energy recovery; Hydraulic modelling; Water distribution network; Water losses

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