

Optimization of Wastewater Lift Stations for Reduction of Energy Usage and Greenhouse Gas Emissions

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ABSTRACT

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) demonstrates a clear relationship between increasing greenhouse gas (GHG) concentrations and higher global temperatures (IPCC, 2007). One key component of sustainable water and wastewater infrastructure is the mitigation of indirect GHG emissions resulting from off-site energy providers. One of the major sources of GHG emissions from wastewater utilities is energy use caused by lift stations operation, especially in flat topographic regions where hundreds of such pump stations are required.

This project includes a new control system featuring new generation SCADA configurations allowing data communication directly from the lift station to the wastewater central control room eliminating aging radio, telephone and hardwired copper networks utilizing data concentrators located miles away from the central control room.

The research team conceptualized a revised operational control method for the lift station system utilizing hydraulic modeling results generated from specific site conditions. This method of operation will reduce operating pressures, reduce the energy demands of the pumping units and stabilize the influent flow entering a wastewater treatment facility.

The final product of this study is a guidebook for utilities that details how wastewater lift stations can be optimized using advanced hydraulic modeling and new generation SCADA systems.

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About the Authors:



David Wilcoxson is a Principal I & C (Instrumentation & Controls) Engineer with MWH in Walnut Creek, California. Mr. Wilcoxson has over 30 years of experience in various instrumentation and control environments. He has worked in the pharmaceutical, chemical, biotech and water and wastewater industries, working with all types of pneumatic and electrical instrumentation as well as computer controls. He has extensive experience with both DCS and PLC based systems, including specification, installation, troubleshooting, programming and start-up of computer based SCADA systems for all types of water related facilities including a high purity water treatment plant, and many potable and reclaimed water and wastewater pumping, treatment and aquaculture facilities.



Travis Crane is the Water Wastewater Reliability Specialist for JEA, Jacksonville Florida's municipality. Mr. Crane has spent the last 6 years as JEA's sewer hydraulic modeler. He is responsible for modeling of the over 3,000 miles of sewer piping as well as over 2,400 pump stations throughout the JEA territory. He holds a BS degree in Mechanical Engineering from the University of Florida.