

## **DEVELOPMENT OF AN INTEGRATED ENERGY MANAGEMENT SYSTEM FOR WATER SUPPLY AND SANITATION AUTHORITIES - WSSA: A Case of Upper Ruvu Water Treatment Plant DAWASA.**

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Water supply systems are large structures that treat and distribute water over vast geographic locations. The water is abstracted from different sources like rivers (case of this study Ruvu River), lakes, dams, underground aquifers and in certain area where portable water is not available other methods to treat sea water are used. The processes involved in water supply systems are highly energy intensive as high pressure is required to pump water vast geographic locations. The high energy costs not only cause financial stress to the organization but the utility may lack the funds to expand the network, contributes to greenhouse gases main cause of global warming. The costs spent on energy in the utilities account for more than 40% of the maintenance and operational budgets.

This study was aimed at developing an Integrated Energy Management System for WSSA to be used for the management of energy with end result that if well implemented the utility will reduce electricity costs, reduce contribution to GHG and enhance sustainability.

This study was conducted through field visits where data was collected using questionnaires, observations, one on one interviews, documents review (utility and production bills) and phone calls. The data was subjected to various analyses and SPSS software was finally used to interpret the data. The data analysis phase enabled this study to develop a mathematical model the model was validated and an integrated energy management system was developed.

This study found that some of the energy costs being incurred by the utility have solutions however the decision making process to implement actions is quite cumbersome which creates uncalled for delays thus increasing electricity bill. It was further noted that energy matters have only become a point of discussion after the energy intensity of the plant exceeded one with higher daily production volume.

It's worth to note that the water demands will keep increasing due population growth in the service area hence more energy will be required the utility should apply this system for the management of all other energy sources and in administrative offices and the organization should budget and integrate renewable energy sources. The plant runs around the clock there is no time that the plant pressure is reduced to be in line with the demand curve the organization should opt to integrate IT into demand response switching and monitor the system through SCADA.

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