ENERGY EFFICIENCY ASSESSMENTS OF WASTEWATER TREATMENT PLANTS IN FLORIDA

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Wastewater treatment plants (WWTPs) play a fundamental role in our society. Water recycling helps the environment and contributes to reducing waterborne diseases. Processes performed in WWTPs vary, but typically include headworks, grit removal, mixing, clarifying, nutrients removal, filtering, disinfection, discharging to local water bodies or open fields, and handling and proper disposal of solid objects. In some plants biogas is generated. Although wastewater treatment is a mature technology, there is significant potential for improvements from an economic and energy efficiency perspectives.

In this presentation, energy consumption, waste management, and productivity data from 15 WWTPs in Florida are presented. The plants range in their processing capacity from 5.5-55 million gallons/day (MGDs) of wastewater treated. For all plants, an energy use baseline has been established to benchmark against expected best practices. Several assessment recommendations (ARs) have been identified. These ARs were all evaluated technically and also to ensure a speedy payback on proposed improvements. Areas of potential improvements included motors, pumps, aerators, blowers, lighting, compressed air systems, occupancy sensors, disinfection systems, boilers, combined heat and power systems, biogas utilization and processing, insulation, heat recovery, photovoltaic systems, power generators, nutrients recovery, and energy management systems. It was observed that the electric energy rate structure has a significant impact on the operational costs of WWTPs. It was also observed that some equipment run a fraction of the annual hours of operation. Plants that further treat their sludge when biogas is being generated onsite can produce biofertilizers of high grade and can sell it for profit. The overall cost savings for all 15 WWTPs studied was as high as $15 million, with an associated reduction in energy consumption of 18% per plant. Adoption of Internet of Things (IoT) linked to a SCADA system can provide promising opportunities for overall process optimization.

PRESENTER BIO: Dr. Cardenas-Lailhacar is an associate research scientist in the Department of Mechanical and Aerospace Engineering at the University of Florida. He has more than 20 years of experience in energy management. He has led over 300 energy audits to manufacturing facilities in the US and Latin America.